



Shiok Shrimp Dumplings, or "siew mai" made with clean shrimp grown from shrimp cells. Shiok Meats is a cell-based clean meat company. PHOTO: LIANHE ZAOBAO



Esco Aster's facility in Ayer Rajah Crescent was given approval and started production of cell-cultured chicken in July last year. PHOTO: ESCO ASTER



A 3D printed plant-based steak mimicking beef produced by Israeli start-up Redefine Meat, at an event to launch its New-Meat product range in Tel Aviv, Israel, last November. In Singapore, researchers at the Singapore University of Technology and Design are taking the lead on creating innovative plant-based proteins using 3D printers. PHOTO: REUTERS

countries to go all-in on building new methods of protein production, because the nation's limited availability of natural resources makes it acutely vulnerable to food supply disruptions.

But the resource scarcity that Singapore has long endured could also soon become the norm in other Asean nations if consumption of conventional chicken, pork, steak and other energy-intensive foods continues to climb.

For perspective, chickens are the most efficient animals for turning crops into meat, yet according to the World Resource Institute, a chicken has to consume nine calories of crops to produce just one calorie of chicken meat.

That's 800 per cent food waste – the equivalent of preparing nine plates of food and throwing eight of them in the garbage.

As per capita meat consumption rates grow, resource scarcity will inevitably become more common, which may lead Thailand, Vietnam and other nations with large agricultural sectors to look at Singapore's novel food ecosystem as the shining example of a smarter path forward.

While Singapore's political leadership may be motivated primarily by increasing food safety and security for the long term, the investments the Government is making in alternative protein production also position the country to score a major windfall if plant-based meat consumption takes off across Asia – as studies suggest that it could.

When public opinion research firm GlobeScan surveyed 27,000 people in dozens of countries, more than 50 per cent of all participants from China, India and several other Asian countries answered that – if the taste and cost are equal – they want their meat to come from plants, not animals.

"If" is the operative word there as most plant-based meats cost substantially more than conventional meat present and have yet to perfectly nail the flavour profiles that mainstream consumers expect.

But ask anyone in the food industry today and they will tell you that the potential is clearly there.

Whether a massive shift towards plant-based meat is ultimately driven by changing consumer preferences or simply out of necessity as South-east Asia's insatiable appetite for protein forces food production to get more efficient, all roads will lead back to Singapore.

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Science Talk

Bold and brilliant bet on making meat from plants

GLOBAL FOODHUB

Singapore is such a central hub, many of the big food manufacturers and companies are here. I can visit suppliers, customers, a handful of them in the same day by just going up and down a single building.



MR DOMINIQUE KULL, whose company SGProtein is planning to open South-east Asia's first large-scale contract manufacturing facility for alternative meats.

Ryan Huling

Rapid economic growth over the past decades has triggered an unprecedented surge in demand for protein-dense foods at a time of diminishing natural resources.

The precarious combination has turned the current global food system into a runaway train, picking up speed as it races towards a cliff.

In the 30-year span between 1989 and 2019, global meat production nearly doubled – from 174 million to 337 million tonnes – driven in large part by emerging economies across Asia.

In the coming decades, Asia's appetite for conventional meat and seafood has been projected to increase by another 70-plus per cent by 2050, contributing to historic levels of deforestation, water depletion and greenhouse gas emissions.

That is, unless Singapore has anything to say about it.

Seeing a code-red strain on resources in the near future, officials in the city-state have invested enormous sums of money in radically

reimagining what meat production looks like before it is too late.

New research released last month by The Good Food Institute Asia Pacific (GFI APAC) shows that despite Singapore's minuscule amount of farable land, it ended last year with South-east Asia's most advanced infrastructure for producing meat from plants.

Plant-based meat aims to retain the aspect of meat people like most – the way it tastes – while dramatically reducing its carbon footprint.

Research shows that producing a plant-based burger can emit 90 per cent less greenhouse gases, require 99 per cent less water, 46 per cent less energy and 93 per cent less land compared with a quarter pound of American beef.

Despite these positive attributes, Singapore's strategic pivot towards more climate-resilient alternative proteins has a very steep hill to climb. In 2020, conventional animal meat accounted for a staggering 99.9 per cent of the city-state's total meat sales, with plant-based meat comprising less than one-tenth of 1 per cent.

If you take a closer look though, signs are everywhere that major

changes are coming.

Spurred along by the Government's full-throated support for sustainable foods, GFI APAC's new data shows that more than 60 public and private entities are now working to rapidly accelerate Singapore's plant-based meat sector.

With astonishing speed, entire networks of pilot production facilities, raw ingredient suppliers, contract manufacturers, research institutions and equipment engineers have coalesced around the mission of scaling up plant-based protein for domestic consumption and global export.

As a result, Singapore now boasts more foreign-owned food and beverage research and development centres than any other city in the world.

New facilities are also coming online at a frenetic pace, including the Republic's first industrial-scale plant protein innovation centre and its first fully automated plant-based meat factory – both of which opened last year.

This month, the National University of Singapore and Nanyang Technological University will both offer semester-long modules fo-

cused specifically on the science of alternative proteins.

Not to be outdone, the Singapore Institute of Technology has announced the launch of the city-state's first shared facility for small-batch production of novel foods, and researchers at the Singapore University of Technology and Design are taking the lead on creating innovative plant-based proteins using 3D printers.

This dense concentration of powerful institutions and service providers has had a force-multiplying effect, allowing Singapore to nimble pivot from being an import-reliant microstate to a global hub of food capabilities.

As Mr Dominique Kull, whose company SGProtein is planning to open South-east Asia's first large-scale contract manufacturing facility for alternative meats, told GFI APAC: "Singapore is such a central hub, many of the big food manufacturers and companies are here. I can visit suppliers, customers, a handful of them in the same day by just going up and down a single building."

It is no coincidence that Singapore has been among the earliest