

SINGAPOREANS are familiar with mock-meat made from wheat or soybean.

In recent years, it has gained in popularity as a meat substitute and is being consumed by a growing number of vegans and vegetarians around the world.

This type of meat is presumed to cause less environmental impact than animal meat, as the carbon foot print of rearing animals is much more than what it takes to grow wheat or soybean.

The wheat gluten used in mock meat is made by repeated washing of wheat flour with water so as to remove starch from the sticky and elastic gluten.

It is further processed to obtain a chewy feel and fibrous texture resembling meat. It is then cooked for human consumption.

In recent years, high technology start-ups are eyeing the growing demand for faux meat.

For example, a Silicon Valley start-up called Impossible Foods has been developing faux meat burgers from plant proteins, which it is selling in Palo Alto, New York, San Francisco, Las Vegas, Los Angeles and Oakland.

On its website, Impossible Foods lists the ingredients as fibrous textured wheat protein, potato protein, water, coconut oil, salt, natural flavors, and vitamins.

For the purpose of obtaining specific taste and colour characteristics mimicking animal meat, heme derived from the plants via fermentation method is used.

The fermentation process is similar to the one used by the beer companies for centuries.

And Impossible Foods declares that its beef burger has no cholesterol, hormones or antibiotics.

Start-ups join the race

Several start-ups in the US and Europe are making high-tech vegan meats which resemble beef, chicken, pork, shrimp, and fish.

Various descriptors of meat analogues on the Internet include imitation meat, mock meat, faux meat, synthetic meat, meat substitute, and vegan meat.

Start-ups are competing on the basis of texture, flavour, appearance and chemical compositions of vegan meat.

They are pushing the envelope by claiming that faux meat is the answer to solving the world's hunger.

The United Nations Food and Agriculture Organisation estimates there are about 780 million hungry people, or one in nine people in the world.

Academic researchers are also joining the growing efforts worldwide.

For example, Professor Atze Jan van der Goot at Wageningen University in the Netherlands is making efforts to innovate processes to produce faux meat from plant proteins on an industrial scale.

Prof Van der Goot mimicked the texture of animal meat by getting the strands of soya protein and wheat gluten to wrap around each other to create a firm fibrous struc-

High tech vegan meat

ture.

Others have textured soy proteins under heat, different pH conditions, and extrusion through food processors.

During the process soy proteins denature.

In other words, the soy molecules open up and become fibrous, thus resembling the texture of animal meat.

Fermentation processes are also employed to obtain textures similar to animal proteins.

Start-ups are into designer vegan meats to suit the palette of diverse customers and cultures.

Automation and robotics solutions are also being explored.

Energy and water consumption efficiencies need to be improved in order to make vegan meat production truly environment friendly.

Further optimisation is needed for suitable anti-microbial packaging for extended periods of freshness of the processed and cooked vegan meat.

High-tech vegan meat is expensive compared with animal meat, and hence there is a need for new business models and economies of scale.

According to market research firm Mintel, sales of vegan meat is touching one billion dollars.

The demand is driven by concerns for animal welfare, impact on environment, and health.

Serendipitously it is a shot in the arm for the proponents of urban farming.

Singapore's initiatives

Last year Singapore launched its Food Manufacturing Industry Transformation Map with the vi-

sion of developing the country into the leading food and nutrition hub in Asia with globally-competitive food companies.

This drive is led by Spring Singapore and supported by various government agencies, universities, research institutes, and associations.

In order to foster close collaborations and sharing of advanced technology resources, there are plans to set-up high pressure processing food innovation cluster facilities later this year.



innovation
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IE Singapore is enabling local food enterprises to internationalise.

For example, it facilitated the launching of online Singapore shop Tasty Singapore on China's leading e-commerce platforms — Alibaba's Tmall and JD.com.

Moreover, the food manufacturing innovation is a key

focus of the National Robotics Program.

The food manufacturing industry plays a significant role in Singapore's economy, contributing more than three billion dollars to GDP and 40,000 jobs.

Leveraging Singapore's strong reputation for high quality, high-tech vegan meat could be a new growth frontier.

Over the years, Singapore nurtured a few hundred highly qualified researchers in biomaterials and tissue engineering fields.

Their expertise is helpful to facilitate the high-tech vegan meat industry.

I have been innovating nanofibers for engineering a variety of tissues at the National University of Singapore.

The former vice-chancellor, Professor Lim Pin, fondly calls me the "fibre man".

With that appreciation etched in my mind, any fibrous structures naturally draw my attention.

I foresee several opportunities for innovation and entrepreneurship in the high-tech vegan meat domain.

For wider acceptance and consumption, further efforts are needed in terms of getting the texture, chewiness, flavours, freshness, calories, health benefits, safety aspects, and nutrition values right.

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