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Senior research technician Jaana Rikkinen prepares a bio reactor where the sustainably grown coffee cells will be placed to keep growing at the VTT research lab in Espoo, Finland.



Head of Plant Biotechnology Heiko Rischer shows cells of sustainable coffee at the VTT research lab in Espoo, Finland.



A picture shows sustainably grown coffee once the process is finished, the darker colour is due to the roasting process at the VTT research lab.

— AFP photos

Finnish scientists create 'sustainable' lab-grown coffee

Latte drinkers may in the future be sipping on java sourced from a petri dish rather than a plantation, say scientists behind a new technique to grow what they hope to be sustainable coffee in a lab. "It's really coffee, because there is nothing else than coffee material in the product," Heiko Rischer tells AFP, pointing to a dish of light brown powder.

His team of researchers at the Finnish technical research institute VTT believe their coffee would avoid many of the environmental pitfalls associated with the mass production of one of the world's favourite drinks. The coffee is not ground from beans, but instead grown from a cluster of coffee plant cells under closely controlled temperature, light and oxygen conditions in a bioreactor.

Once roasted, the powder can be

brewed in exactly the same way as conventional coffee. Rischer's team used the same principles of cellular agriculture that are used to produce lab-grown meat, which does not involve the slaughter of livestock and which last year was given approval by Singapore authorities to go on sale for the first time.

"Coffee is of course a problematic product," Rischer said, in part because rising global temperatures are making existing plantations less productive, driving farmers to clear ever larger areas of rainforest for new crops.

"There is the transport issue, the fossil fuel use... so it totally makes sense to look for alternatives," Rischer said. The team is carrying out a fuller analysis of how sustainable their product would be if manufactured on a large scale, but believe it would

use less labour and fewer resources than conventional coffee. "We know already that our water footprint, for example, is much less than what is needed for field growth," Rischer said.

Taste test

For coffee lovers, the key to the success of the lab-grown variety will be in its taste-but so far only a specially trained panel of sensory analysts are authorised to try the new brew because of its status as a "novel food". For the time being, they are only allowed "to taste and spit, but not swallow it," said research scientist Heikki Aisala, an expert in sensory perception who leads the testers on the project. "Compared to regular coffee, the cellular coffee is less bitter," which may be due to a slightly lower caffeine content, Aisala told

AFP, adding that fruitiness is also less prominent in the lab-produced powder. "But that being said, we really have to admit that we are not professional coffee roasters and a lot of the flavour generation actually happens in the roasting process," Rischer said.

Other initiatives are also under way in search of a more sustainable alternative to coffee. The Seattle startup Atomo in September announced it had raised \$11.5 million in funding for its "molecular coffee", which has the same flavour makeup as the drink, but is originated from other organic material than a coffee plant.

But surveys in the US and Canada have suggested widespread public wariness towards lab-grown food substitutes, although less so among younger consumers. Despite the environmental bene-

fits, some food policy specialists have warned that coffee producers' livelihoods could be hit if there is a widespread move towards lab-produced products.

In Helsinki, Rischer estimates it will be a minimum of four years before the team's lab-grown coffee gains the regulatory approval and commercial backing to enable it to sit alongside its conventional cousin on the shelves.

The project has a special significance in Finland, which according to analyst group Statista ranks among the world's top consumers of coffee, averaging 10 kilos (22 pounds) per person every year. "There's definitely a lot of enthusiasm for it," Aisala said. — AFP



A sheep eats seaweed on the beach at North Ronaldsay, Orkney on September 7, 2021.

Orkney's seaweed-eating sheep offer hopes of greener farming

On a tiny island in Scotland's far-flung Orkneys, thousands of sheep spend the winter munching on seaweed, a unique diet that scientists say offers hope for reducing planet-warming methane emissions. Around 60 people share North Ronaldsay — an island just over 3 miles (5 kilometres) long, ringed by rocky beaches and turquoise waters off the north coast of mainland Britain — with the distinctive native sheep.



Sheep farmer Sinclair Scott poses for a photograph by dry-stone wall on North Ronaldsay, Orkney. On a tiny island in Scotland's Orkneys, thousands of sheep happily munch on seaweed all winter, a unique diet that scientists say offers hope for reducing planet-warming methane emissions. — AFP photos

Boasting brown, beige or black wool, the animals are hemmed into its foreshore owing to a large system of stone walls — called a sheep dyke — built in the early 19th century to keep them away from fields and roads. The island's crofters — people who live and work on so-called croft agricultural land — wanted to use every available space to grow crops and as pasture for cows. The unintended result: in summer the sheep can nibble on grass, but by winter eating the plentiful seaweed is their only means of survival. While some other mammals — including Shetland ponies native to the neighbouring island chain, and red deer — are known to snack on seaweed, scientists say that the North Ronaldsay sheep are unique worldwide for spending months eating only the marine plants.

Methane reduction

With the world facing a deepening climate emergency, they are increasingly seen by some as a case study that could lead to a breakthrough in raising livestock, which is a major source of greenhouse gases. Farm animals belch and fart methane gas which, though trivial

sounding, is about 30 times more powerful than carbon dioxide at trapping heat in the atmosphere.

Given the vast scale of the global meat industry, the issue has become a major focus for climate scientists — just as world leaders prepare to gather in the Scottish city Glasgow from Sunday for the crucial COP26 summit. The seaweed diet of the Orkney sheep has an effect on their complex digestive system and appears to reduce the amount of methane produced.

"There's different components in the seaweed that actually interfere with the process (of) how methane is made," said Gordon McDougall, a researcher at The James Hutton Institute in Dundee in eastern Scotland who has been examining the sheep's diet for two decades. Researchers at The University of California, Davis, published results in March showing that a "bit of seaweed in cattle feed could reduce methane emissions from beef cattle as much as 82 percent".

David Beattie, another James Hutton Institute scientist, stressed there is huge interest in such innovation. "There's a really big movement within the industry to try and cut out the carbon footprint that the industry as a whole has," he told AFP. "I see seaweed playing a part in that."

Scale

This would not necessarily mean cows and sheep switching to a diet entirely comprised of seaweed like the North Ronaldsay sheep, but it could supplement their usual feed. Seaweed is not available in large enough quantities to feed so many animals, McDougall noted, and taking away too much from the sea could also damage the environment and ecosystems.

But the marine plants — good sources of minerals, vitamins and omega-3 fatty acids — could partly replace soy, which is heavily used in animal feed but transported for thousands of miles and linked to deforestation. Researchers still need to determine the types and quantities of seaweed which could be best suited to adding to feed.

"And then, can you scale that up to a level where you'd actually have an effect on the overall UK farming?" said McDougall. The plump North Ronaldsay sheep, who chow down strands of seaweed as if they were spaghetti, are set to keep providing a useful case study. — AFP

Myths, marriages and Mako: Japan's imperial family

Japan's Princess Mako married her sweetheart Kei Komuro on Tuesday forgoing traditional rites following years of controversy. Here are some things to know about what is considered the world's oldest monarchy:

Who are Japan's royals?

Mako is the niece of Emperor Naruhito, who came to the throne in 2019 after his father abdicated, beginning a new imperial era named "Reiwa". The family has a myth-filled history dating back more than 2,600 years and is said to be descended from the legendary sun goddess Amaterasu.

While 61-year-old Naruhito holds no political power under Japan's post-war constitution, he is an important symbolic figurehead. The emperor and empress host state visits and ritual ceremonies at the Imperial Palace, their main residence within vast grounds in the heart of Tokyo. But their status can be a sensitive topic in Japan, given its 20th century history of war waged in the name of Mako's great-grandfather Hirohito.

Why is Mako leaving?

The Imperial Household Law, in place since 1947, only allows male family members to ascend the Chrysanthemum Throne, while women lose their title if they wed a commoner. This means Mako, 30,



File photo shows Japan's Princess Mako (R), the eldest daughter of Prince Akishino and Princess Kiko, looking at her fiancée Kei Komuro (L), as they meet the media during a press conference to announce their engagement at the Akasaka East Residence in Tokyo. — AFP

has left the royal family after marrying law graduate Komuro, four years after they first announced their engagement. Mako's 15-year-old brother Hisahito is currently the only male heir to the throne other than their father, Crown Prince Akishino.

If Hisahito does not have a male child, the line of succession will be broken-prompting some debate about changing the rules, with polls showing the Japanese public broadly support women being allowed to rule. Although traditionalists are vehemently against the idea, Japan has had as many as eight empresses in the past. The last one, Gosakuramachi, was on the throne about 250 years ago.

Why such a scandal?

The Japanese royal family faces huge pressure to conform to tradition and meet exacting standards of behaviour, with each move intensely scrutinised. A furore erupted after tabloid reports alleged Komuro's mother had failed to repay a four-million-yen (\$35,000) loan from a former fiancé.

When the couple's union was finally announced earlier this month, the Imperial Household Agency said Mako was suffer-

ing complex PTSD because of the media coverage. Mako and Komuro did not conduct traditional wedding rites and gave up the lump-sum payment usually made to women marrying out of the royal family, reportedly worth up to 153 million yen.

Has this happened before?

It is the first time in Japan's post-war history that a royal wedding took place with no elaborate rituals. Other female royals have suffered from stress-related illnesses, especially after joining the family through marriage. Mako's aunt Empress Masako, a former high-flying diplomat, has struggled for years, with some observers blaming the pressure of producing a male heir. The imperial couple have one daughter, Aiko, who is 19 years old.

And Michiko, wife to Naruhito's father Akihito and the first commoner to marry into the family, also faced criticism from hardliners and tabloid gossip, especially in the early years of their marriage. She once lost her voice for months, and has also suffered stomach problems linked to stress. — AFP

Washington, District of Cats: US capital first city to count its felines

A striped feline leaps from a rock under the shade of a tree on a late October morning. As its front paws touch the ground, the whiskered creature looks up, eyes darting left. A wildlife camera clicks and captures the scene. It's a cat — and the location isn't a remote rainforest, but the capital of the United States. The photo is part of the DC Cat Count, a first of its kind, three-year effort by animal welfare advocates, conservationists and scientists to enumerate every Felis catus in Washington. The team behind the study says it provides an accurate estimate of the size of the city's indoor, outdoor and

shelter population. It found there are about 200,000 cats in the District of Columbia, with about half of them living indoors only, said Tyler Flockhart, a conservation biologist and science lead on the DC Cat Count. The other half is a group that includes owned cats with limited or unlimited access outdoors, stray cats, and roughly 3,000 to 4,000 feral cats who avoid interactions with humans, Flockhart said. "I don't think that you can find another wild mammal — another wild carnivore — that occurs at that density anywhere in the world," he said, of cats and urban environments. "I think that this is really sort of an interesting idea that we can have so many cats in such a small location."

Consensus for a cat census

The study brought together groups that are often at odds over the impact that outdoor cats have on wildlife and landscape. While conservationists worry that outdoor cats can decimate bird populations, animal advocates seek to ensure the welfare and

safety of cats seeking to survive outside. "What was really groundbreaking with the DC Cat Count was these organizations coming together," said Stephanie Shain, the chief operating officer of the Humane Rescue Alliance (HRA), which took part in the study. They were driven by a common purpose "to really focus not on who is right or who has been right, but really focus on getting it right — finding out the information, analyzing the data," she added. Shain said HRA recommends that cat owners keep their feline friends indoors only in order to keep them safe and avoid damaging wildlife. "I was pleased to see how many people actually follow that advice," she said.

To count all the cats who call the seat of American power home, researchers surveyed more than 2,600 residents, analyzed animal shelter records, walked along specific routes in search of cats and set up wildlife cameras in more than 1,500 spots. "This is probably the most thorough analysis of cats of any city in the world," Flockhart said. He and other researchers continue to analyze the data collected since 2018 and the research has already led to several peer-reviewed scientific papers. The DC Cat Count team also made an extensive toolkit available online with protocols and guidelines for organizations wishing to carry out their own cat census.

Besides cats, the camera traps also snapped pictures of numerous animals including squirrels, raccoons, foxes, deer — and even a bobcat. "There's a huge diversity of wildlife in our cities," Flockhart said. "We tend to think of it as humans-only, and it could be anything but the case. There are all types of wildlife, from rodents all the way up to large predators." — AFP



Humane Rescue Alliance (HRA) employees Alyx Smith (left) and David Ford (right) hold cats wrapped in towels at an HRA animal shelter in Washington.