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Kiwis to explore using fungi to make fake meat from biowaste

Singaporean researchers will join Auckland's Off Piste Provisions to explore new frontier using fermentation to make fake meat.



Fungi is at the heart of a new development in fake meat and protein.

 Dita De Boni
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An Auckland alternate protein company has struck a deal with researchers in Singapore to work together and create fake meat from fermented biowaste, with which it hopes to further springboard into large-scale offshore markets including China.

Off-Piste Provisions, which is based at South Auckland's government-supported, pilot-scale food processing facility The FoodBowl, is also in the process of raising \$15 million with which to build an export-grade fermentation plant to produce the meat substitute once the R&D side of the process is ironed out.

The centuries-old process of fermentation is a well-known one: most typically use yeast to convert sugars into alcohol (and carbon dioxide as a by-product). Increasingly however, offshore companies interested in the alternative meat space are looking at using fungi – a microbe – to break down carbohydrate and create protein as a by-product.

The fungi-based food product needs much less processing than other meat alternatives and pricked the interest of Off-Piste founder and chief executive Jade Gray, and he and his team started talking to very early-stage ventures using the technology around the world more than a year ago.

“We spoke to various companies in this space and in the course of that came across the team at Singapore’s Nanyang Technological University, lead by Professor William Chen,” Gray told *NBR*.

After much communication, the FoodBowl’s chair and CEO accompanied Prime Minister Jacinda Ardern to Singapore in April this year to meet and review the prospective research partner, and a deal was done to jointly explore the mushroom cultivation technology.



Off-Piste Provisions founder Jade Gray.

The project aims to have a consumer product on the shelves by the end of 2024, having first invested millions in an Auckland-based factory to conduct the fermentation. Gray said taking a punt on building out a facility is “not for the faint-hearted – but we believe we have the timing right on this one – if New Zealand has any hope of reaching its methane emission targets set at COP26, we need to have these kinds of plays happening now because they take time to scale up.”

Fermentation

Alternate meat made through fermentation is a new frontier in fake meat, following plant-based meat substitutes and cell-cultured meat grown in labs.

Plant-based meats are the most widely-eaten vegan meat products at the moment, but some contain levels of sodium, fat, and other additives that proponents of clean living do not like.

That’s the beauty of the fermented product, Gray told *NBR*.

“Many consumers do not want to be eating highly processed foods ... there’s a small amount of processing done for the fermented product but it is very different from the extrusion done for plant-

based

meats.



Prime Minister Jacinda Ardern at The FoodBowl to talk to Off-Piste Provisions.

“The protein grown by fermentation is a whole food; it’s like eating a mushroom – what you grow is what you eat.”

The developers argue there are additional health benefits found in the fermented product, which will initially be made from brewers’ spent grain (in the brewing process, barley that has been soaked, sprouted, and dried and most of its starches removed, is made into malt, or brewers’ spent grain).

Nanyang Technology University’s Chen said the fungi-based food product could serve as a healthier, better tasting, and greener alternative to plant-based protein.

“The fungi used to cultivate the product is grown from a base of nutrient-rich common food waste which infuses the mushroom root with more essential nutrients such as protein, iron, and amino acids. This makes it more nutritious than ingredients commonly used in plant-based alternative meat products, such as peas, chickpeas, wheat gluten, and soy,” he said.

In the US, fermentation is being explored by a handful of food startups, including Clara Foods, which is using it to create animal-free egg proteins, and Perfect Day Foods, which is creating animal proteins including whey and casein without animal cells.

Closed loop



Brewers' spent grain.

To Gray, the even bigger advantage is that fermentation is the circular economy argument, and it will initially utilise food waste and by-products of the agriculture and food and beverage industries.

Municipal biowaste (household food scraps) collection is slated to begin in Auckland soon, but, for the moment, our scraps won't be used as a source for the proposed plant.

"The microorganisms we use are quite sensitive to the food they intake so, right now, we'd prefer to be using a consistent supply from commercial waste because we can control that somewhat," Gray told *NBR*.

"[Using municipal waste] would be the end goal but would take a lot of research to get to the point where we have a strain of fungi and the like that were robust enough – and we may need to process the waste into a format of which the substrate would be consumable by the microorganisms."

There will be no shortage of bio-waste anyhow, even discounting the household contribution, with some 39 million tonnes of spent grains currently ending up in landfills each year, where they decompose and add to greenhouse gas emissions.

Food waste in general in New Zealand is some 1.3 billion tonnes a year, or about one-third of all the food produced.

Off-Piste

Off-Piste Provisions was registered as a company in 2020 and records show it is still 100% owned by Gray, despite now being on its third funding round, a Series A looking for \$15m to build a fermentation plant sometime next year. Existing investors are the main source of funds but their names are not disclosed.

Gray lived in Asia for two decades, working primarily in the meat industry including a stint as head of farming operations for China's leading Angus cattle breeding farm Tieling Angus Livestock, head of butchery operations for the supermarket chains owned by multi-billion-dollar supermarket group OSI, and for NZTE assisting companies enter the valuable Chinese market.



Off-Piste Provisions' pea and fava bean-based jerky.

He was also the founder of Gung Ho! Pizza, which was one of the first Chinese pizza brands to make the move into alternative protein and achieve B Corp certification.

Gray returned to New Zealand in 2019 and in 2020 launched Off-Piste, which has received \$200,000 in funding grants from the Ministry of Primary Industries through its Sustainable Food and Fibre Futures, as well as other funding from Arable Research, Callaghan Innovation and Auckland Unlimited.

The company now employs almost 20 people (full and part-time) and while Gray would not reveal its sales, the company's plant-based jerky, biltong and 'bacon'-bits products are carried by 130 retail outlets including the major supermarket chains. Exports are next on the cards.

Progress

The products are made from peas and fava beans and Gray said the company was happy with their progress, but there is a desire for a home-grown solution that means the company will not have to rely on pea and fava bean imports from places such as Canada and Russia.

Most countries in the world are looking inwards for protein sources to buttress their food security in a time of global disruption, said Gray. In New Zealand, animal protein is plentiful, but it is not sustainable at current levels, he said.



“It’s the belief of myself and the company that New Zealand is over-intensified with animals on the land.

“The waterways and land can’t handle that amount of intensification – and while we are not anti-meat, we’re definitely anti that amount of intensification of farming – and we believe we have got a solution for that.

“What we are trying to do is look into the future with the crystal ball and say, ‘how do we ensure that we can have products made in New Zealand from New Zealand ingredients? And how can we build a circular economy and convert really-low-value carbohydrates and food waste into high-value protein that can be exported globally?’

“That’s the magic of the whole fermentation process.”