



Justin Dickens and his wife, Amy, rear Speckle Park cattle – a breed they say produces fewer carbon emissions and less methane. PHOTO: RUBY CANNING/MAVSTAR PHOTOGRAPHY

Australian agtech a testbed for farming's future

Pick of the crop Fungi and 'robotic bees' are among technologies being tested in an industry confronting climate change, writes Nic Fildes.

Justin Dickens is driving his truck along the edges of his farm outside the town of Orange in NSW. Lifting both hands off the wheel, he gestures to a group of calves in a field. They are going to make "good eating", he says, checking their weight gain in an app on his phone.

Dickens and his wife, Amy, first-generation cattle farmers, rear Speckle Park cattle – a breed that produces fewer carbon emissions and less methane than rival breeds in Australia, they say. And now they have the data to prove it.

Their farm is all about the numbers, Dickens says. They have installed Australian-made sensors across the property that monitor how much each cow is eating, which pastures are more productive, whether a specific animal is struggling, and whether anything unusual is going on with the water tanks.

"If a cow is getting crook or has worms, we can see it in the tail," he says – the tail belonging, in this instance, to the data rather than the animal.

Agricultural technology – often called "agtech" – has been dubbed the new green revolution. Robotics and artificial intelligence have made their presence felt in commercial greenhouses, potato fields and fruit farms; synthesised products such as dairy-free

cheese and plant-based proteins and lab-grown meats have appeared on supermarket shelves.

More than \$US200 billion (\$318 billion) of investment has been poured into the sector globally in the past decade, according to AgFunder, a venture fund that compiles data on the food technology sector, funding attempts to grow crops, rear animals and create food more efficiently and sustainably – not to mention strengthen food security in a volatile geopolitical environment.

While the US and China have been the biggest recipients of that investment, Australia is quietly becoming an agtech hotbed.

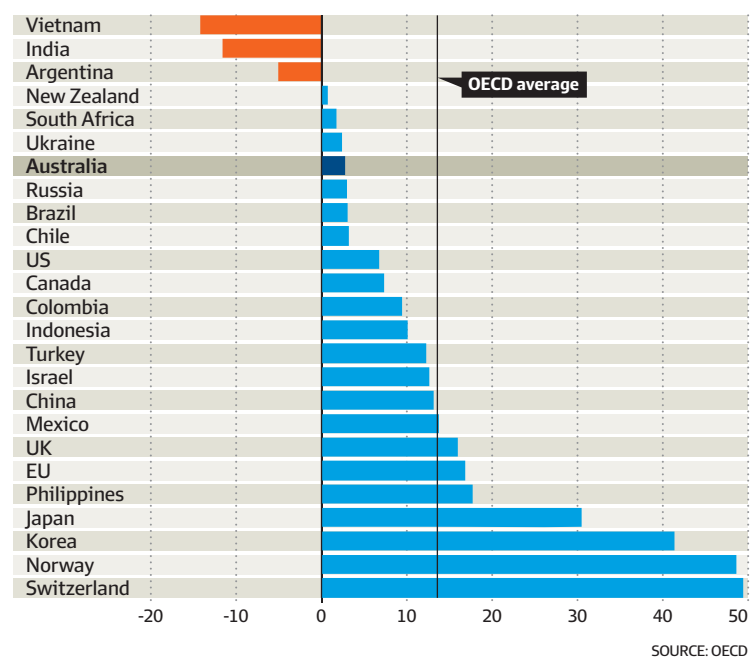
Some of the innovations being trialled in the country – from platforms that track emissions data at farm level to experimental fungal spores that replenish exhausted soil – are not simply changing the way local farmers operate, but also attracting attention from international investors.

A pragmatic, outback-hardened approach to research and development means that there is a culture of risk-taking among Australian farmers. According to a survey by research company Kynetech, its farmers are the world's second-biggest adopters of technology after the US.

"We attack it in a different way," says Keryn McLean, head of digital farming at Bayer's Australian crop science divi-

All on their own

Farmer revenues derived from government support, 2023 (%)



sion. "We're pushing the bar as far as we can. The rest of the world can learn from that."

According to AgFunder's most recent Asia-Pacific report, 85 deals were struck in Australia's agtech sector in 2023 at a value of \$US253 million – less than a quarter of the \$US1.4 billion raised in China that year, but ahead of Japan and South Korea. Data for 2024 showed a slowdown across the region, but the report pointed to "renewed deal activity" in Australia. According to Deloitte, R&D investment in agtech in Australia increased to \$3 billion in the fiscal year 2024, from \$2.9 billion a year earlier.

Agtech funding "dropped sharply" last year, says Duncan Stewart, Deloitte's director of research for the technology, media and telecommunications industry. "Globally, across multiple categories of private equity and venture capital investing, the first half of 2024 was abnormally low."

But amid this, Stewart adds, Australia has emerged as somewhere that could "punch above its weight".

Several factors combine to make Australia an agtech crucible. The coun-

try's vast agricultural system is a vital part of the economy – Australia's farming, forestry and fisheries are expected to be worth almost \$100 billion this year, or about 3 per cent of gross domestic product.

Its position on the front line of climate change has been an incentive for its agricultural sector to rethink its ways of doing things. And the country's comparatively low level of subsidies – the equivalent of just 2 per cent of their farm receipts, compared with 10 per cent in the US and 20 per cent in the EU – means that Australian farmers are always looking for ways to innovate and streamline.

"Aussie farmers face challenges and their opportunities are hard-earned," says Jonathon Quigley, who leads the SparkLabs Cultiv8 accelerator fund, which has helped support 50 agrifood start-ups since it launched in NSW in 2017. "This is genuine investment in technology where it makes sense."

Dimitri Kusnezov, who served as under secretary for science and technology at the US Department of Homeland Security under the Biden administration, says that Australia

could serve as an "excellent test bed" for the rest of the world, particularly when it comes to food security.

"Harnessing our collective expertise and data will not only help protect the economic interests of our agricultural sectors, but also prevent those with harmful intent from using food as a weapon," he says.

The centre of this burgeoning activity is Orange, four hours' drive to the west of Sydney, a former gold mining town now known for its cool-weather vineyards. In the past five years, it has become a hub for dozens of small start-ups, research scientists and funds focusing on the intersection between farming and technology.

In a laboratory, some 80 kilometres from the Dickens' farm, product development scientist Anders Claassens is peering at an iPhone rigged to the top of a microscope. The screen shows fungal spores that he and his team are developing into a supplement that will suck carbon into worn-out soil.

The company he works for, Loam Bio, is among the most prominent of the area's new-generation businesses. Founded in Orange in 2019, it now has operations in Calgary in Canada, Sao Paulo in Brazil and Minneapolis in the US, and has attracted \$150 million in investment from funds controlled by Salesforce's Marc Benioff, Tobi Lütke of Shopify and Atlassian's Mike Cannon-Brookes. The company says its spore supplement is now being tested across tens of thousands of hectares of land around the world.

Claassens explains how the microbial spores, which have been adapted from various nutrient-scavenging fungi, work. By restoring fungal networks to soil, carbon capture and storage can be improved and the plants' nutrient uptake increased. For Claassens, it is about restoring the symbiotic relationship between the organisms.

"The fungi are in it for themselves and the plants are in it for themselves; it's a market function," he says with a laugh. "They're insider trading."

For Robert Oppenheimer, Loam Bio's head of research, what they're doing here could help reverse the effects of intensive farming, not just in Australia but in many other places too. "Eighty years of pesticides has really had a negative impact on the soil and the fungal population," he says.

Loam Bio has ambitions to turn its fungi into a product that can be purchased off the shelf, alongside more traditional fertilisers and weed killers. To boost its international reach, the company has recently hired the former head of computational biology at Swiss agtech giant Syngenta to lead its research in the US.

Also part of the Orange cluster is Cauldron, a "precision fermentation" start-up attempting to create everything from food additives to alternatives to plastic, which received funding worth \$6.25 million last year in a round led by Horizon Ventures. ExoFlare, which specialises in biosecurity data and whose platform has been used to track Australian bird flu outbreaks, is also in the region.

Businesses from overseas are also flocking to the regional hub. Arugga AI Farming, an Israeli agricultural robotics start-up founded in 2017, came to Orange in 2020 with the aid of the SparkLabs incubator to test its so-called "robotic bee" – a large autonomous device used to pollinate tomato plants in the absence of insects.

"Australia presented a great challenge for pollination," says Arugga's founder Iddo Geltner, explaining that, because of biosecurity regulations, the country does not import European bumblebees to pollinate tomatoes, as is the case in most countries. That made it an ideal test environment.

Israel is another global agtech centre, with expertise in greenhouses "out of necessity" owing to the country's shortage of water, but has seen relatively little deployment of agricultural automation and robotics, Geltner says. Australia, however, was open to adopt-

ing his “bees” – robots that trundle between rows of plants, using cameras and AI to spot disease, identify which flowers are ready, and then use blasts of air to pollinate them.

“It weighs 300 kilos. That would be quite a sting,” says Tal Kanety, agronomy manager at Costa Group, one of Australia’s largest tomato growers, which now has 27 robotic pollinators operating across its tomato farms, increasing yields and profitability. They have since been deployed by Thanet Earth in Kent, one of the UK’s largest tomato producers.

Kanety says that the adoption of the robots had a significant impact on Costa’s productivity. “This is the holy grail of sustainability – to produce more within the same space,” he says.

Agriculture has long been seen as a valuable asset class by big investors. The Sydney-based asset manager Macquarie has amassed a huge stake in farming – its Paraway Pastoral Company now owns 4.5 million hectares, as well as being one of the country’s largest cotton producers and owning a majority stake in one of Australia’s biggest fruit suppliers.

Tech has a strong role to play in delivering Australia’s agricultural potential, says Elizabeth O’Leary, who has run Macquarie’s agricultural operations since 2013. “We’re already seeing efficiency and productivity benefits of these types of innovative ag-technologies right across our portfolio,” she says.

We’ve focused on more practical solutions for our farmers, based on efficiency and the environment.

Malcolm Nutt, Cultiv8 Funds Management

Smaller, more focused investors are piling into Australian agtech too, including climate, investment and agricultural-focused funds such as the local division of SparkLabs Group as well as Australia-based companies Mandalay Venture Partners and Main Sequence. The venture capital arms of large-cap companies such as Woolworths, GrainCorp and Telstra have also become involved.

Adrian Turner, ExoFlare’s co-founder and chief executive, argues that Australia leads the world when it comes to biosecurity, which positions the country well to develop technology that can help secure supply chains. “Food is going to be the next contested domain after communications and IT systems,” he says, pointing to the disruption to the grain and fertiliser sectors after Russia’s invasion of Ukraine.

Over the past couple of years, the agtech sector has experienced what some have called a “great reset”, as money has become harder to raise and speculative technologies such as alternative meat and novel farming methods have struggled to deliver returns.

Malcolm Nutt, a partner at Cultiv8 Funds Management, says that Australia’s burgeoning agtech sector has



Malcolm Nutt of Cultiv8 Funds Management says Australia is working on things farmers will actually use. PHOTO: MONIQUE LOVICK

benefited from a flight of hot money out of what he calls “trendy” investments in areas like vertical farming and alternative proteins – technologies that have sucked up a huge amount of capital but haven’t yet paid off.

Shares in high-profile products including Beyond Meat and Oatly have crashed due to slow adoption by consumers. AgFunder’s report showed that global agtech funding dropped almost 50 per cent in 2023 as “jaundiced” investors struck fewer and smaller deals, with the US sector’s share of investments dropping from 40 per cent to 30 per cent.

“Australia didn’t ride on the back of that hype,” Nutt says. “We’ve focused on more practical solutions for our farmers, based on efficiency and the environment. Things they are prepared to use.”

Stewart at Deloitte agrees: “Probably the most important driver of agtech is farmers saying, ‘I’m spending too much money on fertiliser and water and energy. If I buy this thing that costs money, I will be able to use less of that.’ There is an actual economic rationale.”

To expand further, Australian agtech – like the country’s agricultural industry, which exports 75 per cent of its produce – needs to head overseas, says David Lord, a manager at AgriFutures Australia, the federal government’s research and development fund. “We have to look to a global market,” he says. “If we do that, we have a much higher chance of capturing that value.”

Lord says that there has been a con-

certed push by Australian authorities to transfer the “powerhouse” reputation the country already enjoys in agriculture into agtech. He points to GrowAG, a seed funding platform linking Australian start-ups with investors that has raised \$183 million for small agtech companies, and notes that half of that money is from overseas.

It sits alongside other research funding and the NSW government’s Farms of the Future program, which helps educate farmers about agtech. The federal government has invested \$1.1 billion to boost data coverage across Australia’s outback, a scheme that offers farmers rebates on equipment including antennas as well as water and soil-monitoring probes.

Many of Orange’s start-ups are expanding into the US and Europe, but some believe there is greater potential in developing markets, especially in the Indo-Pacific and South-East Asia.

“Lots of groups are targeting the US and UK, but it is South-East Asia that is the real untapped opportunity,” says investor Mark Gustowski, partner and chair of Mandalay Venture Partners, pointing out that countries such as India, Bangladesh and Indonesia need to boost farming productivity to feed their growing populations.

“If we don’t do it, someone else will reap the benefits,” he says.

Stewart says that South Asia is a tempting target too. “If India becomes less likely to develop its own agtech solutions, they become more likely to buy them from somewhere else,” he says. “Australia is a heck of a lot closer than a lot of other places.”

Tom Bishop, director of Sydney University’s Precision Agriculture Laboratory, recognises the scale of the challenge. “They won’t all survive,” he says of the crop of Aussie start-ups, but he believes some will certainly make a global mark, as Australian companies and brands have in the past.

“There’s nothing wrong with being a good Aussie rock band playing pubs, but in terms of money, impact and global influence, we’ve shown it’s possible,” he says. **AFR**

ADDITIONAL REPORTING: SUSANNAH SAVAGE FINANCIAL TIMES

Trump and Putin: the art of the deal

Friends or foes Both leaders are keen to land an agreement and it could go beyond Ukraine, write David E. Sanger and Anton Troianovski.

They have been circling each other carefully for a week now – sending out invitations to talk, mixing a few jabs with ego-stroking, suggesting that the only way to end the Ukraine war is for the two of them to meet, presumably without the Ukrainians.

President Donald Trump and Russian President Vladimir Putin, whose relationship was always the subject of mystery and psychodrama in the first Trump term, are at it again. But it is not a simple rerun. Trump was unusually harsh in his rhetoric last week. He said Putin was “destroying Russia” and threatened sanctions and tariffs against the country if it didn’t come to the negotiating table – a fairly empty threat given the tiny amount of trade between the United States and Russia.

Calculating and understated as ever, Putin has responded with flattery, agreeing with Trump that Russia would not have invaded Ukraine had Trump been president three years ago. He repeated that he was ready to sit down and negotiate over the fate of Europe, superpower to superpower, leader to leader.



ILLUSTRATION: BETHANY RAE

Both men seem to envision taking on the whole relationship between Moscow and Washington, possibly including revived nuclear arms talks, a conversation that has a looming deadline: The major treaty limiting the arsenals of both nations expires in almost exactly a year. After that, they would be free to pursue the kind of arms race the world has not seen since the deepest days of the Cold War.

Recalling conversations with Putin in 2020, before his defeat in the US election that year, Trump insisted last week, “We want to see if we can denuclearise, and I think that’s very possible.” He appeared to be assuming that China would engage in the same conversation. (It has refused, at least so far.)

While he kept using the word “denuclearise”, Trump almost certainly meant negotiating a new agreement to reduce – not eliminate – the stockpiles of strategic nuclear weapons, which can cross continents. For his part, Putin talked about reviving discussions on “strategic stability”, the term among negotiators for talks that cover not just the number of nuclear weapons deployed on each side, but where they are based and how they are inspected, and steps to deter their use.

The last, tentative arms control talks were ended shortly before Russia’s full-scale invasion of Ukraine in 2022. Putin has argued since then that any talks on limiting nuclear arms should also cover the war in Ukraine. The Biden administration refused to mix the two, fearing that Putin’s real goal was to

trade limits on its nuclear arsenal for the territory he had captured in Ukraine and other concessions.

But Trump seems open to a broader negotiation, which is exactly what Putin would like because it could enable him to make that trade-off.

Trump clearly wants to establish himself as a peacemaker. In his first term he suggested he deserved the Nobel Peace Prize, and bringing some kind of end to Europe’s biggest war since World War II would bolster his argument.

“For all these blustering exchanges, the thing Putin most wants to hear is that this is a deal Russia and the US will strike by themselves,” said Stephen Sestanovich, a Russian and Eurasian studies expert at the Council on Foreign Relations.

Putin, confident of his position on Ukraine’s battlefields despite Russia’s enormous casualties, has been trying to telegraph a wait-and-see approach to Trump. Russia’s war goals haven’t changed, he has said, and while Moscow is ready for talks, it will only do so on its own terms.

Putin has strongly signalled that, at a minimum, he would demand to keep the roughly 20 per cent of Ukraine that Russia now controls, as well as an agreement ruling out NATO membership for Ukraine and limiting the size of its military. At the same time, Putin has made clear his eagerness to engage with Trump – and, more broadly, with the US, after three years of diplomatic isolation by the Biden administration.

On Friday, in a stage-managed answer to a state television reporter’s question, Putin said: “It is probably better for us to meet and, based on today’s realities, talk calmly about all areas that are of interest to both the US and Russia.” He brushed aside Trump’s sanctions threats, calling him “smart” and “pragmatic”, and spoke Trump’s language by saying the 2020 election had been “stolen” from him.

Like Trump, Putin has hinted at a desire to discuss a much broader set of issues with Trump than only the war in Ukraine. On Friday, Putin said the Kremlin and the Trump administration could “jointly look for solutions to the key issues of today, including strategic stability and the economy”.

The “strategic stability” reference signalled potential interest in arms control talks, which the Kremlin briefly began under Biden in 2021. “We discussed the range of arms control and nonproliferation issues, from AI in weapons to renewal of New START,” Wendy Sherman, the former deputy secretary of state, who conducted the talks for the US side, said in an email. (New START is the arms control treaty that has been partly suspended by Russia, and expires in February 2026.)

Even as Putin welcomes talks with Trump, Russian officials aren’t backing away from their overall message about the US as a malignant force – one sign of how the Kremlin is hedging its bets in case those discussions do not go well.

Sherman, who has extensive experience negotiating with Russia, warns that if talks with Russia begin, the Trump administration should be ready. “Putin will want what he has always said he wanted: As much territory as possible, no Ukraine ever in NATO, no Western nuclear weapons in Europe that could target Russia.” Given that, she bets that actually negotiating a follow-on to the New START treaty “is likely low on his list”. **AFR**

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