Future Foods

By Callan Boys

As arable land shrinks and global warming intensifies, we will need to look at new ways of producing nutrition. In 15 years, chances are some of the beef you eat will have been grown in a test tube. It will not have come from an animal with a beating heart or a brain that has been raised in a paddock or a feedlot. It will simply be a bunch of cells and tissue.

Not in 100 years or 50 years, but 15 years, perhaps even less. Known as cultured meat, it’s just one of the ways scientists are trying to solve a very global problem: how to feed a population that keeps growing when there’s a finite amount of farmable land in the world.

Meat, particularly grain-fed beef, is also a huge contributor to global warming. Because of factors such as methane emissions, deforestation to create more grazing land and the amount of energy it takes to harvest corn and other grains needed to produce feed, the livestock industry produces more greenhouse emissions than every mode of transport in the world combined.

The bottom line is that if we keep eating meat in the manner we do and don’t invest in more sustainable farming solutions, the world as we know it is likely to end. This isn’t hyperbole, and scientists around the world are working on some fantastical solutions that are close to becoming real.

CULTURED MEAT

If we all started eating more vegetables grown with solar power instead of fossil-fuel-draining livestock, things would start to turn around for the environment in a big way. Unfortunately, experts say world meat consumption shows no sign of falling and the demand for meat is expected to increase 73 per cent by 2050, even though 70 per cent of farmland is already used for livestock.

Test-tube meat could be a solution to the world’s insatiable appetite for protein. In 2013, Professor Mark Post, of Maastricht University in the Netherlands, presented a burger made of cultured beef to an audience in London. Made using stem cells harvested from a cow’s shoulder, the burger took three months to grow and, by all reports, tasted much like a normal burger, although it was a little less juicy.

According to the Maastricht University’s website, cells taken from one cow could produce 175 million burgers.

"I expect cultured meat to be available in 10 to 15 years," says Canberra-based science writer and author Julian Cribb. "It is likely to catch on, as it will be cheaper, use far fewer resources, such as water, land, nutrients and pesticides, and can in theory be tailored to the precise dietary requirements of the individual. Synthetic clothing is already universal and food is likely to follow."

Cultured meat will replace industrial meat, Cribb says. "It will ensure the production of real meat from animals goes upmarket and farmers receive a much better price for it, as has happened with wool since synthetic fibres arrived, enabling them to care for their land better."

As for consumers possibly not wanting to eat meat that hasn’t come from an animal?

"If it’s cheap, healthy and tasty, people will eat it, even if they don’t know how it was grown," Cribb says. "Do you really know what’s in your snack food today?"

3D PRINTING

3D printing works by making three-dimensional objects from digital files, layer by layer, using a variety of materials. It has been around for about a decade, but only in the last couple of years has 3D food printing become a hot topic of conversation and research.

Spanish-based company Natural Machines has developed the Foodini, a 3D food printer for both professional and home kitchens. Scheduled for mass production in the second half of 2015, the internet-connected device looks like a...
microwave and is essentially a tiny food-manufacturing plant.

Want to make a lasagne? Fill three printing cartridges separately with meat, white sauce and pasta dough. Press a button or two and a nozzle starts pumping individual layers of each food stuff onto an ovenproof tray until the lasagne reaches its required height. The food still has to be cooked in the oven, but the idea is that you can sit down and read something on Kindle while the Foodini assembles ravioli.

Imagine the possibilities: a tart in the shape of Thor's hammer or a pizza base that looks like a pirate ship. Perhaps you could even download a Nigella Lawson recipe from the internet, fill the cartridges with strawberries and cream, and press "print" for panna cotta.

Most 3D food-printing uses normal, easily available food that can fit through a nozzle, and it's difficult to imagine an item such as the great Foodini as anything but a novelty as a result, almost like a child playing with edible Play-Doh.

However, there are more interesting things happening in the world of 3D printing at other levels.

It might be possible to 3D-print cultured meat using biomedical technology similar to that used to print human tissue, food innovation expert Dr Angeline Achariya says.

If beef made in a laboratory is to appeal to consumers, making it look like a natural steak or hamburger is the smart way to do it.

"The remarkable thing the Japanese are investigating at the moment is how 3D printing will most likely be the only source of red meat for that market in 10 years," Achariya says.

"You can imagine the biggest competitor to red meat isn't going to be other markets, [but] 3D-printed products.

"I think, from a technological point of view, it will take a while to get it to a reasonable cost," she says. "Initially, you'll have it starting at the higher-end level. I'm thinking of somewhere like a Heston Blumenthal-style restaurant, where people can go for an experience and you can watch your vegetables and meat being printed in front of you and cooked."

An important point worth considering is if the production of 3D-printed food becomes an affordable reality, what will be the effect on public health?

Such technology could be used by supermarkets and fast-food outlets to produce high-fat, high-sugar food at an even lower cost, putting a greater burden on healthcare systems around the world. As United States food journalist Mark Bittman said in Time magazine, "a 3D-printed cheeseburger is still a cheeseburger".

**SOYLENT**

However, what if you never had to worry about food again?

This is the question plastered across Soylent's website. Yep, Soylent, which I always thought was a fictitious green product consumed by Charlton Heston, made from humans and parodied for a generation on The Simpsons.

It turns out it's actually a thing. Created in 2013 by US software engineer Rob Rhinehart, Soylent is a just-add-water powder that provides all of the essential nutrients required to fuel the human body. It can be used to replace every meal or consumed just once or twice a week.

Aussielent is an Australian-made and packaged product similar to Soylent. A single day pouch of the Vegan Vanilla variety costs $15 on its website (a seven-day pack is $88) and includes the recommended daily intake of all vitamins, minerals, fibre, omega 3, omega-6 fatty acid and trace elements.

I tried it as meal replacement for two days. You know what? For the most part, it wasn't a terrible experience. It tastes like one of those breakfast drinks that come in a carton and I liked not having to think about what each meal was going to be. Liquid for every meal gets a bit drab, though, and although I didn't find myself hungry, I did crave texture and food that I could chew.

Products such as Soylent could become common at breakfast and lunch, but unless we start living in one of those utopian futures where something isn't quite right, I doubt that they will be the only form of nutrition available, even if they can fuel a body in the precisely the same way as natural, solid foods, which is up for debate.

"There is a school of thought that says food is going to be for fuel and not pleasure, but I personally don't agree with that," Achariya says. "Something like a meal in a pill that contains all your necessary nutrients isn't far away, but whether the consumer moves that way is a very different question."

In a presentation titled Conviviality for One at Copenhagen's MAD Food Symposium in 2014, Britain-based writer and philosopher Julian Baggini said the idea behind Soylent was dubious and humans eat for more reasons than just to feed themselves.

"A lot of the time when we eat it's about social occasion," he said. "It's about celebration, it's about sharing, it's about
hospitality, it's about being together with people. It's about joy."

PERSONALLY AND GENETICALLY MODIFIED FOOD

Discussion of genetically modified foods is unavoidable when pondering the future of food production.

There has long been fierce debate about the environmental, health, political and ethical concerns of genetically altering an organism's DNA. Supporters of GM foods say they are needed to feed a growing population by potentially producing disease-resistant, higher-yielding crops with a longer shelf life.

"GM is important in developing future crops and livestock, but it is far from the only technology we need," Cribb says.

"It is just one tool in the toolkit. So far it has not increased the world food supply at all, although this may change.

"A major disadvantage is the way it has sucked research and development funding from areas of equal or greater importance, such as soil microbiology, agronomy, traditional plant breeding, plant nutrition and biological pest control. Another is its dependence on oversimplified agricultural systems, such as excessive use of herbicides, which tend to fail after a time. And finally, if consumers do not trust it and see no benefits, they will reject it, whatever the chemical companies may wish."

What if food could be modified to suit a particular individual or group? That would be something certain to attract consumer interest.

"Customisation is the holy grail of any company," Achariya says. "Most people want to live longer and I think one of the big things we'll see is personalised nutrition - creating 'food for me', for my lifestyle, for my life stage."

On a broad scale, we could see more foods engineered to have a higher amount of a particular vitamin that is deficient in a certain population group. At the individual level, there could be 3D food-printing boutiques, where meat, fruit and vegetables are created to suit your needs.

"One striploin thanks, Bruce. Easy on the magnesium, hard on the calcium. Doctor's orders. A couple of chook breasts with extra folate while you're there would be tops too. Shirl's pregnant with twins, you know."

SEAWEED

Urban and vertical farming are well-meaning initiatives to combat the future shortages of arable land, but here's another one: eat more seaweed. There's a lot of deep ocean out there and the stuff is high in nutrients, low in calories and, when prepared correctly, tastes delicious.

It also grows incredibly quickly (kelp can grow up to 3.5 metres in three months) and can be used to make biofuel.

What's not to love about edible algae?

The ocean is a delicate place, so any increases in seaweed harvesting and farming would need to be done in a sustainable manner that didn't damage the ecosystem. However, if it is done correctly, the results could be spectacularly worthwhile.

Biologist Ronald Osinga, of Wageningen University in the Netherlands, has calculated that a sea lettuce marine garden about twice the size of Tasmania could provide enough protein for the population of the world.

Seaweed isn't used only for making California rolls, either. It has long been used as a taste enhancer in Asian cooking to give dishes a rich, savoury tang, and the Irish have been using it for centuries to flavour soups and garnish fish.

More recently, Daniel Patterson, of San Francisco's Coi restaurant, partnered with Los Angeles food-truck pioneer Roy Choi to open a chain of restaurants called Loco'l. The chefs aim to compete with McDonald's and others on price, while providing nutritious food made with sustainable ingredients.

This is hard to do without the huge capital needed to invest in meat stocks, so the Loco'l version of the Quarter Pounder is made from beef, grains, garum, white soy and seaweed.

According to The Wall Street Journal, Patterson and Choi are looking to open one million Loco'l restaurants, so it's a good thing that seaweed grows quickly.

Predicting the future is a dice roll at the best of times, and who knows what new field of science will announce itself tomorrow and save us all? The one thing that is certain is that we must do something about how we farm and consume food, and grow it in a way that appeals to the mass market. If we don't, there's going to be a very real food shortage and a very warm planet, and we can't all move to the mountains and start a vegetable plot.

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