



Plant-based revolution - A globally necessary, but undefined, category

Although human actions have warmed the planet for decades, we've only recently started discussions around the negative environmental impact of industrial livestock. Not only are the legitimacy of the Paris climate agreement being called into question, polar ice caps reaching their second-lowest levels ever, and humanity passing the carbon tipping point, but we've come to find out our cute, cud-eating four-legged friends have had a bigger role in all this than previously imagined.

You'd be forgiven if you didn't realise this, though. We're inundated with conflicting messaging. The meat industry wants us to consume more, promising it's doing its part to save the planet. Conservationists and environmentalists, on the other hand, are trying to curtail our dependence on the meat industry.

Regardless of which side of the fence you sit on, though, the future of protein is really being determined by global innovation. From China to Singapore, the U.S. and Europe, we're seeing consumer demand for more sustainable options finding their way into the food R&D process.

China at the centre

China is impacting the global food economy in more ways than most understand. Consider this: China feeds nearly 20% of the world's population with only 8% of the world's arable land. To keep those bellies full, China relies heavily on trade agreements with foreign partners like Australia, the United States, and Chile. With a middle class increasingly adopting a more western diet, Chinese meat imports have grown over the last few years. In January 2019 the

market research firm CB Insights noted that China's total protein consumption is set to continue growing at a rate of 3% to 4% each year, with the country projected to account for 35% of the global protein market by 2025¹².

As the Chinese become more exposed to the world beyond their borders, they are starting to connect the dots between the consumption of meat and the environment. The origins of their food, their connection to nature, their health and well-being, food habits, and body awareness are all starting to become major focal points.

It's an open secret that this growth is just not sustainable. Government efforts, like a 2016 campaign to halve meat consumption, are working to change meat eating habits³. Furthermore, the Chinese Government recently revealed its much lauded 13th Five-Year Plan—an effort highly praised by the UN—in which heavy emphasis was placed on environmental health and a dedication to development through a low-carbon pathway.

Other efforts, like Wild Aid's Shu Shi Initiative to cut down on meat, are backed by major celebrity endorsers⁴. Consumer trends, particularly around lifestyles of health and sustainability, are also gravitating towards alternative methods of protein consumption. In fact, plant-based protein and foods are not at all foreign to China. Going as far back as the Southern Song dynasty over 800 years ago, Buddhist-influenced vegetarianism and the consumption of plant-based food, or "mock meat", were the mainstay of the Chinese diet.

Even in modern times, mock shark's fin and mock abalone offer an affordable ersatz to their genuine, but more expensive namesakes.

Companies like Qishan Foods, one of China's biggest plant-based food producers, have teamed up with Walmart to launch plant-based meat products in the over 400 Walmart stores across the country.

BoyaLife, a company working out of a 200 million yuan (more than \$31 million) facility south of Beijing, opened a commercial animal cloning centre with the intention of providing 5% of China's meat. While the reception has been mixed, the FDA has said there are no complications unique to cloning.

The world is starting to recognise that the animal-protein food supply chain is simply unsustainable. From awareness at the grassroots to the passing of policies at high levels, these are all strong signs that China is onboard to help propel the plant-based phenomenon forward. And we have the zeitgeist, the spirit of the times, working in favour of this.

International players in plant-based proteins

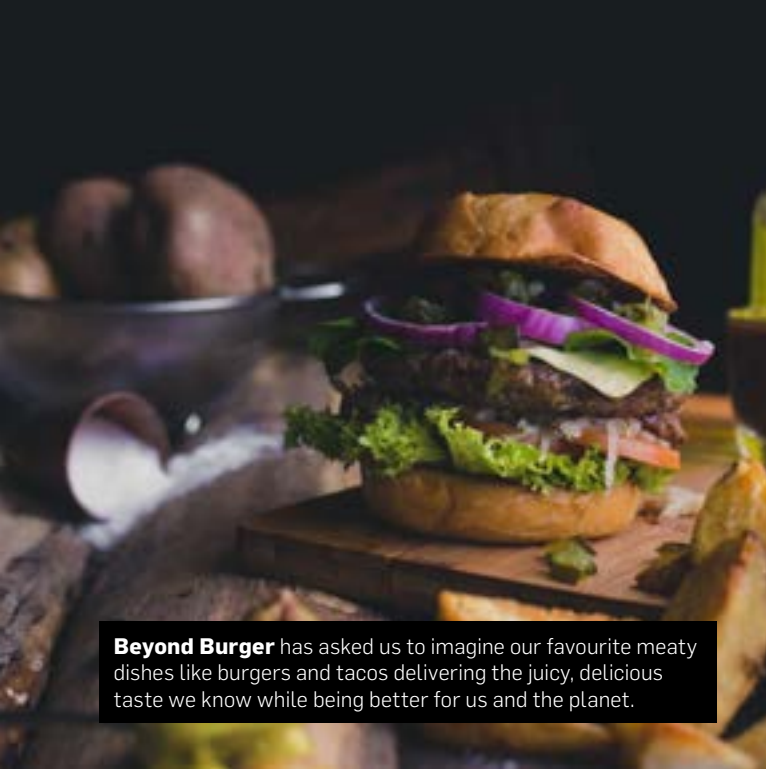
Proteins are essential for our bodies to function properly. When ingested, protein breaks down into its building blocks, amino acids, of which nine are considered essential. For as long as humans have been around, we have always ascribed meat, eggs, and dairy as our main sources of protein¹.

Whilst many foods derived from animals are considered complete sources for all nine essential amino acids, most plant proteins are lacking in at least one. Quinoa, soy beans, and buckwheat are some of the few plant-based exceptions which are complete sources that provide all nine.

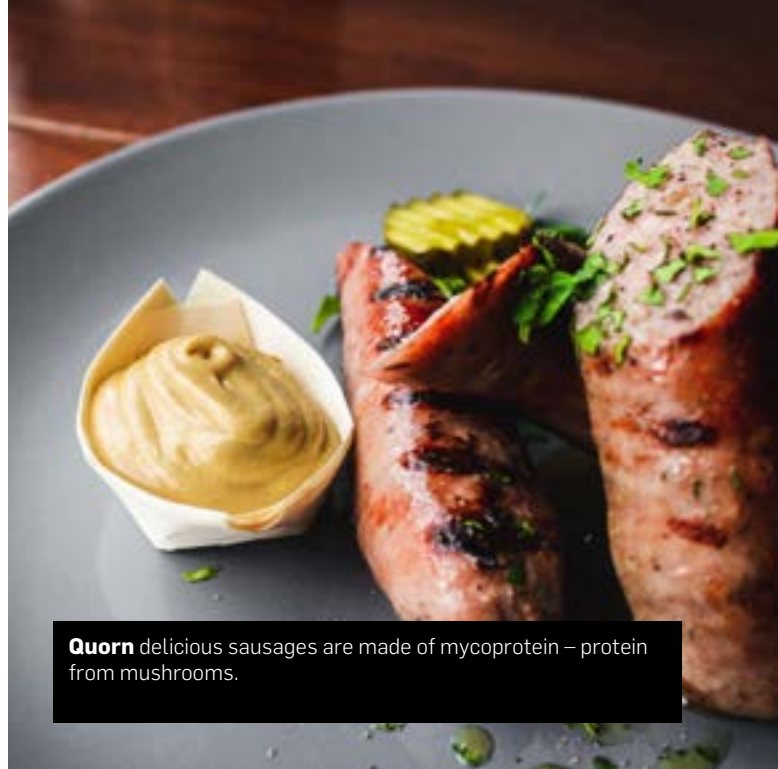
Nonetheless, with rising health and environmental concerns, ethical animal welfare, and religious reasons, the world is starting to turn its attention to plants to meet our protein requirements. Plant-based foods such as grains, nuts, lentils, rice, and peas are extremely rich in proteins.

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Beyond Burger has asked us to imagine our favourite meaty dishes like burgers and tacos delivering the juicy, delicious taste we know while being better for us and the planet.



Quorn delicious sausages are made of mycoprotein – protein from mushrooms.

Companies like Impossible Foods have been quick to recognise plants as a better alternative source of protein⁵. They also realised that people still liked the taste of meat, and thus have leveraged on the star power of celebrities like Serena Williams and Katy Perry to back their meatless, plant-based burgers. Its recent raising of \$300 million ahead of its bid to go public is a clear indication of plant-based foods' appeal².

With ethical and environmental concerns surrounding cattle and other livestock farming increasing, people are starting to focus on plant-based dairy¹¹. Since the 1990s Swedish company, Oatly, has been providing its customers with a nourishing milk derived from fibre-rich oats using its patented enzyme technology.

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With the plant-based food market booming, it comes as no surprise that innovative products such as Quorn's mycoprotein would appear on the shelves. Mycoprotein is an extremely rich source of protein made by fermenting one of the most nutritious fungi around, the *fusarium venenatum*¹⁰. Upon

fermentation, the fungi's carbohydrates turn into mycoprotein dough. Its meat-like texture provides it with a wide variety of culinary uses. A single gram of *fusarium venenatum* produces over 1,500 tonnes of mycoprotein, making it one of the most sustainable and environmentally-friendly food sources in the world.

Cellular agriculture

Compared to their conventional counterparts, cellular agriculture products have fewer environmental impacts, a safer, purer product, and a more consistent supply. This is because the product is being produced in safe, sterile, controlled conditions. Another exciting aspect of cellular agriculture is the ability

to design and tune what you are making. For instance, you could make meat with fewer saturated fats and more unsaturated fats, or you could make leather of different thicknesses. You could make milk without lactose, or eggs without cholesterol.

One company committed to creating cell-based clean meat is Singapore's ShioK Meats. Harvesting cells instead of animals means their food is friendly to marine life, the environment, and to consumers as they won't contain microplastics or other cancer-causing agents sometimes present



Chinese delicacies such as dumplings are the perfect dishes for minced-meat substitutes.



Shiok Meats set a goal of creating a shrimp substitute that would be similar to what's typically found in the freezer section, and a minced shrimp-replacement for use in dumplings.

in live seafood⁸. The company is aiming to make their lab-grown shrimps available within the next three to five years, starting with the Asia-Pacific region⁷.

Culturing meats **Regional appeal - Singapore**

In Asia, a lot of innovation in this space is being done in Singapore. One reason is because its cultural diversity offers a variety of consumer segments. Singapore is the perfect microcosm to develop lab-grown meat. With 5.8 million people⁶ comprising of over 865,000 Muslims (14.3%), more than 2 million Buddhists (33.9%), 315,000 Hindus (5.2%)—each with their own specific and unique dietary needs—coupled with trend-following residents, this cosmopolitan city is always looking for the next big food trend.

This broad base offers companies a wider reach within extremely varied demands. Its various consumer segments mean that more diversified learnings can be made when compared to relatively homogeneous markets, such as China and India.

Additionally, to protect the country from vulnerabilities in its food supply chain and ensure the population's dietary and nutritional needs are met, the Singapore Government initiated its Research, Innovation and Enterprise (RIE) 2020 Plan. The Plan allocates US\$144 million to fund projects in the Singapore Food Story R&D Programme, which includes cellular agriculture and lab-grown meats⁹.

Included in this Plan is A*Star's Bioprocessing Technology Institute (BTI), which is leveraging current technologies in bioproduction and stem cell

bioengineering to culture meat in the lab. A first mover in the lab-grown meat industry, BTI is presently running their trials off the ovary cells of hamsters.

The diverse consumer insights, along with strong Government support, are just part of why Singapore is the place investors and companies should look for indicators and other signs with regard to market movement in this sector.

The challenges

Despite its current burgeoning success, experts have yet to properly categorise this new food phenomenon. It would be interesting to see how it would be classified as more innovations, investors, and companies are thrown into the mix.

There is currently also not a lot of transparency, traceability, and accountability over the various supply chains. This may partly be due to the desire to protect intellectual property rights, but it is still something that needs to be regulated as supply and demand around the world increase exponentially.

Plant-based foods have spread from the West and already exploded onto the scene in Hong Kong and Singapore. It is only a matter of time before the rest of Asia picks up on it. Scalability might become an issue as we see supply struggling to meet demand. This problem may be further compounded especially if regulations set by the different governing bodies in each country are not standardised.

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¹¹ Schroeder. (2019, June 18) Plant Based Food Products Started With Milk, Now Taking On Meat, What's Next?

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Evelyn's experience with agency-side design and branding, as well as an MBA, means she can straddle the creative and commercials divide.

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