

THE STRAITS TIMES

Waste to plate: Fish feed from soybean processing run-off spells hope for cheaper fish



Professor Stefan Wuertz of NTU's School of Civil and Environmental Engineering (SCELSE) feeding Asian seabass with SCP50. PHOTO: LIANHE ZAOBAO

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SINGAPORE – Fish on your dinner table could one day be produced more sustainably – and possibly more affordably – as scientists here have found a way to create fish food from food processing wastewater.

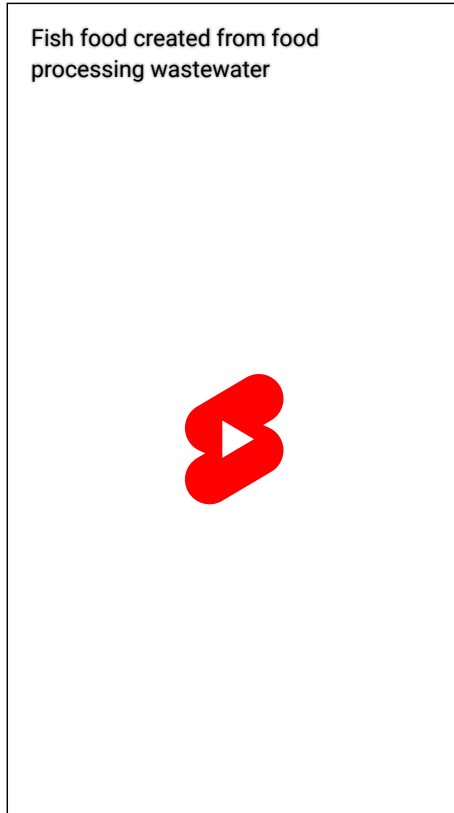
Farmed fish such as Asian sea bass are typically fed fishmeal – pellets made from powderised wild-caught fish that has been cooked.

But fishmeal is expensive and unsustainable, as it contributes to overfishing at sea.

The alternative – feeding fish with expired bread and baked goods, which is common in traditional fish farms in ponds or rivers – pollutes saltwater environments and leads to lower oxygen levels in the water.

“And so the idea is to find a sustainable source of protein in the feed, so that the aquaculture industry can grow,” said Professor Stefan Wuertz, lead investigator of the study published in the journal *Scientific Reports* in January.

His team, from the Singapore Centre for Environmental Life Sciences Engineering (SCELSE) and Temasek Polytechnic’s Aquaculture Innovation Centre (AIC), created fish food pellets where half the fishmeal is replaced by a microbial protein.



The scientists took the water that soybeans are soaked in before they are processed into soybean milk, and put it in bioreactors with microorganisms, to cultivate the single-cell protein. Bioreactors provide a controlled environment for biological and chemical reactions.



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This wastewater contains these same microorganisms, which have probiotic potential essential for healthy fish growth.



(From left) Dried soya beans, soya beans that have been soaked in water before processing, soybean wastewater, and single-cell protein in powder form. PHOTO: LIANHE ZAOBAO

The research team used soybean processing wastewater, which would otherwise be discarded, from the soya bean food and beverage chain Mr Bean.

The scientists fed a group of young Asian sea bass with regular fishmeal, and a second group with pellets comprising equal parts regular fishmeal and single-cell protein. Both diets provided the same amount of nutritional content for the young fish.

The scientists found that after 24 days, both groups of Asian sea bass had grown the same amount by the end of the experiment.



(Clockwise from left) Regular pelletised fishmeal, regular fishmeal powder, pellets comprising equal parts regular fishmeal and single-cell protein, and the single-cell protein in powder form. PHOTO: LIANHE ZAOBAO

Dr Diana Chan, co-principal investigator of the study and head of AIC said: “The results of our fish feeding performance trials are promising for the aquaculture industry, offering an alternative protein source to meet the increasing need to replace fishmeal, which has become very costly and unsustainable in supply.”

The study has received \$4 million in funds from the National Research Foundation since 2020.



Dr Loo Poh Leong, a research fellow at SCELSE, feeding three-month-old Asian sea bass with a diet comprising equal parts regular fishmeal and single-cell protein, which is cultivated from soybean processing wastewater. PHOTO: LIANHE ZAOBAO

Prof Wuertz, who is from Nanyang Technological University's School of Civil and Environmental Engineering and deputy centre director of SCELSE, said the research team is currently in talks with Mr Bean to scale up the production of the single-cell protein.

Fish feed made from single cell protein will be cheaper than commercial fishmeal in future, as wild-caught fish becomes less available, he said. This will impact the price of farmed fish.

“We hope that the results of our research will encourage other food processing companies to collaborate with our team to make use of their waste streams,” he added.

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