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Introducing: Debbie Jaarsma

'When I was younger, I dreamt of becoming a veterinarian in the countryside. I loved the idea of being outdoors in my wellies. The prospect of sitting in an office all day seemed awful.'
But life is full of unexpected twists and turns. Since August 2021, Debbie Jaarsma is the Dean of the Faculty of Veterinary Medicine at Utrecht University. Although she didn't always aspire to be an administrator, we're grateful she has the courage to change course. 'I've never been afraid to take the road less travelled.'

Debbie Jaarsma studied Veterinary Medicine in Ghent and later in Utrecht. After graduating, she had the opportunity to specialise as a pathologist, but preferred being among students to peering through a microscope. She decided to drop out and became an animal health lecturer at a University of Applied Sciences. 'My parents were disappointed that I didn't become a specialist or a practising veterinarian. But I'm not motivated by status, I just do what feels right and what I enjoy.'

After a stint in the pharmaceutical industry, Jaarsma returned to Utrecht and obtained a doctorate for her research on curricular changes in veterinary education. From 2011 onwards, she held professorial positions in Amsterdam and at the University of Groningen, where she founded the LEARN research group: Lifelong Learning Education and Assessment Research Network. The group's mission: laying the groundwork for educational and curricular innovations in order to improve patient care.

Coming home

After ten years as a professor, it was time for a new challenge. 'I didn't necessarily have ambitions to become an administrator. I just wanted to be one here, at the faculty in Utrecht. This place is part of my identity, it's where I became who I am today. I hold the faculty dear and I want it to remain a shining presence in the academic world and broader society.'

'The strategic plans for the faculty and Utrecht University as a whole really appeal to me. There's a lot of emphasis on recognition and reward and encouraging an open attitude, which is right up my alley. Academics like to work on the cutting edge of new knowledge, but that's certainly not a given. You need to keep feeling that energy, it all starts from there.'

Network veterinary medicine

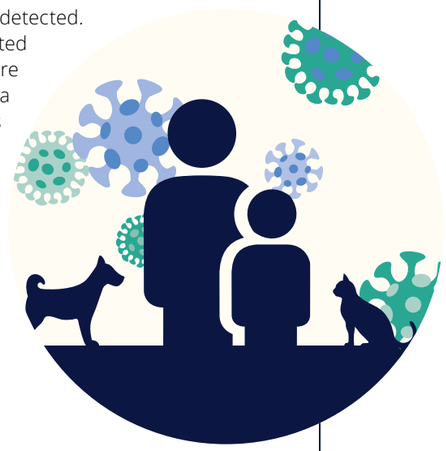
Jaarsma also feels it is important for students to develop a broad perspective on the professional field. They obviously need to learn about high-complexity care, but it doesn't stop there. Preventive, primary, secondary and tertiary care should all complement each other. Naturally, patient care, education and research – and all the other fields veterinarians end up working in – are also closely interlinked.
'Those aren't just separate pillars; they're actually communicating vessels. I think we can learn to collaborate even more effectively across the entire playing field. In human care, that philosophy is referred to as network medicine. I'm a strong supporter of the idea of network veterinary medicine.' ■

TEXT: IRIS KRUIJEN | IMAGE: BAS NIEMANS

Contents

Pets can catch COVID-19 from owners

Domestic cats and dogs can catch COVID-19 from their owners, research by Utrecht University suggests. Swabs were taken from 310 pets from 196 households where a human infection had been detected. Six cats and seven dogs tested positive, and antibodies were found in 54 pets indicating a previous infection. Most pets did not become very ill and showed no or only minor symptoms. Furthermore, positive-tested animals got rid of the virus fairly quickly and there was no indication that the virus continued to circulate among pets.



New WHO air quality guidelines

The World Health Organization (WHO) revised its guidelines for air quality in September 2021. The conclusions are clear: limit values for air pollution must be lowered considerably to prevent damage to health and mortality in humans. 'Air pollutants are harmful in much lower concentrations than we previously thought' says Gerard Hoek of Utrecht University, who was involved in the study leading to the new guidelines. 'If we want to improve both our health and the environment, we need to accelerate introduction of environmental measures that have long been on the agenda.'

3D-printed titanium leg for dog

Thanks to a unique collaboration between the Faculty of Veterinary Medicine and the 3D lab of UMC Utrecht, a dog received a 3D-printed titanium elbow at our University Animal Hospital. 'This was a very special operation which prevented amputation', says Professor surgeon Björn Meij. 'The development of patient-specific 3D-printed implants is on the rise in the veterinary world, and the University Animal Hospital is very busy developing and innovating these.'

To be or not to be: an organoid

Organoids play a big role in the future of medicine and can help develop and implement tailored therapies for each patient. The revolutionary development of organoids started in Utrecht with a group of curious scientists. But when organoid research started booming, confusion arose. What exactly is an organoid? In May 2021, Utrecht scientists published the first consensus on what is – and what is not – an organoid in *Cell Stem Cell*, describing the different types of organoids and how they should be called.

Animal-free innovations

Thanks to 50.000 Euros funding, an educational course on the transition towards animal-free innovation is currently being developed at the Faculty of Veterinary Medicine. Participants will collaborate to solve real life questions and dilemmas, and exchange insights, experiences and competencies to achieve better results together.

Assistance dog paws cleaner than shoe soles

Over 10,000 people in Europe use an assistance dog and according to law, these dogs are welcome in hospitals and other public places. In practice, many assistance dog users and their dogs are regularly refused entry based on hygiene reasons. Utrecht research now shows that assistance dogs' paws are cleaner than their user's shoe soles, and thus, paw hygiene is no reason to ban assistance dogs from hospitals.

How exposome research can help clean up the air

For one and a half years, every time Roel Vermeulen cycled to his office in Utrecht Science Park, a sensor placed underneath the bike's handlebar measured the air quality along the ride. The size of a disposable camera, this 'sniffer' bicycle sensor would capture fine particulate matter – particles that are small enough to be invisible to the naked eye, but that can cause adverse health effects, including premature death.

The Cartesius district. Design: Mecanoo, development: MRP - Ballast Nedam, visualisation: studio Prins.

Google street view car with sensor to measure air pollutants.

'When the human genome was sequenced in 2003, we thought we would be able to explain what makes people sick,' says Roel Vermeulen, an environmental epidemiologist at Utrecht University and UMC Utrecht. 'But now we know some 70 to 80 percent of our health is actually determined by environmental factors, such as the air we breathe, the food we eat, and the quality of our living environment.'

The big thing we're still missing to be able to treat, and possibly prevent, most common diseases is to know which of the thousands of chemicals and compounds we are exposed to daily are harmful, in which quantities and combinations, and whether there are moments in life when we are particularly vulnerable.

That is precisely what Roel Vermeulen and colleagues in Utrecht are determined to answer with advanced tools. In their quest, they are spurring a new science. It is called exposome and it captures the sum of all environmental exposures over a lifetime.

How do we measure the exposome?

'Exposome research requires a multidisciplinary approach in which we combine new technological developments from multiple research fields – such as sensors and spatial models – to study the influence of the entire exposome on a cell, tissue or organ,' explains Vermeulen, who leads several large-scale exposome projects. There's no universal method to measure every single compound or external stressor each of us is exposed to from the womb, says Vermeulen. 'But we already have tools from genomics, proteomics or exposomics that, when combined, can help us analyse as many exposures as possible and how our bodies react to them.'

The Sniffer Bike experiment

Thanks to over 500 residents who participated in the Sniffer Bike project, which started as an experiment by the Province of Utrecht, researchers gathered more than 20 gigabytes of data about air quality. The measurements show that it really matters whether you cycle along a busy or a quiet road, with far higher concentrations of particulate matter in the inner cities of Utrecht and Amersfoort than on bicycle paths through the countryside. 'This is a big step in measuring individual exposure to air pollution,' says Vermeulen.

This information is of great value for cyclists, residents and governments alike, he adds. 'People can choose to take a greener cycle route where air quality is better, and governments can easily identify where measures are needed to improve air quality in our cities. And that's important, because air pollution is a silent killer.'

As deadly as smoking

Air pollution is now responsible for as many deaths as smoking. An estimated four to nine million people worldwide die prematurely every year as a result of pollution from particulate matter, including ultrafine dust and nano-size particles (with a diameter of less than 0.1 micron) from car exhausts. The problem is these numbers are not included in official statistics, as the EU has not yet set formal limit values for them, even if these particles can penetrate deep into the lungs and bloodstream, increasing the risk of respiratory and cardiovascular disease. Last September, the World Health Organisation had just issued new global air quality guidelines that provide evidence of the health risks of air pollution at even lower concentrations. However, air quality measurements in a city are done through stationary air monitoring stations, whereas air quality – and thus the degree of air pollution – can vary from street to street and from day to day. In many cases, the measurements only include substances that are legally required to be monitored. That obviously distorts the results.

Air quality maps

Vermeulen wanted to find a reliable way of measuring air pollutants in cities around the world. 'We entered into a unique project with Google where we fitted some of their street view cars with sensors that could measure the amount of nitrogen oxides, particulate matter, soot and ultrafine dust in the air.' The team started in Oakland and subsequently expanded its runs to Copenhagen and Amsterdam. 'Our collaboration with Google gave us daily access to dozens of hours of air quality data. The result: a "map" at street level that tells us which routes to work will help us avoid the worst of the traffic fumes.'

Over summer the City of Copenhagen unveiled its air quality map. It showed that Copenhagen's major access roads have on average nearly three times more ultrafine particles and nitrogen dioxide (NO2) and five times higher black carbon levels when compared to less trafficked residential areas.

'It is crucial to have these very detailed maps of air pollution for an entire city, especially when we talk about the harmful particles that are not regulated yet, such as ultrafine particles and soot particles', says Vermeulen. 'It is the first time that we can see where and how these ultrafine particles are concentrated, and measure them down to the street level.'

Making healthy cities for people

This data can help urban planners identify and target areas with poor air quality. The City of Copenhagen, together with architects and designers, is now using the maps to design healthier and more liveable neighbourhoods. That includes creating spaces, like schools and playgrounds, away from high-pollution zones to provide young children with access to cleaner air. The city also plans to use the air quality data to encourage more sustainable transportation and create healthier bicycle and walking routes away from car traffic.

Utrecht University, the National Institute for Public Health and the Environment (RIVM) and the Economic Board Utrecht have established the Data and Knowledge Hub Healthy

Urban Living in an effort to improve the usability of measurement data and disseminate the resulting knowledge more effectively. Since its launch in May 2020, the Hub has launched eight projects in collaboration with their partners. One of these is the new urban district of Cartesius in Utrecht, a car-free neighbourhood whose aim is that residents live healthier for five more years.

The ultimate goal, Vermeulen says, is to use Cartesius as a 'living lab' to understand what exactly constitutes a healthy living environment and garner the necessary evidence and support to create one. ■

TEXT: MARTJE EBBERINK AND MARTA JIMÉNEZ | IMAGE: STUDIO PRINS

Interested in learning more about exposome research? Then have a look at our Massive Open Online Course (MOOC): a free online course on the exposome, made by Roel Vermeulen and colleagues, available for anyone to enroll: www.coursera.org/learn/exposome

The Cartesius district. Design: Mecanoo, development: MRP - Ballast Nedam, visualisation: studio Prins.

New Bachelor's programme focuses on the health challenges of the future

By 2022, students will be able to opt for a new, interdisciplinary degree programme at Utrecht University: 'Care, Health and Society' (Zorg, Gezondheid en Samenleving). The COVID pandemic has further highlighted the urgent need for healthcare professionals with an interdisciplinary and innovative perspective on health issues. The new programme was established in response to this public demand for broadly trained human and veterinary healthcare professionals.

The programme leverages the potential of Utrecht University's intensive collaborations in the field of Life Sciences, as well as its knowledge alliance with universities in Wageningen and Eindhoven, and is unique in its kind.
Students will be trained in a diverse environment, ensuring that they are better prepared for both the complexity of modern medical issues and their own role as professionals. Utrecht University's faculties of Veterinary Medicine, Medicine and Sciences (Pharmaceutical Sciences) are working together to establish this interdisciplinary programme.
Programme director Wim Kremer stresses the importance of the underlying vision. 'The initiative will allow us to reshape our academic education in the health domain,' he explains. 'We aim to attract a diverse group of students. As compared to other Bachelor's, the programme will offer them more opportunities to explore the complex health issues of today from a scientific and professional perspective. In the process, they will also gain in-depth knowledge of and insight into themselves and broader society. This will help them to develop an open mind while enabling them to make informed judgements and decisions in a world where opinions and truths are constantly being challenged.'

A cross-disciplinary perspective

The new Bachelor's programme will encourage students to look beyond the boundaries of their own field, helping them to appreciate the added value of other disciplines and perspectives on human and animal health care. They will learn to speak each other's language from the very start of the programme. They will also develop a helicopter view of current social and technological developments and the resulting impact on people and animals in their respective environments.
Sophie Deleu, veterinarian and chair of the Royal Dutch Society of Veterinary Medicine (KNMvD) previously worked at the National Institute for Public Health and the Environment (RIVM) and sees great added value in the new programme. 'Knowledge institutes like the RIVM urgently need people with a broad perspective on health issues as well as in-depth knowledge of specific subjects. We need broad biomedical knowledge in many different areas including healthy lifestyles, disease prevention and healthy living environments. Complex risk assessments also require a joint effort by multiple disciplines. There's a lot to be gained by examining problems from different angles and perspectives. For example, knowledge of behavioural change proved crucial in developing the scenarios on the impact of various COVID measures.'

Comparing systems

Besides health and illness, the new Bachelor's degree programme will also emphasise knowledge of the body's basic systems. This extends to both humans and animals: for example, how does the human circulatory and respiratory system work and how do the same systems work in a cow? What's the difference between the human and animal immune response to asthma? Students will learn to recognise the similarities and differences between different diseases as well as those between humans and animals. They will become familiar with conceptual and comparative thinking and learn details about all the various species.

A diverse, small-scale programme

The new Bachelor's programme is set to start on 1 September 2022 and will admit a total of 50 students; this small scale was a deliberate choice. Students, lecturers and staff will form a close-knit group. There will be ample opportunities for broad academic and personal development, with plenty of room for extracurricular activities.
Education will be provided by lecturers from various Utrecht University faculties including medicine, veterinary medicine, pharmacy, social sciences and law as well as other universities such as Eindhoven University of Technology and Wageningen University & Research. Students will also have the opportunity to connect through social and academic activities such as debates, excursions, lectures or music and sports events.

A broad perspective on health

Tambinh Bui holds a Bachelor's in Pharmaceutical Sciences. She is currently taking a Master's in Medicine and is involved in developing the new programme. She enthuses: 'I think graduates of the new Bachelor's programme will have a lot to offer society. With a broad perspective on health, they will be ideally equipped to help solve today's complex healthcare issues no matter what direction they ultimately take. I would have loved to do this Bachelor's myself.
Sophie Deleu adds: 'The programme offers so much added value; a broad knowledge of other fields is always useful, even if you decide to do a Master's in a clinical field after finishing your Bachelor's in Care, Health and Society. That's also very much in the spirit of One Health.' ■

TEXT: JUUL COUPERUS | IMAGE: BAS NIEMANS

The new 'Care, Health and Society' programme is a collaboration between the faculties of Veterinary Medicine, Medicine and Sciences (Pharmaceutical Sciences) at Utrecht University. Students who complete the Bachelor's programme can then transfer to various Master's programmes, such as Medicine (Selective Utrecht Medical Master), Veterinary Medicine, Pharmaceutical Sciences or other programmes within the broad field of human and veterinary healthcare. The Faculty of Veterinary Medicine is responsible for coordinating the new Bachelor's programme.

Test facility for research into the welfare of chickens.

Data as the stethoscope of the future

How often does a cow eat, and for how long? Which chickens in a coop display problematic behaviour such as feather pecking, and why? Sensors and cameras allow the behaviour of animals to be monitored ever more effectively. This produces an impressive amount of data and important insights into the influence of housing, animal management and genetic factors on animal welfare. However, it also introduces new challenges. Do you really know what you are measuring? Who does the data belong to? And will the vet of the future have to be a data expert?

Sensors are not a new phenomenon in livestock farming. In dairy farming in particular, sensors are used to measure milk production, fertility, feeding behaviour and lying behaviour. 'The behaviour of animals says a lot about their well-being. With new camera systems and smart data integration, we can monitor and explain this more effectively,' says Bas Rodenburg, Professor of Animal Welfare at Utrecht University and Professor by Special Appointment at Wageningen University. 'In practice, the use of sensors in the poultry and pig farming sectors is still in its infancy. Fitting sensors to the necks or legs of chickens and pigs is difficult: large numbers of relatively small animals are involved, so it's not practically or commercially viable. With cameras, you can automatically monitor the behaviour of individual animals, as if you were observing them yourself 24 hours a day.'

Data sharing

There is room for improvement in dairy farming too, says researcher Miel Hostens, who works with data and sensors for cattle at the Faculty of Veterinary Medicine. 'Digitisation holds a great deal of promise, but it has yet to be fulfilled in practice. Data reliability of is open to question, for example.' Hostens is working on solutions, such as the development of ISO certification for sensors.

Sensor manufacturers are often reluctant to release their algorithms. Hostens: 'Clearly, there are major commercial interests at stake – but if we really want to help the sector move forward, we must find a way of sharing and analysing information. I'm confident that we'll be able to do that.' Hostens is supported by Richard ten Cate, director of FarmResult, a company that supplies a platform on which several flows of sensor data at a farm are combined in a dashboard. 'There's only one owner of the data and that's the farmer. If they see the benefits of sharing data, they will do so.' Ten Cate is enthusiastic about the promising new camera systems and is therefore a partner in the research. 'We'd love to include behavioural data in our dashboard, as a key predictor of well-being and health.'

Under the umbrella of the research project IMAGEN, Rodenburg and colleagues are looking for technical solutions to combine large data sets and algorithms, together with data experts from Eindhoven University of Technology and breeding and behaviour experts from Wageningen University & Research. Hostens: 'There's a wealth of untapped data. This will allow us to conduct far more research without the need for new laboratory animals.'

'There's a wealth of untapped data'

The data vet

With the advent of sensors, the farm vet will increasingly become a welfare adviser. Hostens and Rodenburg see the faculty's new building plans as a good opportunity to pay more attention to data skills in the degree programme. Hostens: 'The faculty's farm De Tolakker will be a real innovation hub, where we will conduct research on data integration together with the sector, and where students will gain hands-on experience with using sensors in coops and stables.' ■

TEXT: CARIEN DUISTERWINKEL | IMAGE: BAS NIEMANS

A BILLION OBSERVATIONS

How many steps does a cow take per day, how often and how long does a cow eat and lie down? PhD candidate Peter Hut uses sensors in his research on cattle. To date, he has analysed over a billion observations to determine which factors have the most impact on well-being and health.

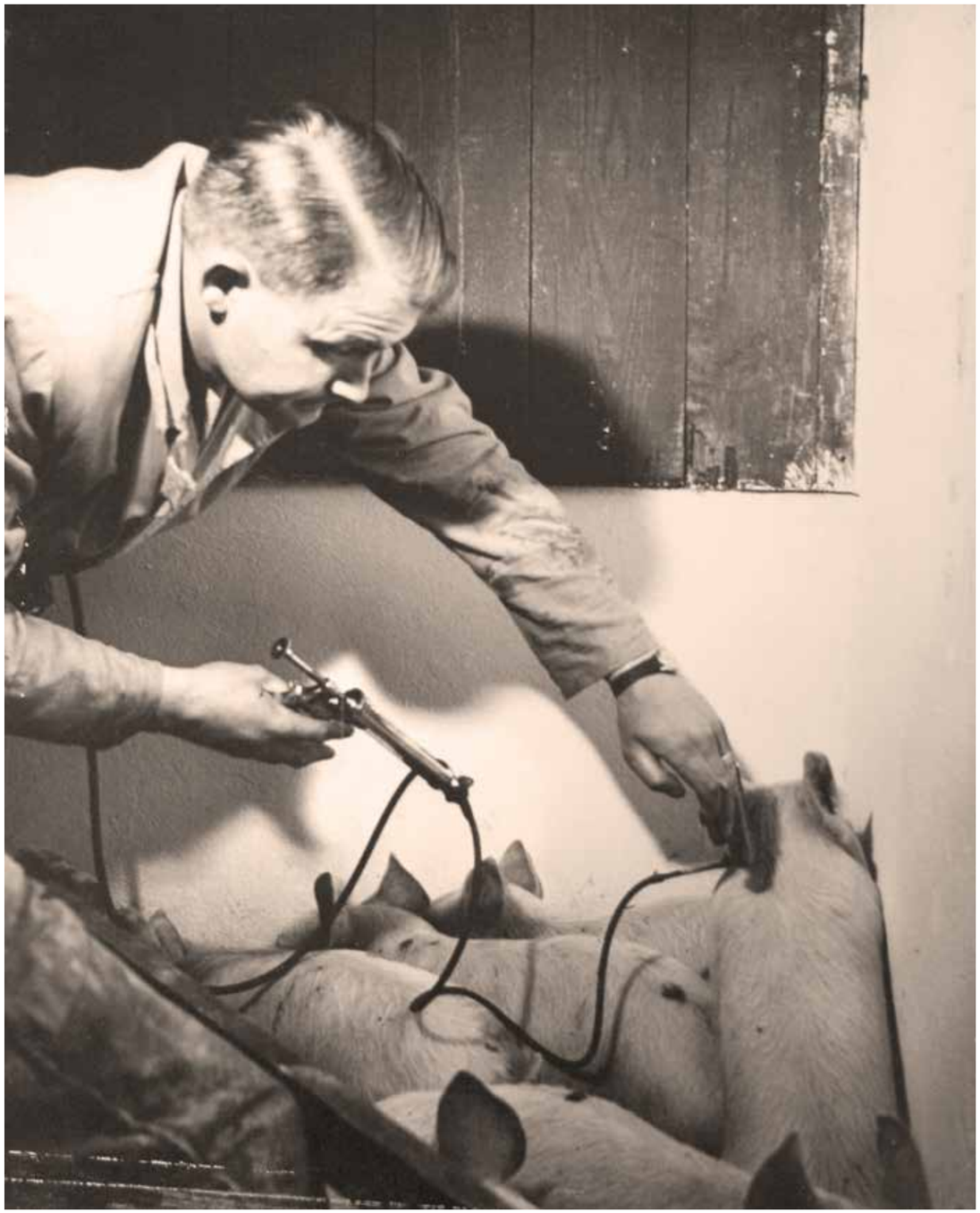
'Lameness is a common problem in cows, which are forest animals by nature. Our analysis shows that cows that are lame and have lost weight are much more likely to eat less often and for shorter time periods. So the question is: does a cow become lame and lose weight as a result? Or will a cow stand up more due to a lack of comfort in the stable, for example, which results in painful hooves and a reduced appetite? With the data from sensors, we can move from treating problems to early detection or prevention of disease.'

Photographer Cas Oorthuys points his lens at veterinary medicine in the sixties

According to the website of the Dutch photo museum, 'Cas Oorthuys is one of the twentieth century's most influential Dutch photographers. After the Second World War, Oorthuys used his camera to capture unique images of the reconstruction effort and renewed spirit of optimism and hard work'. He also explored the subject of veterinary medicine during the early nineteen-sixties. This resulted in a beautiful visual record of the veterinary profession of the day.

Cas Oorthuys devoted almost two years to the 'Veterinary Medicine Today' (Diergeneeskunde nú) photo book, published in 1962 to mark the centenary of the Royal Dutch Society for Veterinary Medicine (KNMvD). His photographs sought to capture the beauty and complexity of the veterinary profession in all its facets.

After a period of stagnation during the depression years and Second World War, the faculty experienced a period of rapid growth from around 1960 onwards. Many people started spending more time and money on hobbies. The keeping of various animals for companionship, recreation and sport became an increasingly popular pastime.



The livestock industry was also scaled up and intensified. These developments led to a growing demand for veterinarians. Veterinary practices and the faculty both experienced a sharp rise in the number of patients.

The urgent demand for veterinarians was reflected in a growing amount of education and research programmes.

TEXT: SIL HEUNKS | IMAGE: UNIVERSITY MUSEUM OF VETERINARY MEDICINE

Utrecht University | Sharing science, *shaping tomorrow*

200 years of Veterinary Medicine in Utrecht

On 10 December 2021, the Dutch educational programme to become a veterinarian celebrated its 200th anniversary. This infographic gives an impression of the rich history of the Faculty of Veterinary Medicine at Utrecht University.

1713-1865
In the 18th and 19th century, there are major outbreaks of cattle-plague or rinderpest which generate a need for more scientific knowledge. The army also requires experts on equine health.

1821
The 'Veepest Fonds' (Cattle-plague Fund) provides funding for the establishment of the Dutch State Veterinary School. 24 trainees start their studies.

1822
Physician Alexander Numan is appointed as Professor and later director of the school.

1851
Thorbecke, the Dutch Minister of Education, radically restructures the educational programme. Veterinarians are taught more practical skills.

1895
Scientific knowledge of bacteria and vaccines increases. Bacteriology and immunology become new areas of research.

1922
Veterinarians become responsible for food quality control. Chairs for food research are established.

1925
The Dutch State Veterinary School becomes the Veterinary College in 1918. In 1925, the college is made part of Utrecht University. Its name is changed to Faculty of Veterinary Medicine in 1956.

1930
The first female veterinarian graduates: Jeannette Voet.

1932
Establishment of the Veterinary Students Association D.S.K.

1940 - 1945
During the Second World War, education is put on hold. Jewish professor Jacob Roos is fired and dies in the Mauthausen concentration camp at the end of 1942.

1960
Drastic increase in the size of the veterinary profession due to intensive livestock farming and the growing number of pets.

1967 - 1988
In a time span of 20 years, all faculty departments move from the Utrecht city centre to the Uithof - now Utrecht Science Park.

1970
Critical students push for democratisation of the educational programme. The 'Wet Universitaire Bestuurshervorming' (University Administration Reform Act) is adopted.

1985
More attention is paid to the human-animal relationship and animal welfare. The first Professor of Laboratory Animal Science is appointed.

1990
Innovative imaging techniques such as ultrasound, CT and MRI are introduced and take off.

1995 - 2001
Separate Master's programmes for Farm Animal Health, Companion Animal Health and Equine Health are launched.

2007
The educational programme changes as computers and digital materials start to play a bigger role.

1967 - present
The relationship between humans and animals changes. More veterinarians are needed.

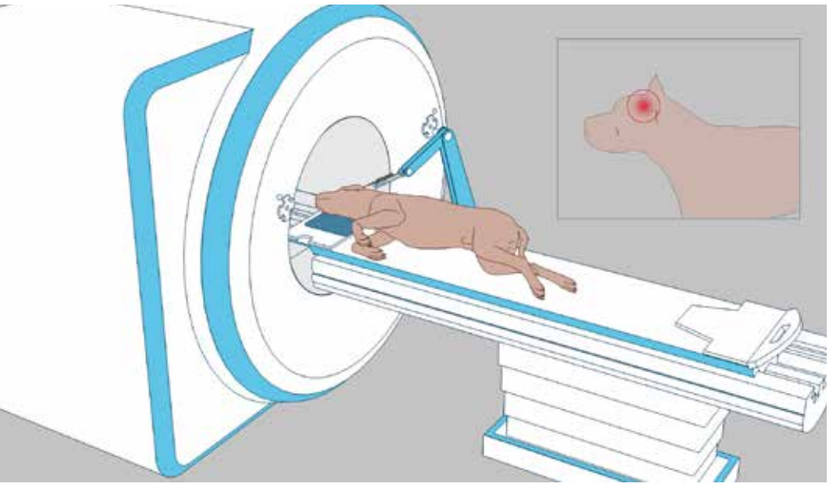
2016
Emergence of animal free innovations such as the Haptic Horse simulator and artificial cow Henryetta.

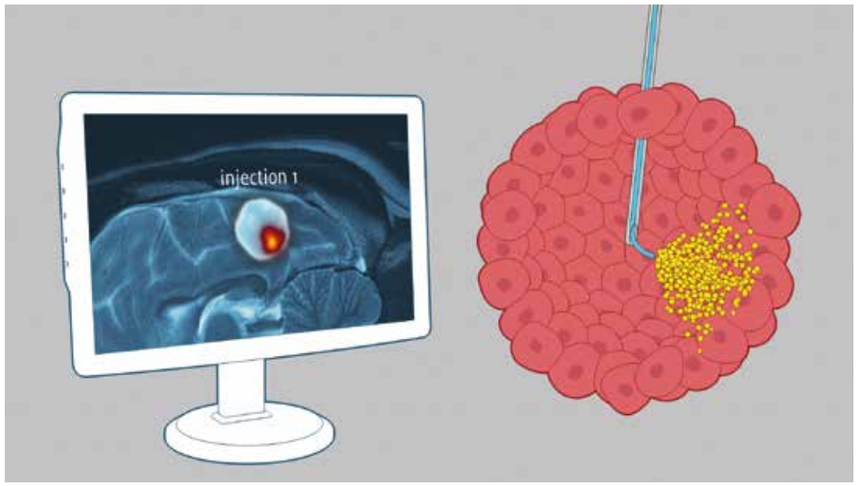
2016
Establishment of the Netherlands Centre for One Health (NCOH) for national cooperation on infectious diseases.

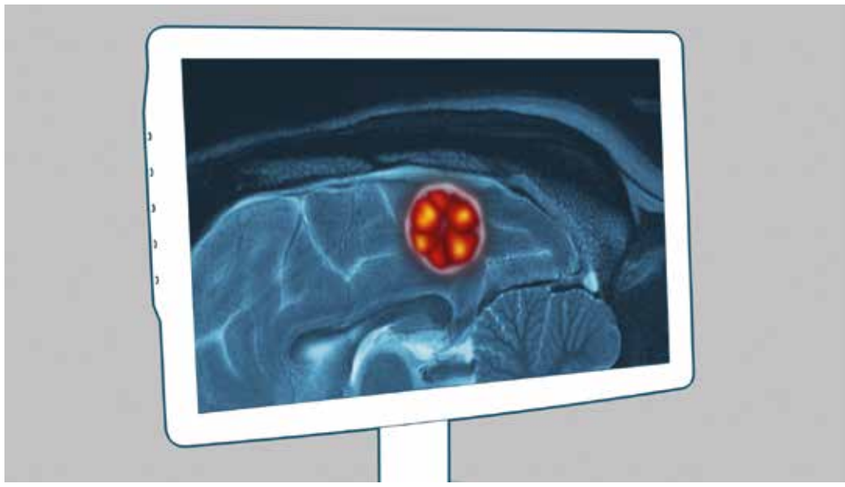
2018
Veterinarians and doctors collaborate to develop more innovative 'one medicine' treatments for animals and humans.

2020
The COVID-19 pandemic is a catalyst for knowledge development and new research into health, humans, animals and the environment.

2021
The Faculty of Veterinary Medicine is working on various initiatives for an even brighter future: educational renewal, sustainable new buildings, the transition of livestock farming, open science and more diversity.







Illustrations of the holmium technique used to treat brain tumours in dogs.
Guided by CT or MRI scans, radioactive holmium microspheres are injected into the tumour.

Breakthrough in the treatment of canine brain tumours

Bas van Nimwegen has spent years conducting research into the use of radioactive holmium particles ('microspheres') as a treatment for cancer. Now, he is on the brink of a major breakthrough. In late 2020, Van Nimwegen began trials of a minimally invasive therapy that involves using a camera-guided needle to inject holmium microspheres into the brain tumour, using CT and MRI scans to monitor the process. The technique will first be used on dogs, but hopefully one day on humans as well.

The problem with tumour cells in the brain is that they are surrounded by healthy nerve cells. This makes the tumour cells difficult to remove; in only few cases is it possible to remove them all. When you excise a tumour, there is a risk of damaging healthy brain tissue in the process, so surgery is not always an option. Since radiation therapy involves a risk of damaging healthy brain tissue as well, the size of the dose delivered to the tumour is limited. Now, with the help of visualisation technologies (MRI and CT) and the resulting ability to calculate the dose of the radioactive microspheres injected into the tumour, it is possible – for the first time - to treat brain tumours in highly targeted fashion.

Van Nimwegen explains: 'After we anaesthetise the animal, we conduct a CT or MRI scan. We subsequently use a flexible, camera-guided needle to inject a large radioactive dose locally – straight into the tumour – which preserves the surrounding tissue. We can repeat this until the scan shows that the microspheres have permeated all sections of the tumour. As the tumour gets "coloured-in" by the microspheres, we are able to watch this directly via the scan. The microspheres destroy the tumour from the inside out. The treatment takes about an hour. Generally, the animal is expected to experience few to no side effects, but will remain in the clinic for a few days. Because we administer such a large dose, we expect to see improvement fairly quickly.'

The holmium technique has already been used successfully in recent years, for tumours in the head and neck. 'We have injected around forty tumours with radioactive microspheres. The treatment proved effective in the majority of the animals. On average, the tumours shrank by 50-80 per cent and the patients retained normal use of the tongue and other involved body parts. With these results, we've demonstrated that it's possible to perform repeated and controlled injections of holmium into a tumour,' says Van Nimwegen.

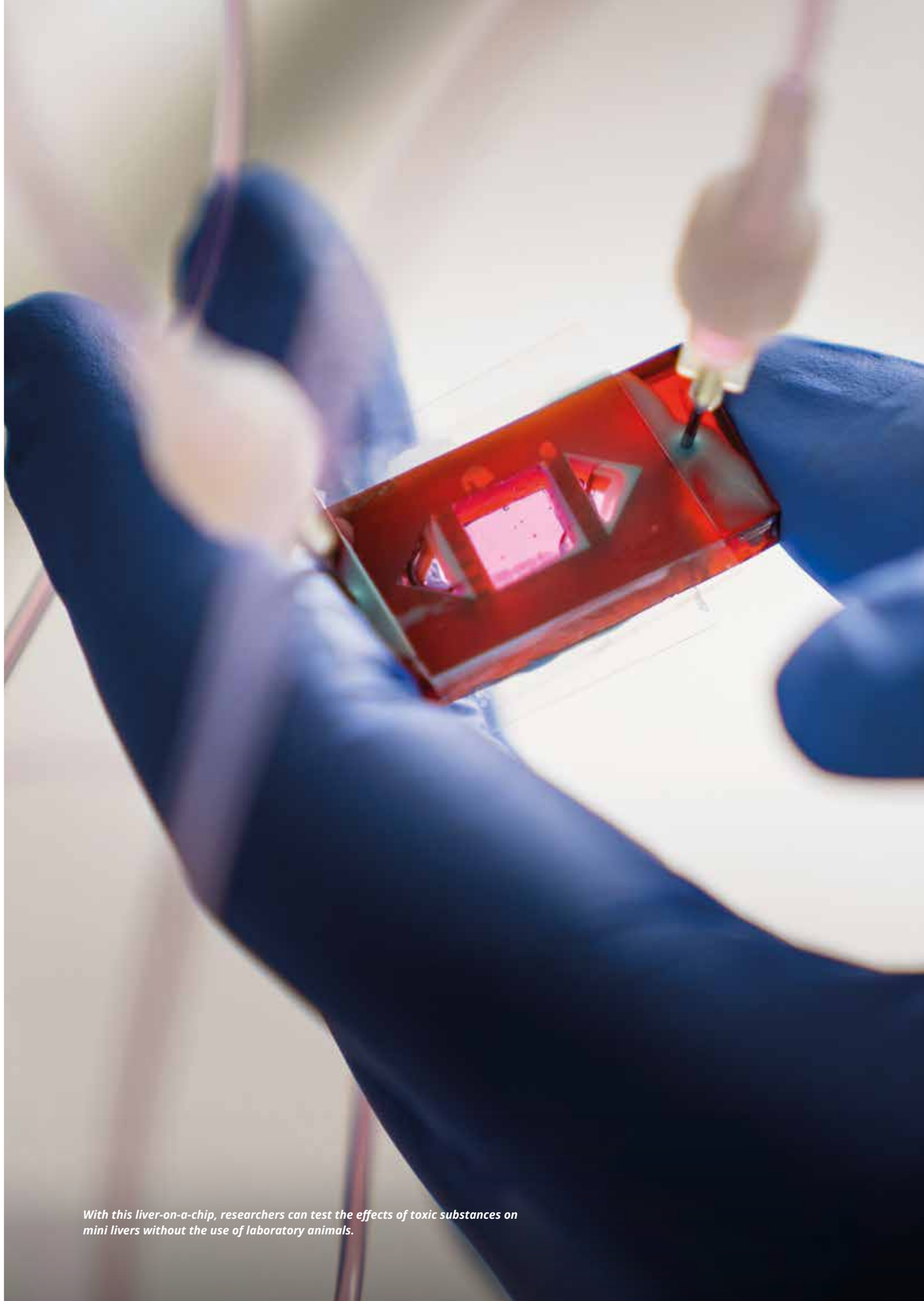
The study is supported by a grant from the Netherlands Organisation for Scientific Research (NWO) and is multidisciplinary and strongly translational in nature. Van Nimwegen: 'An important portion of the research involves veterinary patients, that is dogs with brain tumours. Their tumours and the resulting symptoms are similar to those seen in human patients. With this new therapy, we can treat animal patients while also observing them as a model for applying the same treatment in human patients in the near future.' ■

The research project is being conducted by a consortium of the Faculty of Veterinary Medicine, the Radboud University Medical Center in Nijmegen, Delft University of Technology, the Neurosurgery department at UMC Utrecht and two companies, Quirem Medical and Elekta.

TEXT: JOSIEN JACOBS | IMAGE: RADBOUDUMC

Animal-free science next level

Ever dissected your own lab rat as a student? Or removed a beating heart from a frog, while the rest of the classroom was doing exactly the same? It isn't a very distant memory for most scholars. But it seems like a lifetime ago for today's life sciences students. Utrecht University students can now virtually explore every layer of the anatomy of a rat using holograms, they can practice blood sampling from the brain with a plastic pig, and a robot horse simulates internal examinations in a sophisticated manner. These novelties offer new ways to learn about life, without the use of test animals. And not just for students.



With this liver-on-a-chip, researchers can test the effects of toxic substances on mini livers without the use of laboratory animals.

Smart innovations like organs-on-a-chip and virtual humans take our science to the next level, while reducing or replacing animal testing. Our students are the alumni and professionals of tomorrow: now is the time to educate them for a world in which laboratory animals are not the norm.

From a distance, it looks like just a group of students chatting in the corridor. But when you come closer, you'll notice they're each wearing big black goggles and take turns pointing at something that doesn't seem to exist at all. For the students, what they see is true to life. A glance through their goggles shows that they are looking at a hologram of a rat. By 'pressing' the virtual buttons, the students can create different layers showing only the blood vessels, the skeleton or specific organs. They can make it as complicated or simple as they want. Without ever dissecting an animal, they can study its anatomy in detail in 3D.

'How can we educate our students in the best possible way'

'We have to constantly ask ourselves: how can we educate our students in the best possible way? That is not by default with laboratory animals,' says Utrecht University Professor of Comparative Anatomy and Physiology Daniela Salvatori. 'Virtual reality improves spatial skills: it is difficult to learn 3D structures from 2D pictures in a textbook. That's why we've developed three-dimensional and holographic models together with UMC Utrecht and Utrecht University computer scientists. With these VR goggles, students can practice as often as needed and it is less stressful than working with laboratory animals. And vets can practice on the trickiest structures once more virtually just before an operation. Life-long learning,' says Salvatori. There is already an avatar of a rat, mouse and fish, and the Avatar Zoo will soon be expanded with a dog, cat, cow and sheep.

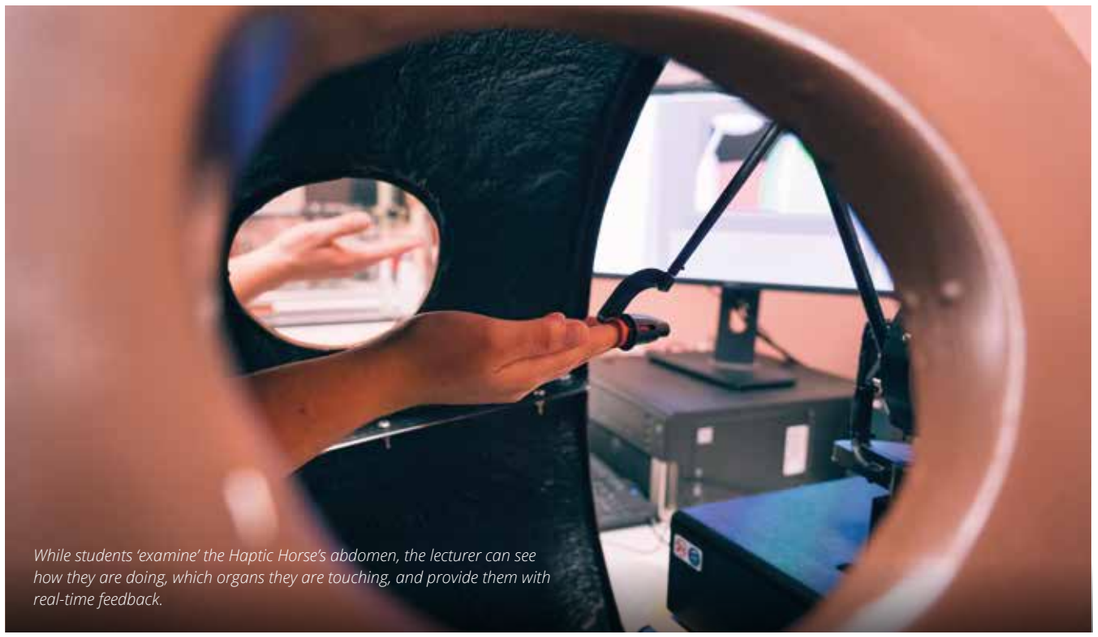
And this is not the only educational innovation that has come to life in Utrecht. The Centre of Excellence for Plastination and Virtual Reality, an initiative of Utrecht University and UMC Utrecht, develops virtual models of animals and humans as well as plastinates. By replacing the water and fat in a deceased animal with polymers, such as rubber and epoxy, lifelike models are created in which the anatomy can be studied for years. Soft plastinates are also suitable for practicing clinical procedures on animals, such as injections and internal examinations. This significantly reduces the use of laboratory animals.

'Now is the time to train our students for a world where animals are not the norm'

Although laboratory animals have a strong association with research, many are also used in education. 'Every year, 10 million animals are used for scientific purposes in Europe; around 200.000 are used for education and training and this is an underestimation,' says Salvatori. By veterinarians in training, life sciences students, PhD students, technical support staff and researchers, practicing anatomy, research skills or surgical techniques.

'It can be different,' says Salvatori, who is also head of TPI Utrecht, an initiative that stimulates discussion and animal-free innovation, and recently developed

The Haptic Horse is a simulator which allows students to practice conducting rectal exams in a safe environment before they move on to real horses.



While students 'examine' the Haptic Horse's abdomen, the lecturer can see how they are doing, which organs they are touching, and provide them with real-time feedback.

the study programme Better science with less animals. 'We have noticed that this awareness has been set in motion. In both research and education, there are entrenched ideas and test animals have long been the standard. Today's students are critical of the use of test animals, researchers are more open to the growing number of animal-free methods. Our students are the alumni and professionals of tomorrow: now is the time to train them for a world where animals are not the norm.'

These alternatives do not always have to be very advanced. Sometimes simple solutions can lead to a turnaround. In the course Laboratory Animal Science – the basics for anyone working with laboratory animals – they practice handling animals with Ikea mice, and learn how to stitch on an inner tube of a bicycle, says medical biologist Jan van der Valk, coordinator of the Utrecht 3Rs-Centre, which is committed to divulgation of the 3Rs: replacement, reduction and refinement of animal experiments. 'For invasive techniques, such as interventions in the abdominal cavity, we start with an artificial rat. It is also less stressful for students than operating on a real rat, where you also have to monitor all kinds of factors such as heart rate and anaesthesia. These alternatives are not solely better for animal welfare, but it also leads to better study results among the students.'

And the same applies to research: working with laboratory animals does not always yield the best results. 'An animal is a kind of black box. You cannot tell if an animal gets a headache, if it turns red or is confused. Animal experiments do not tell you everything. It is not surprising that nine out of ten drugs tested on animals still fail in the clinical phase,' says Van der Valk. Results in animals are not simply translatable to humans.

'Working with laboratory animals does not always yield the best results'

Advanced techniques like organoids and organs-on-a-chip that enable researchers to study human cells directly are therefore promising, and their possibilities grow by the day. Could research and education even be conducted entirely without animals? The Virtual Human Platform is taking the first steps in this direction. This initiative collects data on the safety of chemical substances and medicines, without the use of test animals. It is the largest project ever undertaken in this field in the Netherlands, bringing together more than thirty partners from universities, companies and health organisations, says toxicologist Juliette Legler, project leader of the multi-million project that started in the summer of 2021.

'Of the 100 million laboratory animals used worldwide each year, 30 percent are used for legally required toxicological and safety tests. The remarkable thing is: these safety assessments are there to protect humans, but they are performed on animals. Even though the predictive value of animal tests for human health is limited. It is out of date. Humans should be the starting point, not test animals,' says Legler.

The aim of the Virtual Human Platform is to provide a completely animal-free safety assessment of chemicals and pharmaceuticals for humans, based solely on human physiology and biology. 'The system changes very slowly when you reduce or replace step by step; it offers too little innovation,' says Legler. 'It's time for revolution, not evolution.'

The platform sparks the revolution by integrating innovations in data sciences with human tissue culture models. 'We are bringing together all the data that is available and making it openly accessible,' says Legler. The platform has started to pool data around three cases: 'Kidneys, brain and thyroid. For these three there is a lot of expertise, as well as data that is not available in animals.'

Although scientists are sometimes sceptical about whether non-animal methods are feasible for their field, there is more awareness, notes Legler. 'They realise that we have not taken enough steps in recent years. The new trend is to think again and again about whether things can be done differently. Certainly among students. For some disciplines, such as neuroscience, a transition to animal-free testing will be difficult. But if we keep thinking it's impossible, we will not get there. As we become better at predicting biology, we will need fewer and fewer laboratory animals.' ■

TEXT: MAARTJE KOUWEN | IMAGE: IVAR PEL, GIJS VAN OUWERKERK, BAS NIEMANS

At Utrecht University we work on animal-free innovations. This offers a world of new possibilities, that we pass on to the next generation. To make sure our first-year students are already aware that things can be done differently and better. That animal experiments are not the gold standard. We take the human being as our starting point, rather than a test animal. We stimulate debate and develop advanced techniques. So we can do even better science, with fewer test animals. Our students are the researchers, policy-makers, vets, doctors and medicine developers of tomorrow. Together, we work towards a better future, one with fewer laboratory animals.

With this lifelike plastinate of a female dog, all students will soon be able to practice a vaginal examination.

Impactful alumni

In 2021, Utrecht University and UMC Utrecht celebrated 385 years of science in Utrecht. The theme of this lustrum celebration was 'Creating tomorrow together'. After all, we can only achieve a better world by joining forces. Our alumni turn out to be particularly good at this. We talked to three impactful alumni - Odette Doest, Marion Koopmans and Martine van Zijll Langhout - about how they see the future and the projects they are working on to reach a better tomorrow.

Veterinarian Odette Doest and flamingo Bob give nature education.

Odette Doest and Bob the flamingo.

Odette Doest

Odette Doest (graduated in 1999) gained international fame in 2018 when a series of photos by her cousin, nature photographer Jasper Doest, were featured in National Geographic and received major honours at World Press Photo and the Sony World Photography Award. The photos portray her remarkable efforts to educate children about the natural environment and care for wounded wild animals on Curaçao.

Bob the flamingo's life took a dramatic turn when he flew into a hotel window. Odette Doest and her colleagues nursed him for months. They generally treat animals and release them back into the wild, but that was not an option for Bob. 'I thought to myself: you're so tame, let's see what happens if I bring you along to a small-sized class', says Odette Doest. 'As it turned out, he didn't mind at all. He just quietly stood somewhere for a while and started wandering around the classroom.'

'I teach kids wildlife appreciation'

'Bob now joins me in class almost every Thursday. Besides my veterinary practice and work at the shelter for injured wild animals, I'm really passionate about nature education. I try to help kids fall in love with all the animals I bring to class. Bob is obviously beautiful and the kids love him, but I also bring other educational animals like a pelican. They're extremely intelligent and tend to cause some funny situations. The animals just display their natural behaviour and I teach kids wildlife appreciation.'

'I try to lead by example: look, I'm a woman, I'm black, I wanted to be a vet as a child, I managed to become one and now I help animals.'

'The kids get to experience these animals from up close, and that really lends my stories on conservation a lot of impact. I teach them that they can also do things to help wild animals. For example, you can collect waste plastic when you go to the beach at the weekend. You can take good care of the natural world.'

Life lessons

'I also try to teach them some life lessons. As a vet, they tend to treat me as a bit of a superhero anyway. After all, most kids want to be a veterinarian at some point. I want to show them that they can take control of their lives and have an impact on the world around them. I try to lead by example: Look, I'm a woman, I'm black, I wanted to be a vet as a child, I managed to become one and now I help animals. You can achieve anything if you really put your mind to it.'

Stichting Fundashon, Dier en onderwijs cariben provides therapy and rehabilitation for wounded animals and teaches school children about nature conservation.
www.fundashon-doc.com

Nature photographer Jasper Doest took many more beautiful photos of Odette Doest working with Bob the flamingo. These are featured in the book 'Meet Bob'.
www.jasperdoest.com/meetbob

Marion Koopmans at the award ceremony of the Dutch Machiavelli Prize.

Marion Koopmans

At the beginning of 2020, most people weren't quite sure what COVID-19 was. In the Netherlands, the name Marion Koopmans probably didn't mean much to most people either. All that has changed now: as a professor of virology, an adviser to the European Commission, and a member of both the Dutch Outbreak Management Team and the WHO's research team, Marion Koopmans appears in newspapers and on radio and television programmes almost on a daily basis.

Marion Koopmans (graduated in 1983) is Professor of Virological research for Public Health at Erasmus Medical Center. In March 2021, she received the Machiavelli Prize for her unremitting efforts to make research on the coronavirus accessible to a wide audience.

Enthusiasm is contagious

As a seventeen-year-old, Marion Koopmans wanted nothing more than to leave her hometown in the South of the Netherlands. She had no doubts about where she would go: Utrecht, Veterinary Medicine. 'That's when my life really began. I remember having insightful discussions night after night. It was great! I did several student assistantships, and the one I enjoyed the most was for pathologist-anatomist Professor Wensvoort. He was fascinated by pathogenesis and that fascination struck a chord with me. People who love their work are very inspiring; their enthusiasm is contagious.'

'There are clear limits to how we interact with the world'

'Later on, during my specialisation, I noticed how much I enjoyed gathering information and explaining it to people like horse owners and livestock farmers in a way that was easy to understand. I constantly had to ask myself the question: How do I translate what I know into words that my target audience will understand? I still benefit from that experience.'

"There are clear limits to how we interact with the world"

Now, many years later, Koopmans is utilising much of her knowledge and experience in the fight against pandemics. 'There are clear limits to how we interact with the world. Whether in veterinary, medical or environmental contexts, we are facing major challenges.'

The solutions have to come from all possible perspectives. Collaboration – also outside of your own discipline – forces you to really reflect. You fuel each other with different questions and insights, and that sharpens your mind. The pandemic has given collaboration a boost, and we're seeing more and more parties focusing on issues like the climate and the environment. So I choose to be optimistic and believe that solutions will continue to be developed. Because, come on: we put rovers on Mars! If we put our minds to it, almost anything is possible.'

Martine van Zijll Langhout in the Kruger National Park region in South Africa.

Martine van Zijll Langhout

Her work as a wildlife and zoo veterinarian has taken her all across the world, from Gabon and South Africa to the Isle of Man. Yet for Martine van Zijll Langhout, Utrecht University is never far away. She enjoys passing on her knowledge to current students in the Veterinary Medicine programme.

Martine van Zijll Langhout (graduated in 2001) spent over six years in Africa working as a wildlife veterinarian. Alongside her current activities at ARTIS Amsterdam Royal Zoo and Stichting AAP, a foundation that gives primates and other exotic mammals a better future, she conducts research, teaches and gives lectures to inspire others.

Nature conservation as a mission

The realization that we as people are connected to all life on earth, as just one small link in the ecosystem, truly came to life when Martine was working with gorillas, rhinos and elephants in Africa. In her book On Living in the Wild, she describes the richness of the wilderness and the great importance of nature conservation, including for our own survival. 'It's important to take a good look at the impact of the choices we make. We depend on biodiversity and a healthy ecosystem here in the Netherlands as well. We can start small in our efforts to contribute to this, for example by admiring a wasp instead of immediately killing it.'

'It's important to take a good look at the impact of the choices we make'

Appreciating and protecting wild animals

Someone who inspired her early on is Jeroen de Lange, a highly socially engaged housemate in her Utrecht student house. He motivated Martine to think about things like meaning and social awareness. 'Jeroen organized peace missions in the Middle East, for instance. He founded 100WEEKS, a foundation that directly connects women in African countries with donors, who help lift them out of poverty within 100 weeks. We're working together to look at how we can use a similar concept for nature conservation. If the local people who live near wildlife parks can generate an income on their own, rather than just the park owners, they will appreciate and protect the wild animals.'

'I love helping students and teaching courses, including the Wildlife elective in the Veterinary Medicine programme at Utrecht University. I also give lectures for their study society and regularly answer questions about topics like career choices.' These activities fit perfectly with Martine's mission to protect animals and the environment. 'Every young colleague who has the right knowledge and expertise and decides to help nature and wild animals, makes a difference.' ■

TEXT: HANNEKE OLIVIER, JURGEN SIJBRANDIJ, NICOLE VAN HOORN | IMAGE: JASPER DOEST, ANP, MARTINE VAN ZIJLL LANGHOUT,

Utrecht University

Veterinary Medicine

Facts & Figures

The only veterinary faculty in the Netherlands

Accredited in:

Canada **(CVMA)**

USA **(AVMA)**

the Netherlands **(NVAO)**

Europe **(EAEVE)**

Professors

Male **64%**

Female **36%**

400
Researchers

529
Publications in scientific journals in 2020

Students

Bachelor's students **777**

Master's students **669**

Alumni

>9.000

100% of Master's alumni employed within a year after graduation (based on sampling of 2019 graduates)

PhD candidates
210

International **46%**

Dutch **54%**

QS World University Rankings Veterinary Science 2021

3

Ranked #3

Friends of VetMed

€3.8
million raised to date

University animal hospital

Companion animals:
>10.000
cases treated annually

Working with
400 **livestock farms**
through the University Farm Animal Health Practice

Equine:
>7.000
cases treated annually

Veterinary education partners

87
Veterinary clinics

A horse walks into the vet's office

The figures don't lie. Technological advancements are making it increasingly easy to accurately measure horses' movements. Gait analysis has been widely used on humans for some time now.

A horse walks into a vet's office... If the patient in this joke were human, it would go like this: 'Doctor, my right lower leg hurts'. Horses can't talk though. 'That makes it hard to determine the cause if, for example, they have become lame', observes Filipe Serra Bragança, a researcher at the Faculty of Veterinary Medicine. 'The animal's owner may be able to talk, but that doesn't necessarily mean they can adequately pinpoint the problem. The horse's owner may believe the lameness is in the front left leg even though it later turns out to be in the right hind leg.' It's up to the vet to make a diagnosis, but that's not always easy, as Serra Bragança points out. 'A team of the world's best vets might examine a horse and still not agree on the exact source and severity of a lameness.'

That's why we need gait analysis to objectively determine the source of the pain. Recent years have seen major advances in this area, as Serra Bragança enthusiastically explains. 'We now have access to a few systems to help us study movement in horses; for example, Utrecht University and two of our partners have developed the Equimoves measurement system to enable quicker and better diagnostics.'

Horses and Parkinson's sufferers

Human medicine has been somewhat more successful in applying these technologies. In fact, it works pretty much the same way it does with animals, explains Jaap van Dieën. Van Dieën is a professor and head of the Movement Sciences Department at VU Amsterdam. 'We use camera systems to record people's movements, just as we do with horses. In most cases, we also film them while walking on the treadmill so that we can measure a large number of steps. These days, we also measure the forces exerted by the feet, which gives a very complete picture. In terms of technology development, they're currently working hard to make the system more accessible to a broad group of users. For example, they've started using cheaper sensors instead of cameras. We're also seeing a trend towards gathering big data on a lot of people with a wide range of conditions. After all, if you can link a patient to a large database, you might only need three sensors instead of 20.'

When it comes to horses, most movement analysis is currently conducted on professional racehorses. Applications in human medicine are a lot broader. Van Dieën is mainly focused on clinical applications. 'For example, we use movement analysis to study cerebral palsy patients. We also use it to analyse falling issues among the elderly, people who have had a stroke or patients suffering from Parkinson's disease. We're trying to find out how healthy people manage to avoid falling and figure out what's going wrong in these patient groups. Could we eventually recognise the problem early on and intervene on time? Other than that, it's always difficult to adjust medication levels accurately.
If you can tell whether the medication is at the right level from a movement pattern (more quickly than you could on the basis of subjective observations), you can make the necessary adjustments. We're also focused on early diagnostics. Parkinson's tends to be discovered at a very late stage, whereas people may have had vague symptoms for years and early treatment could probably have achieved much better results. We hope movement patterns will ultimately allow us to detect diseases or problems in the early stages. That sort of knowledge can then also be applied to horses.'

'The clinical aspects of our research into lameness are very subjective. That kind of subjectivity is also at play in human medicine.'

Early diagnosis would also be a welcome development in equestrian medicine, Serra Bragança agrees. 'Unfortunately, we're still years behind human medicine when it comes to gait analysis. We've basically just started using the technology on horses, so I think there's huge potential across the full spectrum of equestrian sports: from riding school horses to professional athletes.'

Grand Prix dressage rider Jolanda de Pijper has been following the developments with great interest. De Pijper has international ambitions for her Bombay. 'Bombay already knows all the exercises, so now we're just focusing on fine-tuning everything and strength training – we actually train five times a week. I'm terrified he might get injured: that would be back to square one. The earlier you detect and locate an injury, the better. That will obviously benefit his performance, but it's also good for the animal's wellbeing – as the rider, I'm also responsible for his health. New technologies might allow us to measure a horse's condition on a monthly basis. If a

'I'm terrified he might get injured. The earlier you detect and locate an injury, the better'

particular leg turns out to be weaker, you can work on it and draw up a training plan.

Entrenched ideas

As Serra Bragança sees it, the greatest benefit of technology lies in greater objectivity. 'The clinical aspects of our research into lameness are very subjective. As a result, everything that follows – including the medications used to treat the condition – tends to have insufficient scientific basis. The subsequent analysis to determine whether the situation has improved through medication is also subjective.' In Van Dieën's view, this subjectivity also affects human medicine. 'We tend to have very entrenched ideas about how things work. For example, clinicians invariably claim that differences in leg length are a huge problem that will eventually lead to back pain. However, when you start measuring, you find that people can often compensate those differences quite well and that there is no evidence of any link with back problems. Objective measurements are primarily a way of debunking entrenched views.'

Hands-on expert De Pijper believes dressage would also benefit from more objective methods. 'It can be so hard to pinpoint exactly what's wrong with a horse, even with all those experts weighing in. In fact, all those different opinions may actually be the problem. If you put ten people in a room, they'll all have different opinions about an injury. If technology can help us reach a consensus more easily, that's definitely a bonus.'

Combining knowledge

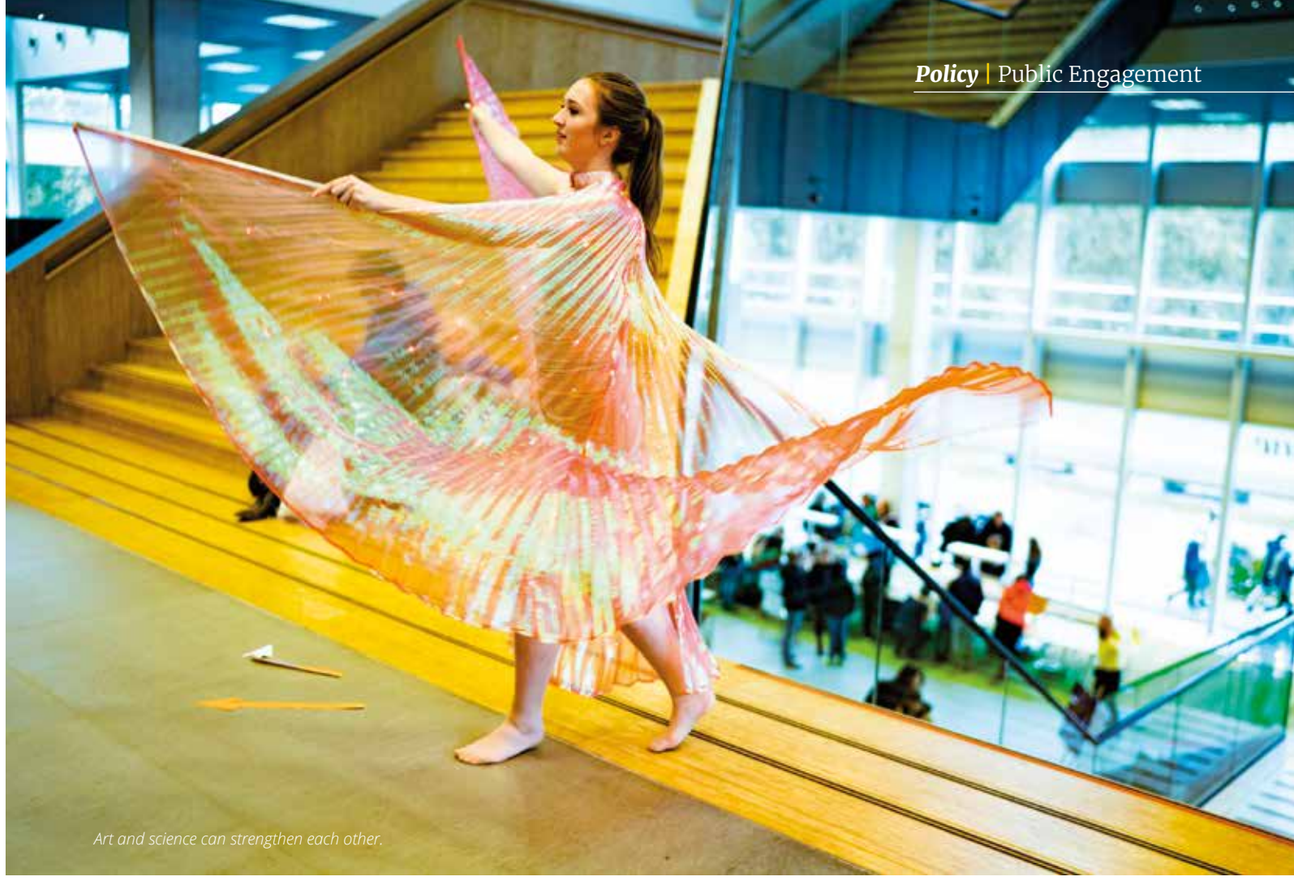
So could human medicine – despite its head start in this field – learn something from animal movement analysis? 'Absolutely', Van Dieën says. 'When it comes to animals, there's more anatomical variation between the species; that tells us a lot about underlying and evolutionary principles. The restrictions on technology development are also a little less strict when it comes to research on animals.' Serra Bragança: 'I think we could collaborate more closely and gather and share ideas. We're basing a lot of our research decisions on existing knowledge on humans. If something works in humans, I'll try it too. With the help of our colleague Van Dieën, we have now also started to measure horses' movements using techniques that have already been applied to humans for some time.'

'Those are basically just scaled-down versions', Van Dieën explains. 'There's not really that much difference. It's obviously easier to give instructions to people, but it's definitely also doable with horses. Horses can be trained quite successfully, Serra Bragança agrees. 'After all, they have been used to being led, trotted and lunged from an early age. We want to make the technology even more user-friendly, so that you can measure horses during training with a focus on prevention. We're already offering the option of movement analysis to the owners of our patients at the Academic Veterinary Hospital, but that still doesn't tell us how these horses move in their own environment. That's why we would like to be able to measure during training sessions, using the same big data approach they want to apply to people. We can then apply machine learning to optimise the horse's training routine.'

A horse walks into the vet's office... The fact that that joke set-up doesn't segue into a conversation isn't strictly a disadvantage, Van Dieën argues. 'People can talk, that's true, but patients' descriptions of their own symptoms can also be misleading. After all, pain is also a psychological phenomenon, a matter of perception. If you ask a human patient to point out their pain, the answer doesn't necessarily tell the whole story.' ■

TEXT: EVA MUNNIK | IMAGE: BAS NIEMANS

Interested in carrying out a gait analysis on your own horses or applying Equimoves in your veterinary practice? If so, email us at dierenziekenhuis@uu.nl.



Art and science can strengthen each other.

'With public engagement we elicit trust'

Four researchers explain how they involve a broad public in their research

At the Faculty of Veterinary Medicine, we encourage broad public involvement in our research. That could be citizens but also civil society organisations, entrepreneurs, schools, industry or the government. We keep our eyes and ears open for their questions, ideas and concerns. And we incorporate these in our research to achieve as much societal impact as possible. What does that look like? In this story you can read about four examples of this approach.

'I let children think about the use of animals'

Monique Janssens manages to make children think about the use of laboratory animals by playing a game with cuddly toys. As an ethicist and communication advisor, she challenges children to make their own choices about difficult dilemmas.

There are five cuddly toys on the table: a dog, a rat, a monkey, a fish, and a rabbit. There is also an Erlenmeyer flask from the laboratory and a laptop. The children sit at the table and Janssens presents the dilemmas to them. For example: 'You are a smart scientist and you have developed a medicine against headache. How will you test whether this medicine is safe?' The children are allowed to choose one of the objects on the table and explain their choice. 'I was surprised about the responses', says Janssens. 'The children are very nuanced and think carefully about the pros and cons.' Next, she makes the game more difficult and she poses questions about diseases like cancer or smoking addiction.

Animal experiments against smoking addiction

'The tensest moment is always when we reach the subject of smoking addiction. Most of the children think it is not fair that animals should have to pay for that. Next, I introduce the idea that addiction is also a sort of illness. That gets them doubting. Sometimes a child comes with the proposal of testing the safety of the substance on smokers or we seek volunteers from among the adults who are also sitting at the table. With this approach, I give children insight into the dilemmas involved and the ethical assessment of animal experiments.' Janssens believes that public engagement is important. 'I think it helps to generate understanding and elicit trust.'

Video of the game

Janssens produced a video in which she plays the game with experts. Scan the QR code to watch the video (English subtitles).

'I received 130 unique research questions'

In the winter, many people burn wood in their stove or open fire. It is really warm and cosy but also a source of nuisance due to the wood smoke. PhD student Fleur Froeling, together with about 100 citizens, is investigating the effects of wood smoke on health.

'We are involving citizens from the start to the end of our research', says Froeling. 'First, we jointly examine which questions we would like to answer. That is realised via meetings, newsletters and social media.' A total of 130 unique research questions were received and Froeling selected the most important ones during meetings with citizens. Examples are: What are the physical consequences of inhaling wood smoke in the short and long term? And: Is there a sustainable way of burning wood?

What do citizens find important?

Next, the citizens think with Froeling about the best way of answering the questions, help with collecting and analysing data, co-author publications and even communicate about the final results. Froeling: 'It offers new perspectives and a good insight into what citizens consider important. They, in turn, gain insight into our work. In this way, we can learn from each other.'

'Teenagers were wildly enthusiastic'

Researcher Vivian Goerlich involves school pupils in her research into feral pigeons. Secondary school students help her with observing and counting the birds.

Goerlich developed two programmes to involve students in her research. Together with the University Museum Utrecht, she produced a two-hour online teaching programme in which the students become researchers themselves. They devise a research question about pigeons and try to answer this by counting and observing the birds in Dutch cities. Next year, Goerlich will go a step further with the second programme. 'I will involve a class in my research for three months. For that, I will work together with teachers. They know the students well and will give the lessons.'

Will they like it?

It was the first time that Goerlich had worked together with students. Therefore she was quite nervous when the first class set to work with the teaching programme. 'They were 15-year-old teenagers and I doubted whether they would like it, but they proved to be wildly enthusiastic! Research should not be limited to your office at the university. I have noticed that our research themes about the human-animal relationship are a major societal issue.'

Accurate picture of science

According to Goerlich, public engagement is a win-win situation. On the one hand, it is valuable for both her and society. 'The secondary school students collect data about pigeons that I can use in my research. Furthermore, by studying the feral pigeons, the students gain more appreciation for the pigeons and the natural world. That is important because young people are the nature conservationists of the future.' On the other hand, it is also useful for the students. 'They acquire an accurate picture of what science entails because I tell them about everyday life of a researcher.'

'Art and science can strengthen each other'

At the end of her PhD research, Nikae te Moller decided to involve the public in her research in an original manner. How? With dance.

The young scientist produced a dance about osteoarthritis and used this to tell the story of her research into this condition. Te Moller, who also joins in the performance of the dance: 'I wanted to share my research with the public in a creative and accessible way and, simultaneously, gain attention for research into osteoarthritis. I also wanted to inspire other scientists to share their work in a creative manner. Science and art can strengthen each other.'

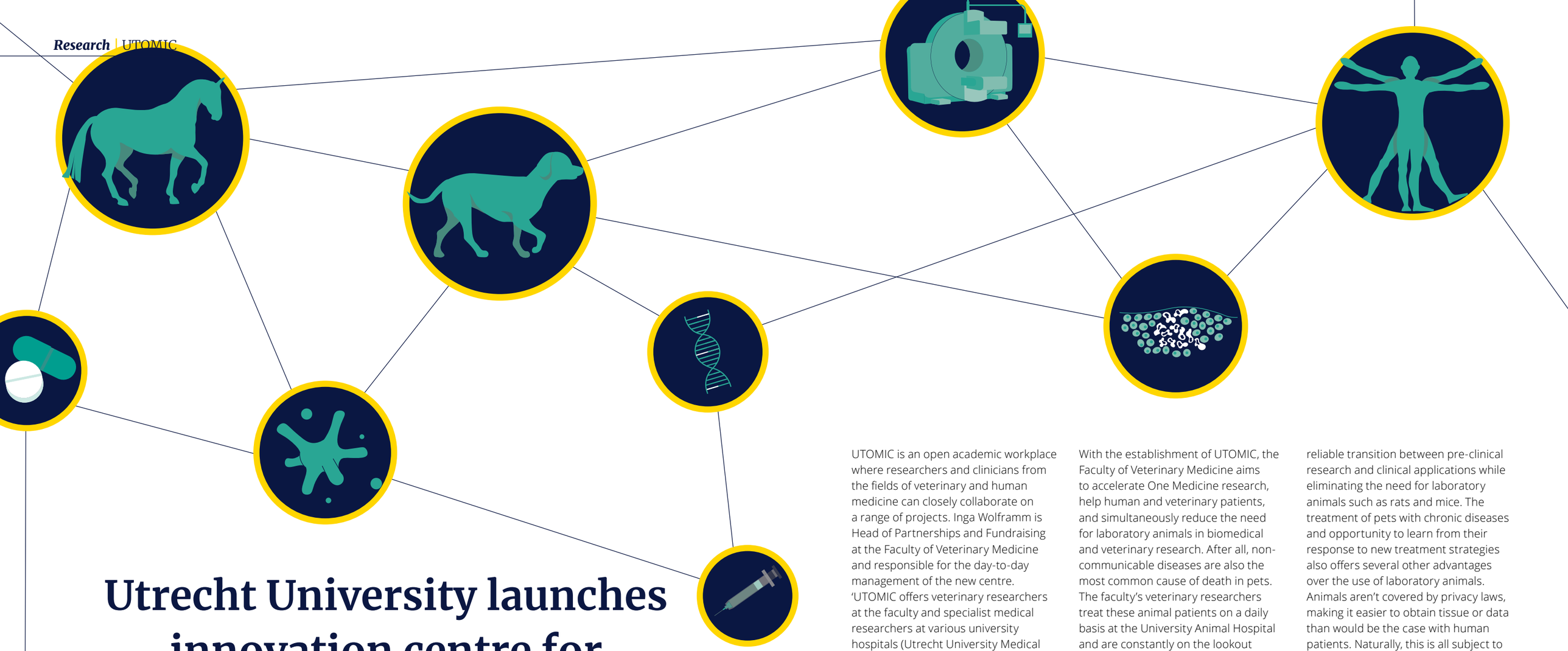
Smart questions from kids

Te Moller worked together with the dancers and a choreographer to make a video and create a live performance. The performance could be seen, for example, during the Weekend of Science, an event during which Dutch universities open their doors to the public. After the dance performance, she talked with the public about osteoarthritis. 'It was fantastic to talk about my research with kids. And their smart questions revealed that they had clearly understood the abstract portrayal of the joint and the problems that arise with osteoarthritis.'

Watch the dance video

Scan the QR code and watch the video 'Joints Jumping for Joy' on YouTube. ■

TEXT: ROSAN REUSKEN | IMAGE: MONIQUE JANSSENS, BAS NIEMANS, ISTOCK AND IVAR PEL



Utrecht University launches innovation centre for One Medicine research

An open academic workplace for veterinary and human medicine researchers and clinicians

Each year, over 41 million people worldwide die from so-called non-communicable diseases such as cancer, cardiovascular diseases, diabetes, neurological diseases, or musculoskeletal diseases. The need for research on more effective diagnostics and new treatment methods is more urgent than ever. Veterinary and human medicine researchers at Utrecht University's new Translational One Medicine Innovation Centre (UTOMIC) are working together to find solutions in areas such as personalised 3D printed implants.

UTOMIC is an open academic workplace where researchers and clinicians from the fields of veterinary and human medicine can closely collaborate on a range of projects. Inga Wolframm is Head of Partnerships and Fundraising at the Faculty of Veterinary Medicine and responsible for the day-to-day management of the new centre. 'UTOMIC offers veterinary researchers at the faculty and specialist medical researchers at various university hospitals (Utrecht University Medical Centre, Groningen University, Leiden University, Radboud University and VU University Amsterdam) the opportunity to engage in unique collaborations. Researchers will also have access to state-of-the-art diagnostic and treatment facilities at the University Animal Hospital, provided in collaboration with our civil society partners and commercial stakeholders.

Animal patients replace laboratory animals

The fight against non-communicable diseases is undoubtedly one of the greatest socio-economic challenges of the 21st century. Unfortunately, biomedical research on drugs and treatment methods for these diseases is still heavily reliant on animal testing, with as many as 115 million laboratory animals used worldwide every year.

With the establishment of UTOMIC, the Faculty of Veterinary Medicine aims to accelerate One Medicine research, help human and veterinary patients, and simultaneously reduce the need for laboratory animals in biomedical and veterinary research. After all, non-communicable diseases are also the most common cause of death in pets. The faculty's veterinary researchers treat these animal patients on a daily basis at the University Animal Hospital and are constantly on the lookout for ways to improve their health and welfare. As they carefully observe and treat their patients, the researchers and clinicians gain important insights that ultimately yield better diagnostics and more effective treatments for both veterinary and human patients while reducing the use of laboratory animals.

Accelerating One Medicine research

The Faculty of Veterinary Medicine will be further integrating its One Medicine research with human and animal health care at UTOMIC over the coming years. Human beings and companion animals share many similarities when it comes to spontaneously occurring diseases and disorders. These parallels can play a crucial role in translational research. After all, the treatment of animal patients can serve as a scientifically reliable transition between pre-clinical research and clinical applications while eliminating the need for laboratory animals such as rats and mice. The treatment of pets with chronic diseases and opportunity to learn from their response to new treatment strategies also offers several other advantages over the use of laboratory animals. Animals aren't covered by privacy laws, making it easier to obtain tissue or data than would be the case with human patients. Naturally, this is all subject to the owner's consent.

Some diseases or conditions are also much more common in veterinary patients than in humans. Examples include certain types of cancer (pheochromocytoma, osteosarcoma, lymphoma) and endocrine disorders (such as Cushing's disease, caused by a tumour on the pituitary gland). This allows for broader and more rapid data collection. Finally, euthanasia is now often the only option for pets with incurable diseases. Experimental treatments for these animal patients – provided they have been proven safe in the preclinical phase – can be an important step in developing effective research applications for the medical practice. One Medicine research can accelerate human and veterinary medicine innovation in several ways.

'One Medicine research can accelerate human and veterinary medicine innovation in several ways'

SPECT/CT scanner at UMC Groningen

UTOMIC is being equipped with state-of-the-art diagnostic equipment thanks to the financial support of academic partners, private sector partners and equity funds. The University Veterinary Hospital recently acquired a SPECT/CT scanner that will allow for even more precise imaging. The Symbia SPECT/CT scanner was donated by the University Medical Center Groningen (UMCG) and delivered and installed by Siemens Healthineers. Rudi Dierckx, professor and head of the UMCG department of Nuclear Medicine and Molecular Imaging, explains why the UMCG is happy to contribute. 'The Faculty of Veterinary Medicine is a unique organisation in the Netherlands with a unique approach. The One Medicine concept is important for several reasons. Donating our SPECT/CT to the Faculty of Veterinary Medicine will lend the unit a new lease on life while contributing to circularity. We're glad to support the field of veterinary nuclear medicine and open up new possibilities for researchers. Sharing knowledge on nuclear research and care for human and veterinary patients will also encourage cross-pollination between our two fields. Animal patients can play an important role as 'natural animal models'. This will allow us to help veterinary patients while speeding up the development of human care applications.' Visit www.utomic.nl for details. ■

TEXT: CHARRO VAN TILBORG | IMAGE: LISANNE ROOTH

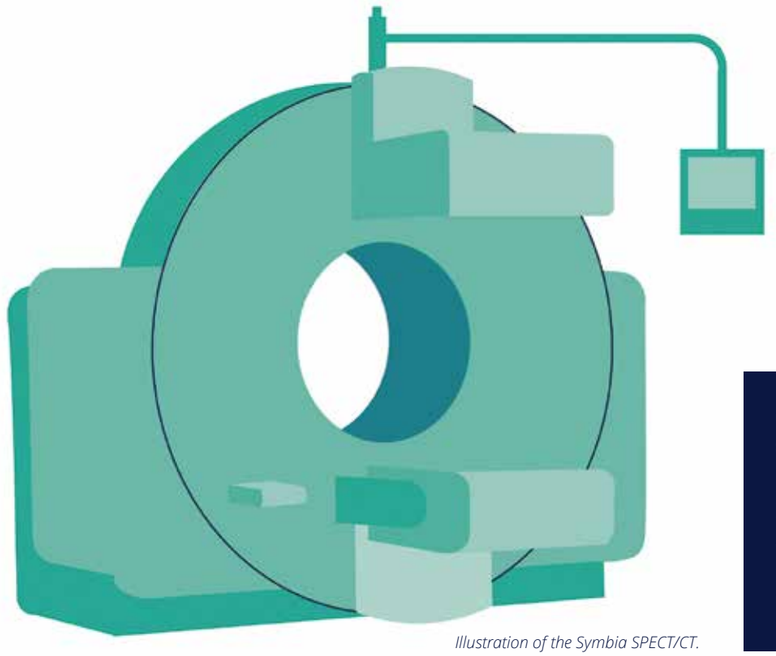
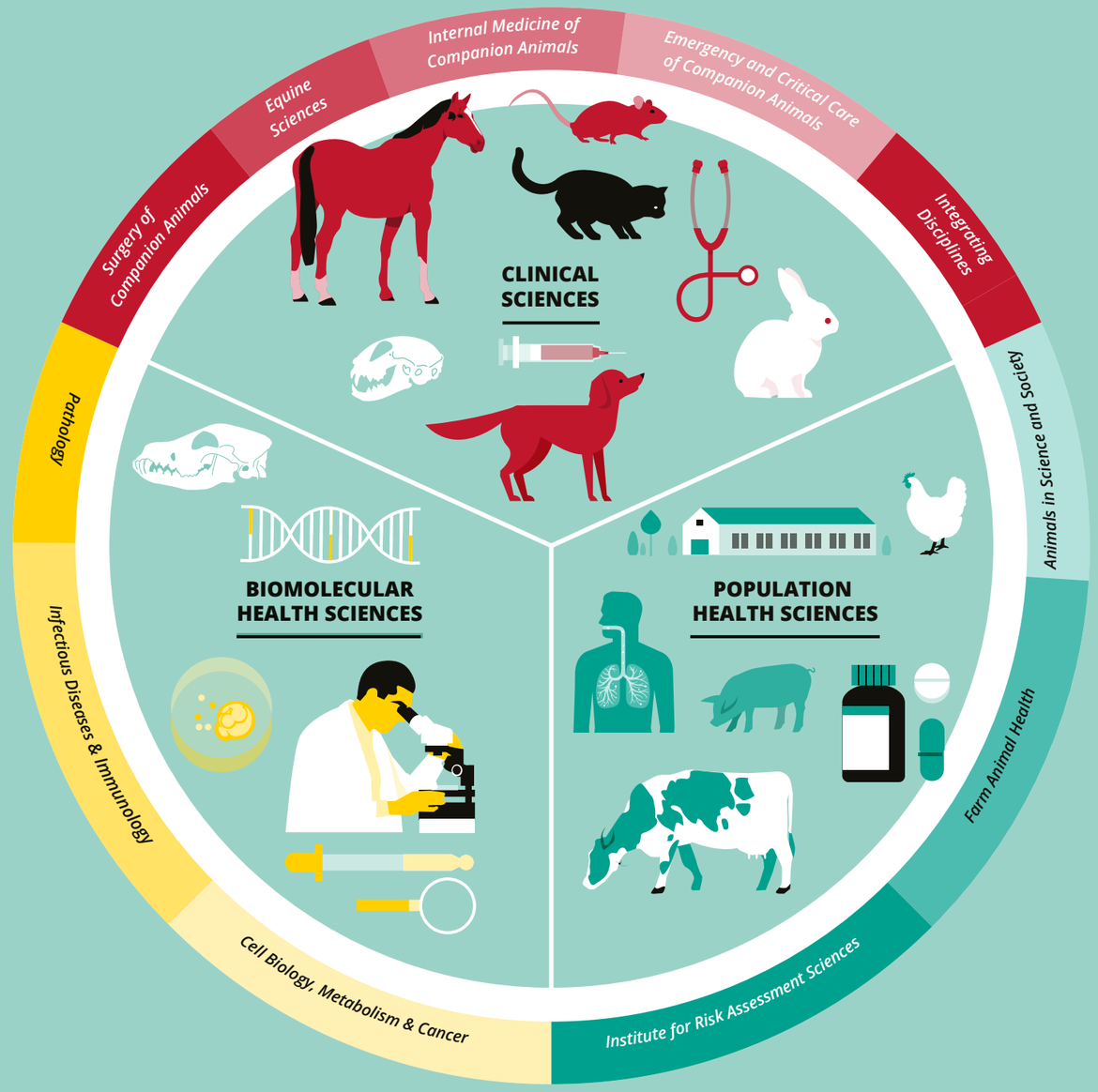


Illustration of the Symbia SPECT/CT.

UTOMIC receives financial support from the following foundations: Abri voor Dieren, Bouwstenen voor Dierenwelzijn, DierenLot, D.O.G., Dr. C.J. Vaillant Fonds, Het Waardige Dier, Triodos Foundation, Utrecht University Fund.

OUR ORGANISATION

Together, our 800+ colleagues across three departments work towards one common goal: health and wellbeing for animals and people, in relation to each other and their environments.



Microplastics are everywhere, but just how harmful are they to human health?

Interview with Juliette Legler and Dick Vethaak on MOMENTUM

Plastics are everywhere. They gradually break down into (very) small particles, micro and nanoplastics, which eventually end up in the soil and oceans. They are deliberately added to a wide range of everyday products such as cosmetics and abrasive cleaners, get released every time we wash our clothes, or end up as contaminants in human and animal food products. So how are these plastics affecting our health and how can we minimise our exposure to them?

Researcher Hanna Dusza and colleagues investigate the absorption, transport and toxicity of different types of plastic particles in human placental cells.

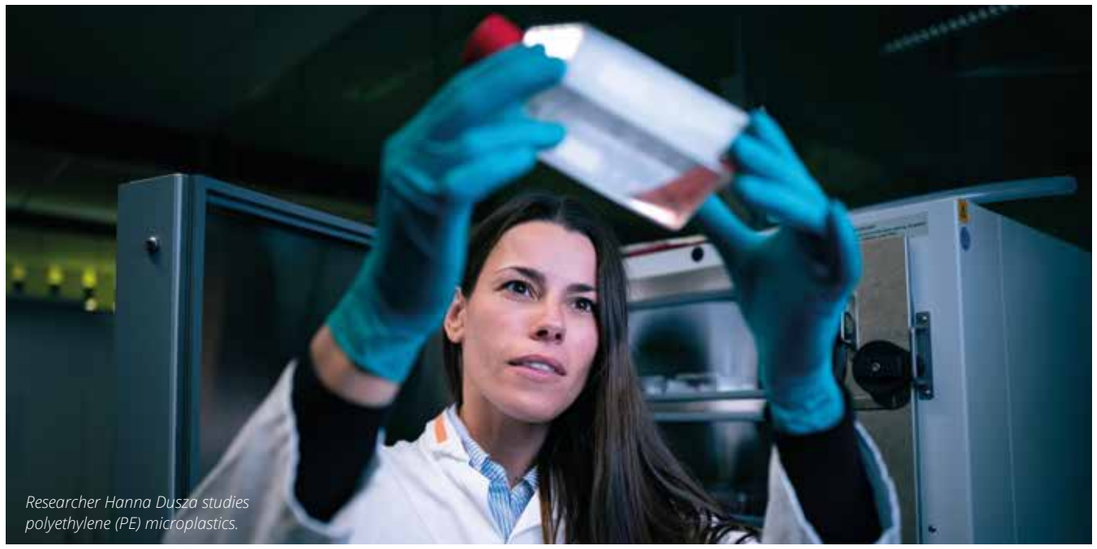
MOMENTUM, a consortium of Dutch toxicologists, chemists, epidemiologists, biologists, knowledge institutes and industry, was established to explore this issue. ZonMw, Health~Holland and the Netherlands Organisation for Applied Scientific Research (TNO) are investing more than five million euros in the project. The sense of urgency is greater than ever, according to Juliette Legler (Utrecht University) and Dick Vethaak (Deltares, a research institute specialising in water and subsoil). 'Goats and sheep graze on fields where agricultural plastics are used on a regular basis. Tiny plastic particles end up in the soil and find their way into the animals' bodies. We then eat them, drink their milk, make cheese from it or wear clothes made from their wool, and the plastics end up accumulating in our bodies as well.'

Detecting particles in the bloodstream

Juliette Legler and Dick Vethaak effortlessly reel off a list of examples, each one more alarming than the last. For example, one of Legler's PhD students, Hanna Dusza, conducted a study last year using cell culture models. She discovered that plastic particles are easily absorbed by placental cells. 'We're now setting up exploratory studies to assess the effects of plastic particles,' explains project leader Legler, Professor of Toxicology at the Faculty of Veterinary Medicine. 'There's quite a bit of evidence to suggest they are being ingested in the human body, but we still don't know much about the health implications. That's why MOMENTUM will be developing measurement methods to detect these particles in human blood, tissue and placentas. We're also working with the industry to see if we can reduce or prevent exposure to plastics.'

The consortium was launched in June 2021. So where do we currently stand?

'All the researchers and partners have met in November 2021 to discuss the results of the fifteen ZonMw breakthrough projects that led to this wonderful consortium', Legler explains. 'MOMENTUM brings together virtually every Dutch researcher working in the field today, which is really unique.' Co-project leader Vethaak, researcher at Deltares and now Emeritus Professor of Water Quality and Health at VU University Amsterdam, adds: ZonMw has also developed a knowledge agenda for the coming ten to fifteen years. We've basically kicked things off by setting up the necessary infrastructure for this research here in the Netherlands. MOMENTUM is a three-year project, but Juliette and I now realise that this research will definitely involve a long-term commitment. We'll barely have achieved any practically applicable results in three years' time, because we still don't have the analytical methods we need to measure the tiniest of the plastic particles. This is a major obstacle. As a result, we have no way of determining whether people are being exposed to them at all. Unfortunately, those minute particles are the most dangerous ones.'



Researcher Hanna Dusza studies polyethylene (PE) microplastics.

So how did you figure that out then?

Vethaak: 'There's already been a lot of research into other, non-plastic particles in air pollution, such as soot. They've been linked to all sorts of diseases. In fact, the WHO recently announced that these particles are already harmful to our health at low concentrations. Not only do they cause all kinds of diseases, they're also responsible for seven million deaths a year worldwide'.

While there have also been various animal experiments involving exposure to micro- and nanoplastics, Vethaak says these are more difficult to interpret because the particles simply aren't comparable to those polluting the environment. 'However, we have known that textile industry workers were exposed to plastic dust particles for several decades now thanks to occupational toxicology, and we also know this has led to all sorts of illnesses including cancer. However, textile workers were exposed to extremely high concentrations. Animal populations are generally exposed to far lower concentrations. Micro/nanoplastic is an umbrella term for a class of diverse and highly complex contaminants – there are so many different types, forms and compounds out there. They can also absorb and release chemicals – such as pathogens – into your body. All in all, it's a very complex issue.'

How do you approach such a complicated puzzle?

'We had to decide what we wanted to focus on', Legler explains. 'What are the biggest gaps in our knowledge of microplastics and human health? Crucially, as Dick already mentioned, you need to be able to prove that we've actually been exposed to it. We know plastics end up in the environment, but how many of those particles ultimately accumulate in our bodies? That requires some incredibly complex analysis, and our current methods are still in their infancy. That's why we're focused on developing effective measurement methods that can detect these minute particles in human blood, lungs and placentas. Determining actual exposure levels is a crucial part of the project.'

'Tiny plastic particles end up in the soil and find their way into the animals' bodies, which we then eat'

Is that your main challenge at the moment?

'Yes. If there hasn't been any exposure, there's obviously no risk', Vethaak responds.

But I thought we had already proven that beyond any doubt?

'The thing is, we can basically only measure the larger particles at the moment. But those are the kinds you excrete or exhale if you've ingested them. The minute particles capable of penetrating deep into the lungs, passing through the intestinal wall and into the bloodstream still can't be accurately measured. Next, you need to answer two other crucial questions: how do they end up there, and where do they ultimately go? Do they accumulate in certain organs, or are they quickly excreted again? What level of risk is acceptable in the case of lifelong exposure? We still don't have solid answers to any of these questions. You'll need to conduct epidemiological studies if you want hard evidence of the effects in humans'.

Could there also be some correlation between soot particles and plastic particles? Perhaps one type 'piggybacks' on the other?

'That's actually a relevant question – both types of particles are released

when we burn plastic or wear out car tyres,' Vethaak continues. Legler: 'Although we unfortunately can't cover everything in this project, MOMENTUM will also examine the presence of pathogens on plastic particles and the potential for human ingestion. How important is that sort of ingestion?'

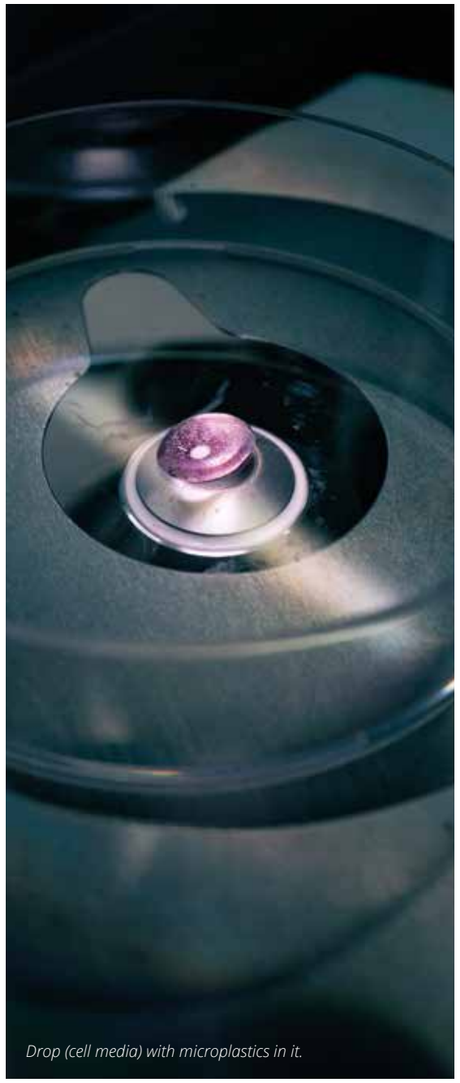
You said you'd mainly be developing measurement methods over the coming three years?
'I think we'll definitely make some headway', Legler says. 'In three years' time, we will have figured out whether our methods can be applied to large populations and identified any biological effects on the human body. After all, we're working with a large group of toxicologists, biologists and collaborating with physicians.'

Which types of plastics would you consider to be the most dangerous?
'We decided to focus on the plastics to which we are most commonly exposed, such as polypropylene and polyvinyl chloride (PVC). One of our partners produces very fine particles from both plastics, which we then use as base materials. We also produce nylon particles for testing purposes. The latter ties in with Dick's concerns about particles from the textile industry. Once they get into your lungs, they can cause some serious problems.' Vethaak: 'We also need to devote more attention to the veterinary dimension – the problem is also affecting livestock farms. Cattle feed can also become contaminated with microplastics, and the same goes for fish feed. Every time you mow grass, you also end up grinding plastic waste which then ends up in the feed you give to pigs and cows. Plastic chemicals are also relevant in that regard. We should be more focused on that, don't you agree, Juliette?' Legler: 'Definitely. We're also working with the Farm Animal division at the faculty to determine how microplastics are affecting farm animals' environments. We conducted an initial study to determine the effects on cow ova, but we'd like to take a broader view. We want to identify all the sources of the plastics found at farms. Do they also end up in cows and their milk? While there are indications that this is the case, there hasn't been any sound, systematic research into microplastics in agriculture.'

'MOMENTUM brings together virtually every Dutch researcher working in this field today, which is really unique'

Plastic particles in shredded carpets

Microplastics are also a common occurrence at riding schools, Vethaak explains. 'Some riding schools use carpet shreds as a riding surface instead of wood shreds. Those shreds tend to be contaminated, and plastic particles get released every time the horses run on them. As a result, both the instructors and pupils are heavily exposed. The same goes for the face masks and food packaging. A lot of plastic particles are released when you microwave something in plastic packaging. The same thing happens when you open plastic bags with a pair of scissors. There's also the ongoing debate about non-stick layers in Teflon pans. Plastic particles are literally everywhere.'


Drop (cell media) with microplastics in it.

'Cattle feed can also become contaminated with microplastics, and the same goes for fish feed'

It's good to hear you're working closely with the industry. I can imagine that might be challenging in light of their commercial interests?
'It is, but we've managed to get the largest umbrella organisations in the plastics industry on board, such as Plastic Europe and the American Chemistry Council,' Legler proudly explains. 'They're also worried and we assume they're genuinely interested in finding solutions. Industrial partners submit their products to us for testing and they're obviously aware we'll be publishing the results. We owe that to the world – our research is being funded by taxpayers.'

So, when will the project have succeeded, what's your biggest ambition?
Legler: 'If we manage to develop effective ways of detecting microplastics in humans. We can then apply those to larger human studies and launch studies on human exposure and its relationship with health problems. If we can make progress in those areas, the project has been successful.' Vethaak adds: 'Thankfully we're not the only ones working towards that goal – there are also other EU projects focused on microplastics.' ■

TEXT: MYRNA TINBERGEN | IMAGE: BAS NIEMANS

LIDWIEN SMIT:
ONE HEALTH AND ENVIRONMENTAL EPIDEMIOLOGY

The world is changing rapidly and we are facing global environmental problems due to climate change, population growth, loss of biodiversity and deterioration of ecosystems. All these changes lead to (new) infectious diseases and affect the spread of non-communicable diseases.

'The Netherlands is a densely populated country with extensive livestock farming' says Lidwien Smit. 'That creates an area of tension with public health, think of Q-fever, the spread of antibiotic-resistant bacteria, and the effects of air pollution, but also the recent SARS-CoV-2 infections between humans and animals on Dutch mink farms. With the current major issues surrounding livestock farming, possible risks to the environment and public health must be tackled in a progressive way. With this chair, I hope to contribute to this, not only in the Netherlands, but worldwide.'

In her research and teaching, Smit focuses on the impact of the living environment on health, from a One Health perspective: the relationship between human, animal and environmental health.

'It really suits my research group to work interdisciplinary on complex issues. One Health is all about cooperation and connection between different disciplines and institutions to improve the health of humans, animals and the environment. I think it's great that the faculty of Veterinary Medicine embraces this vision and wants to show the many facets of how we treat animals in research and education.'

Smit's chair falls under the Institute for Risk Assessment Sciences (IRAS) at the Faculty of Veterinary Medicine and the UMC Utrecht. ■

TEXT: MYRNA TINBERGEN | IMAGE: BAS NIEMANS

‘Ultimately it is the team effort which ensures that everything comes together’

Open Science is one of the pillars of the Utrecht University strategy. Its key features are openness, reliability and relevance for society. Recognising and rewarding employees in a new way is also important for the transition towards Open Science. Paul Boselie explains what the Recognition and Rewards programme entails at Utrecht University, and Debbie Jaarsma and Marianna Tryfonidou detail how this is implemented within the Faculty of Veterinary Medicine.

Paul Boselie, leader of the Recognition and Rewards programme of Utrecht University.

‘We do not shy away from the discussion’

‘Recognition and Rewards is part of the Open Science Programme at Utrecht University, but it also reflects a national development that started in 2019 with a position paper from, amongst others, the Association of Universities in the Netherlands (VSNU). And internationally there are also developments that Utrecht University participates in such as signing the Declaration on Research Assessment (DORA).
‘We have developed a vision document in which we present the so-called TRIPLE model. TRIPLE stands for team spirit, research, impact, professional performance, leadership and education. Team spirit and leadership form the basis of the model, and together, they support the three key domains of the university: education, research and professional performance, such as patient care. Impact is the way in which we work, and it is an integral part of the three domains and how we shape these, for example in the co-creation with societal partners.
We are elaborating the model into a template that the faculties can use. The Executive Board and the deans are fully committed to the new system of Recognition and Rewards and that gives a lot of impetus to the movement. Of course, implementing something new is not without the inevitable friction and resistance. For example, there will be vacancies where people say: but that does not fit in the new system of Recognition and Rewards. We also see that, and we do not shy away from the discussion. In due course, this approach will allow us to make gradual advances towards a different system of Recognition and Rewards.’

Debbie Jaarsma, Dean of the Faculty of Veterinary Medicine

‘Other career pathways will become more important’

‘I always say: focus on the people who work in your organisation. Recognise what they do and what they are good at. And provide them with a perspective too. How can you develop, where does your talent lie and how can you use this talent to contribute to the aims of our faculty community? Everybody has unique qualities that supplement each other within a team. Nowadays, the competition often already starts between students. We want to convince them that teamwork is vital in our modern world. The complex issues we are facing can no longer be solved by individuals.
We will be thinking about the creation of different career possibilities. For example, a career pathway that allows you to become professor in patient care or when you have a background in education. I would be really pleased if people gain the confidence to choose something other than the traditional research pathway. Then we will also acquire a more diverse faculty community.
In time, I hope that our researchers, lecturers and clinicians, actually all of our employees, will be rewarded for what they do in the Netherlands and worldwide. And that this rewarding will be in the form of the grants they acquire but also, for instance, in the form of the educational accomplishments they deliver. That is why it is so important to make everything visible. So, perhaps it can be made apparent in a PhD thesis what the PhD student did within his or her own team to realise impact. Or in the case of fundamental research, it could be stated how this is incorporated in educational material. Once we start doing things like this, then we will have made a lot of progress.’

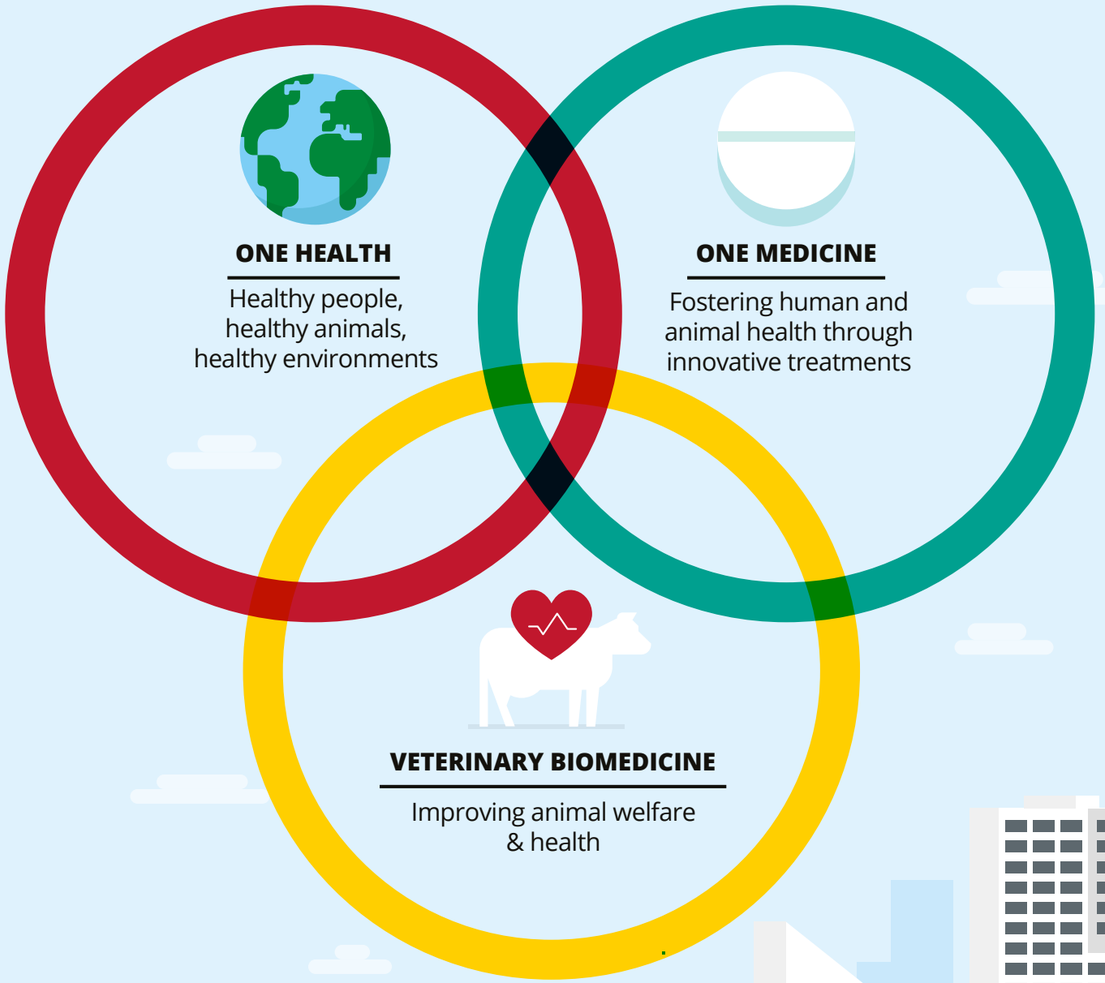
Marianna Tryfonidou, active in the Open Science team of the Faculty of Veterinary Medicine.

‘It is about team effort’

‘We all have different roles and everybody contributes to the outcome. Now it is sometimes only the hotshots who gain recognition, but they cannot achieve this unless they have a fantastic team behind them. One person might have a knack for public engagement, whereas another is good at ensuring that processes work well, while a third focuses more on publications. Ultimately, it’s the team effort, which ensures that everything comes together.
In the Open Science Team of the Faculty of Veterinary Medicine, we are further elaborating the Utrecht University model. We want to obtain information from the organisation about how we can best set up certain things and take small steps to realise the new system of Recognition and Rewards within the organisation. What we definitely do not want to do is produce checklists that increase the workload or that create even more forms for line managers to fill out. If you wish to realise a cultural change, then you should not do that on a very large scale in one go, but rather in small concrete steps. When you convert a position into a task, you can focus more on talent. Once it is clear which talent you have, you will also be able to achieve a certain position without needing the status that this currently requires. In this way, patient care will also acquire a different form of recognition because you can also be an expert and develop in this field without necessarily having to acquire a large research grant. Come what may, we want to reduce the work pressure and increase the work pleasure. And the latter will definitely happen if each person’s qualities are rewarded more.’ ■

TEXT: SJOUKJE VAN DER KOLK | IMAGE: GEERT SNOEIJER AND BAS NIEMANS

OUR RESEARCH FOCUS



Chicken in cage-free environment at Kipster.

Ending the cage age

Between 2018 and 2020, a total of 1.4 million people signed the 'End the Cage Age' petition, which aims to end cage housing of farm animals in Europe. In response to this initiative, the European Parliament commissioned Utrecht researchers to prepare an advisory report on the potential for abolishing cage housing. The researchers presented their report 'End the Cage Age - Looking for Alternatives' to the European Parliament on 13 April 2021.

Behavioural biologists, animal scientists, veterinarians and ethicists from Utrecht University's Faculty of Veterinary Medicine compiled all available scientific literature on potential alternatives to cage housing. 'We were mainly focused on laying hens and pigs. These are the most commonly reared animals and there are already cage-free alternatives available or in development for both species,' explains Bas Rodenburg, Professor of Animal Welfare. As for other animal species – such as dairy and veal calves and rabbits – the researchers presented a brief overview of the current situation and possibilities.

Scavenging, rooting and pecking

'We demonstrated that the abolishment of cage housing would have positive effects on animal behaviour and welfare,' Rodenburg explains. 'Animals in cage-free environments will exhibit their natural behaviours. Chickens and pigs are omnivores, and normally spend the whole day scavenging, rooting and pecking. That's essential for those animals, but they obviously need something to rummage about in, like sand or wood shavings. That's difficult or impossible to achieve in a caged environment.'

'All stakeholders should be involved in the process so that they can help to shape the new livestock industry together'

Additionally, the researchers conducted a sustainability analysis covering all aspects of the production chain and found no differences between cage housing and non-cage alternatives. However, the alternatives did present new risks including a higher risk of social unrest and feather pecking and infectious diseases. In order to ensure a successful transition to cage-free alternatives, farmers will thus have to be properly trained and taught how to use the new systems.

In the case of some species – such as mink, geese and ducks used for foie gras production – no cage-free alternative is available. The alternative would then be a ban on production and a European import ban.

Incentive

The report demonstrated that we can make the transition to cage-free alternatives. The question is, how do we go about that in practice? 'You need to give farmers an incentive to make the switch,' Rodenburg replies. 'The necessary investment has to yield added value for their products. Consumers also have to be willing to pay a bit more, so you need to raise awareness among that group as well.'
In the short term, that will require financial measures such as subsidies for new welfare-friendly systems and animal welfare product labelling to help consumers shop more consciously. In the longer term, legislation could be used to ban certain types of cage housing. Rodenburg: 'Among other key recommendations, we believe that all stakeholders should be involved in the process so that they can help to shape the new livestock industry together.'

Overwhelming support

In May 2021, the European Parliament's Agriculture Committee voted in favour of a motion to ban caged animals in the food industry by 2027, and the proposal was approved by an overwhelming majority of the European Parliament in early June (558 votes in favour, 37 against and 85 abstentions). It's now up to the European Commission to legislate towards phasing out all cages and crates by 2027. ■

TEXT: IRIS KRUIJEN | IMAGE: BAS NIEMANS AND HET FAMILIEVARKEN

Pigs in cage-free environment at Het Familievarken.

CAGE-FREE SYSTEMS

Cage-free systems for sows range from farrowing crates in which the sow is tethered during the first few days before and after farrowing and released after a maximum of one week, to systems where the sow farrows freely and is not tethered. At Family Pig ('Familievarken'), sows are kept in small groups and are free to choose a suitable nest in which to farrow their piglets. The various litters can play with each other and will later be kept in the same pen and group as the finishing pigs. After weaning, the sows return to the large group of pregnant sows. The natural sandy soil and floor feeding encourage both sows and fattening pigs to forage for food in the most natural way possible. An innovative pig toilet system helps to keep the pen clean.

Lifelong learning at Utrecht University

The Faculty of Veterinary Medicine offers high-quality post-academic courses for professionals in the field. Our highly competent lecturers – most of which are EBVS specialists - make use of the latest insights and research results in veterinary medicine.
Because of our unique position as the only Faculty of Veterinary Medicine in the Netherlands, we strive to connect vet students with veterinarians in the field and vice versa, in order to promote reciprocal learning. We have experience with fruitful mixed classrooms, for example in our bachelor elective Zoology of reptiles and amphibians.
We are working together with EBVS and VetCEE to have our courses certified.

Poultry Health Science

Poultry production is a global, fast-growing industry. The production of eggs and poultry meat is no longer just about the lowest costs and highest efficiency. Aspects such as human health, animal welfare, reduction of antibiotics use, social acceptance, and the environment are becoming increasingly important. This requires a thorough and continuous education on poultry health, diagnostics, clinical reasoning, evidence-based veterinary medicine, disease management, animal welfare, food safety, and related matters. The modular course Poultry Health Science offers in-depth knowledge on these topics. This course is provided by the Faculty of Veterinary Medicine in collaboration with Royal GD, Deventer, the Netherlands.

For whom: This course is for veterinarians and postgraduates in Life Sciences working in poultry in a scientific or leading position.
Dates: Module 4 on Avian Influenza starts on April 4, 2022. Module 5 on Enterococci and Streptococci starts on May 30, 2022.

Information about the course and enrollment can be found in this page: www.uu.nl/en/professionals/programmes/poultry-health-science

Zoology of reptiles and amphibians

The main goal of this course is to help participants gain insight in the diversity, anatomy and physiology of reptiles and amphibians, and how these aspects influence their habitats, niches and susceptibility to diseases.
This is an elective course in our Bachelor's programme, which is open to professionals interested in knowing more about zoology of amphibians and reptiles.

For whom: Professionals interested in the zoology of amphibians and reptiles
Dates: Available from February 7, 2022

Information about the course and enrollment can be found in this page: www.uu.nl/en/professionals/programmes/zoology-of-reptiles-and-amphibians

TEXT: LISA DIETZ | IMAGE: BAS NIEMANS

Utrecht University | Utrecht University Fund

Fighting cancer in people and pets

It's not just people who suffer from cancer, our pets do too. What is more, cancers that are considered rare in humans, often occur more frequently in cats and dogs.

That is why, when our veterinary surgeons treat their patients, they don't just remove the tumor. They subsequently use the diseased tissue, with the owner's consent, to grow organoids in a lab. These 3D mini-versions of the original tumor show great potential in the field of precision medicine, and can be used to test drugs beneficial to both human and veterinary cancer patients.

Friends of VetMed supports the development of organoids as a viable and reliable alternative to the use of laboratory animals in the fight against cancers in people and pets.

www.friendsvetmed.org

Together, we'll make a difference
Friends of VetMed

Utrecht University | Veterinary Medicine