

Fungi-based food product that tastes and shreds like meat

BY [CLAIRE REID](#) | MON, 29 AUG 2022 AT 13:41:14 |

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Scientists from Nanyang Technological University, Singapore (NTU Singapore) have developed a technique to cultivate a fungi-based food product that might serve as a healthier, better tasting, and greener alternative to plant-based protein.

The fungi used to cultivate the product is grown from a rich source of common food waste, which infuses the fungi with more essential nutrients, such as protein, iron, and amino acids, making them more nutritious than ingredients commonly used in plant-based alternative meat, such as peas, chickpeas, wheat gluten, and soy.

The cultivation of the NTU-developed food product would also give us an opportunity to reuse common food waste and byproducts from agriculture and the food and beverage industries,

such as soybean skin, wheat stalk, and beer waste, a by-product of the beer-making industry.

Around 39 million tons of used grains and 14 million tons of soybean skin, also known as okara, are thrown into landfills each year, where they would decompose and increase greenhouse gas emissions.

The investigation, which incorporates a new technique that might help reduce waste, reflects NTU's intention to minimize our impact on the environment, which is one of four major challenges humanity is trying to tackle through its NTU 2025 strategic plan.

Professor William Chen, the director of NTU's Food Science and Technology (FST) program, who led the development of the food product, said, "Our fungi-based food product is yet another breakthrough for us, as we strive to find successful solutions to improve food supply chains."

The NTU team, which includes Ph.D. student Mrs. Malsha Samarasiri at NTU's FST program, is collaborating with The FOODBOWL, a member of the New Zealand Food Innovation Network, a national network of open access food processing facilities supported by the New Zealand government to assist food businesses and startups internationally innovate, scale up, and commercialize new products—finally to international scale.

The FOODBOWL's Chief Executive said, "We are excited to be able to assist global innovation here at The FOODBOWL in developing more nutrient rich alternative proteins by utilizing local waste streams." New Zealand and Singapore have already established strong collaboration agreements, and this project is another great example of how innovation can benefit both countries' economies and their overall food systems, with industry leading and government enabled innovation.

Off-piste Provisions, a plant-based meat business, is one New Zealand business that is collaborating with the NTU's FST program to integrate the fungi cultivation technology in its food products.

Off-Piste Provisions CEO Jade Gray said: "We're looking to partner with leading food scientists, such as NTU's Prof. William Chen, to help solve the problem that alternative protein startups like us face—improving the taste, texture, and protein impact of animal products."

Easing the mainstream consumer's preference for plant-based meat

In 2021, startups in the Asia Pacific region that are developing plant-based proteins received US\$220 million in investment, of which a large part went into research and development to enhance the taste and texture of their products to mimic that of meat, as research has found that those two factors would aid mainstream consumer acceptance of plant-based proteins.

The edible white mushroom (*Agaricus bisporus*) that was developed by the National Science Foundation would address several concerns about plant-based protein, which often requires flavoring to be added to taste good, is highly processed, and may deplete essential minerals, such as iron and amino acids.

Consumers may prefer the fungi-based food product because it already resembles meat more than other plant-based proteins, shredding like cooked chicken.

It also tastes more like meat, as it has higher levels of amino acids, glutamic, and aspartic acids, which are common in animals, which give their flesh the distinctive "meaty" flavor.

Prof. Chen said, "We are driven by our close connections with the food industry to translate our findings into solutions for today's food & beverage producers, such as improving the flavor, nutrition, and sustainability profiles of their products." Nature, in the form of fungi, is a powerful tool to assist corporations not only reduce waste but also enhance human nutrition, but they also require research and innovation, which we are happy to provide, to bridge the gap."

Researchers at NTU's FST program aim to develop their product in order to increase its nutritional profile as well as reduce food waste. They also hope to commercialize their solution by 2024.

A protein-rich, plant-based emulsifier that might replace dairy and eggs in certain foods

Citation: Fungi-based food product that tastes and shreds like meat (2022, August 29) retrieved 29 August 2022 from <https://phys.org/news/2022-08-fungi-based-food-product-shreds-meat.html>

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