

Making ordinary food extraordinary

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Final-year FST student Chew Ding Xiang holding a bottle of high-pressure processed bok choy juice. This improved version preserves nutrients well, and retains the flavour of the vegetables. Credit: National University of Singapore

Enjoying a glass of juice, tucking into a hearty piece of meat or having a

plate of cut fruit may be part of the diet that many do not give much thought to. However, could these common food items be more nutritious or sustainable? Some final-year undergraduate students at NUS Food Science and Technology (FST) are applying their knowledge and creativity to address these needs.

Preserving the goodness of vegetable juices

Cold pasteurised juices are gaining popularity, but most juices in the market are more commonly preserved by thermal pasteurisation. Chew Ding Xiang's final-year project examines the effect of High-Pressure Processing (HPP), which is an industrial non-thermal process involving the application of high pressure to inactivate microorganisms in food, on the nutrient preservation of vegetable [juice](#).

"Vegetable juices are popular as a low-sugar alternative to fruit juices and for their reputation as 'detox drinks'," said Ding Xiang, as he explained the context of his project.

Based on his research, Ding Xiang found that the bok choy juice he prepared using HPP not only preserved nutrients well, it also retained the ideal sensorial properties of the juice. The colour of the juice was a fresh-looking green, compared to the dark, less appealing green of the thermally processed version.

"This means that HPP could be a viable option to produce and distribute vegetable juices on a large scale, and consumers can enjoy greater convenience and accessibility. Furthermore, as vegetables are susceptible to spoilage, juicing is one way to help reduce wastage," said Ding Xiang.



Bok choy juice that has been high-pressure processed retains nutrients and freshness well. Credit: National University of Singapore

Adding texture to cultured meat

Observing and growing animal muscle cells in a lab is what FST student Yap Wee Swan's project is all about. She is working on growing cultured meat at a micro level on 3D-printed scaffolds that look like thin, translucent sheets.

"Scaffolds are important as they help the muscle cells to grow in a way that replicates the features of real meat," shared Wee Swan. She grows

cultured mammalian muscle on the 3D scaffolds which enables the cells to stretch, mimicking those in the muscles of animals. "The parallel alignment of the cells is responsible for the streakiness of meat, and hence crucial for the textural imitation of conventional meat products," she elaborated.

Wee Swan's research contributes to the growing developments in the cultured meat sector. Current cultured meat products in the market are being typically minced, so they do not have the proper form or structure of meat. Culturing meat on the 3D scaffolds will therefore bring food scientists closer to producing lab-grown meat that imitates the texture of traditional animal [meat](#).

Using probiotics to improve freshness and nutrition of cut fruits

Compared to whole fruits, cut fruits usually lose their nutritional quality and moisture faster over time. To improve the shelf life and add to the nutritional quality of cut fruits, FST student Ian Mak developed an edible [probiotic](#) coating. His research involved dipping apple slices into the probiotic coating solution he developed and then testing for [shelf-life](#) characteristics.



Apple slices being dipped into the probiotic coating solutions. Credit: National University of Singapore

With the probiotic coating, Ian observed a reduction in the growth of spoilage microorganisms such as mould, and rate of moisture loss which allowed the apples to remain fresh and retain their texture. He also found that adding the coating could allow cut apple slices to last two to three days longer than those without.

The probiotic solution also added another aspect of nutrition not originally present in the apple slices—two slices of apples coated with the probiotic solution would contain the same amount of probiotics in a

bottle of commercially available cultured milk drink.

"I am interested in developing novel applications of probiotics in food products. Most people would associate probiotics with dairy products like cultured milk drinks or yoghurts. Hence, the application of probiotics in mainstream foods would not only be novel and intriguing, it also increases the number of people consuming probiotics," he shared.

Equipping students to impact our world

The projects undertaken by Ding Xiang, Wee Swan and Ian are but a glimpse of what FST students embark on in the course of their undergraduate studies.

"These creative projects attest to how our students are equipped with relevant skills to contribute effectively as they prepare for careers in the area of food science. By encouraging students to explore ways to improve the nutrition and quality of everyday foods, we hope to give them the opportunity to push the boundaries of [food](#) research and development," said FST Head Professor Zhou Weibiao.

Provided by National University of Singapore

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