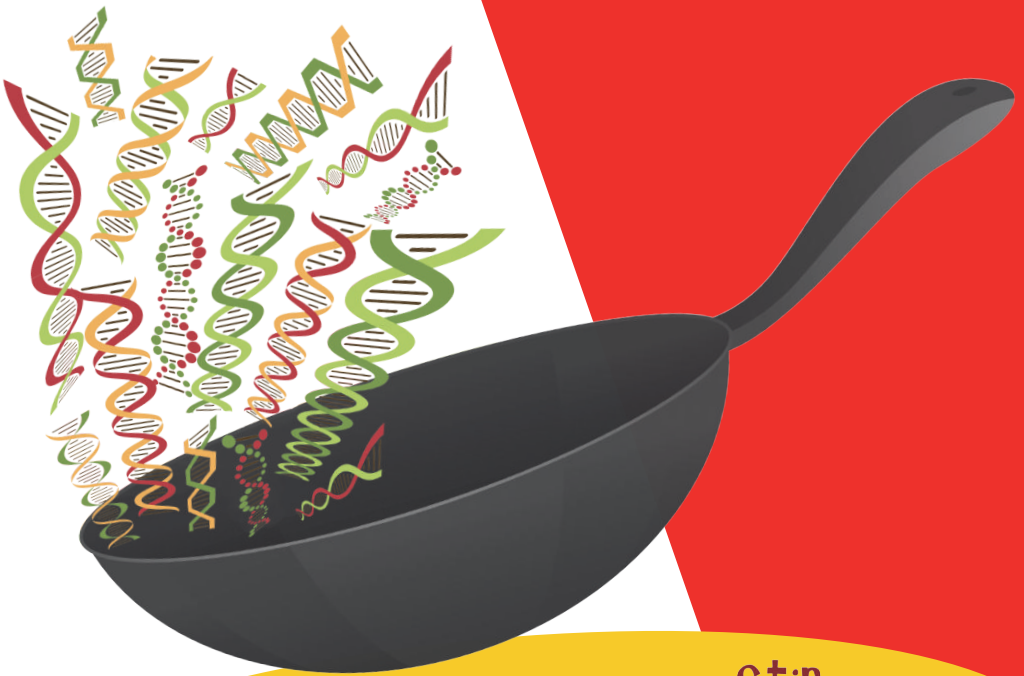


# WHAT'S IN THE POT?

Genetic engineering,  
synthetic biology and  
sustainability and  
authenticity in food



A  
Beyond GM  
initiative

# DOES IT MATTER WHERE FOOD COMES FROM?

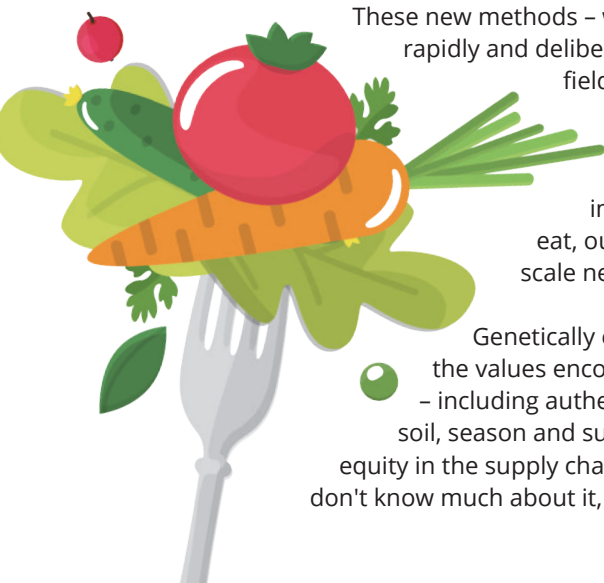
Most chefs are concerned about the quality of the ingredients they use. This concern encompasses where ingredients come from and how they are produced and also the reassurance that the foods we eat are produced in a way that respects nature, and treats farmers and other workers fairly and well.

The catch all word used to talk about these things is provenance.

Generally, chefs who care about provenance feel that one way or another they can find the information they need. But this could change as more types of genetic engineering, or genetic modification (GMO), techniques are taken up in the farming and food chain.

As this happens, provenance will take on a new perspective and provoke new questions around authenticity: Is that tomato, really a tomato if it has a gene from a fish in it? Is the bread baked from wheat which has a gene from a cow in it suitable for vegetarians? How authentic are cutlets from cloned lamb, or meat analogues 'grown' using genetically engineered enzymes in the lab?

This is not science fiction; all of these products are in the pipeline and as new methods for creating genetically engineered crops and animals come on stream there will be more.



These new methods – which include plants and animals that rapidly and deliberately spread GM traits to others in the field, and 'synbio' foods and flavourings engineered entirely in the lab – aren't just a bit of 'gee-whiz' science. They have the potential to cause adverse impacts on plants, animals, the food we eat, our health and our environment on a scale never seen before.

Genetically engineered food is the antithesis of all the values encompassed by the notion of provenance – including authenticity and real quality, connection to soil, season and sustainable practices, transparency, equity in the supply chain and above all good health. If you don't know much about it, here's some things to think about.

## FALSE 'SOLUTIONS'



The often-promoted idea of GMOs feeding the world distracts us from urgent issues in food insecurity. As identified by the United Nations, these are: poverty, lack of access to food and increasingly, lack of access to land to grow it on – issues which the genetic engineering of crops and animals and synthetic biology ingredients made in the lab cannot hope to address.

## THE ANSWERS ARE IN NATURE

Many of the benefits of GMO plants already exist in naturally occurring, selectively-bred plants. We can grow and eat them right now rather than waiting decades for them to be engineered. GMO crop varieties with special properties, such as drought or flood resistance or extra nutritional benefits – exist only as ideas and promises.



## WHAT'S ON THE MENU, CHEF?

Today, many genetically engineered and synthetic biology food products are being introduced to the marketplace through the food service sector. Restaurants risk becoming a marketing arm of the biotech industry, helping to open up new markets while obscuring the true provenance of food ingredients.

## WHERE ARE WE HEADING?

The direction of travel for food technology takes us towards food that is designed and built rather than grown and harvested. It removes soil and farmers from the equation, replacing them with test tubes, petrie dishes, and vats of bacteria, yeasts and other microorganisms bioengineered to produce flavourings and additives.



# FOOD FOR THOUGHT

Conversations around issues like genetically engineered food can get pretty big pretty quickly. One reason for this is that food production and consumption intersects with so many areas of our lives and has lots of different practical, philosophical, emotional, cultural and political dimensions. If you are new to the subject, here are a few things to consider.

## **GMOs aren't natural**

The international definition of a GMO, according to the World Health Organization, is any organism (i.e. plants, animals or microorganisms) "in which the genetic material has been altered in a way that does not occur naturally by mating and/or natural recombination".

The distinction is important since it is the 'unnaturalness' of foods created by genetic engineering and synthetic biology which allows them, and the processes used to create them, to be patented. Patents and intellectual property are how biotechnology companies make their money.

## **Genetic engineering is not the same as conventional plant breeding**

Increasingly, new genetic engineering techniques are being referred to as 'new plant breeding techniques' - even though they are unlike 'breeding' as most farmers and growers practice it.

For centuries, farmers and plant breeders have selectively bred crops to produce varieties with unique characteristics that are adapted to each area's specific soil, geography and climate. Selective breeding alters the whole plant, ensuring that its DNA is

intact, fully functional, stable and able to help the plant thrive.

In contrast, altering the DNA of a plant in the lab applies a cut and paste mentality to plant production, snipping out isolated bits of genetic material and substituting other isolated pieces of genetic material in its place.

Far from being superior, the process has a high failure rate.

Most plants produced fail to grow or end up producing unacceptable levels of toxins or allergens, or lower levels of nutrients. Those that grow well in the lab, often fail in the less controlled natural environment.

## **GMOs move farming and food production further away from sustainability**

GM crops promised consistently better yields and less use of expensive pesticides, leading to more profitable farming. They have largely failed to deliver on these promises.

Insects and weeds have rapidly become immune to the pesticides used on, and bred into, these crops. This means farmers apply more on GM crops and more residues enter the food chain.

Also, GM seeds, which cannot be legally saved for replanting, now cost around 3-6 times more than conventional seed. Higher costs for farmers are passed on to food businesses and consumers.

In addition, a genetically engineered food system is, by its very nature, one that depends on large monocultures that damage biodiversity, and are also a threat to humans since we need to eat a wide diversity of foods to get all the nutrients necessary for health.

### **We don't need GM crops to feed the world**

The notion that genetically engineered food will feed the world is consistently used to make those who question this technology appear selfish. But after more than 20 years of promises, GMOs are still not feeding the world. In part this is because hunger and malnutrition are complex issues, that

can't be solved with a magic bullet. But also it's because GMOs are the ultimate expression of food as commodity, to be sold to the highest bidder. That is why nearly half of GM maize and soya goes into producing biofuels for cars instead of food for people.

### **There is no consensus on the safety of GM foods – and there are legitimate concerns.**

Genetically modified crops are 'safety tested' by the same companies that develop them. No independent human studies have ever been done to show the safety of eating these foods. The large gaps in our understanding prompted more than 300 scientists and legal experts to publish a statement in 2013 affirming there was no scientific consensus on safety and real potential for harm from eating GM foods.

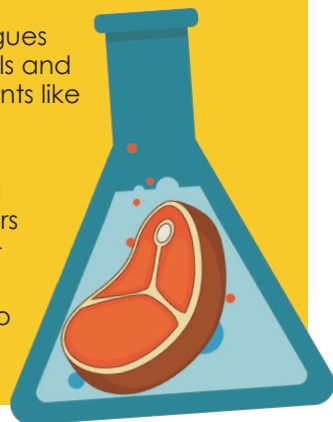
The regulation of GM crops varies from

## **FAKE vs REAL**

There is a growing corporate interest in a type of genetic engineering known as synthetic biology (synbio) where DNA sequences can be written on computer, printed on 3D printers and used to make flavourings like vanilla, saffron, stevia, vetiver, coconut and cocoa.

Scientists are also experimenting with meat analogues grown in the lab from a mixture of animal stem cells and synthetic growth hormones, or containing ingredients like genetically engineered vegetable-based 'blood'.

These products are being introduced to the public through the food service sector, with manufacturers counting on the enormous trust that customers put in out-of-home eating establishments. But, in some cases, restaurants are selling foods that have yet to gain regulatory approval.



weak (EU) to virtually non-existent (US). Regulators have decided, without any real proof, that GM crops are 'substantially equivalent' to non-GM crops.

But studies by independent scientists continue to show this is not the case. For example, in 2016 an important study showed that GM maize produces higher levels of a known toxin than conventional maize.

### **Evidence of significant health risks is now emerging**

The usual argument for the safety of eating GM foods is that millions of Americans are already eating GMOs and they seem fine. But do they? In the US, rates of chronic non-communicable diseases such as heart disease, cancer and diabetes are on the

rise. Allergies, fertility and digestive problems are also increasing.

These diseases mirror those which independent scientists have seen in laboratory animals fed on a diet of GM food – and which farmers who feed their animals GMOs also report. With no GM food labelling and no independent research being carried out, it's not scientific – and likely not correct – to claim that there are no negative health impacts.

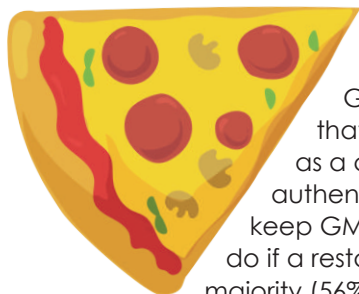
At the moment we eat GM foods largely as ingredients in processed foods. But new foods like genetically engineered salmon, apples, pineapples, rice and potatoes are intended to be consumed as whole foods and, researchers warn, may produce much more obvious health problems.

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## **CUSTOMER CONCERNS**

In late 2014 take-away pizza giant Dominoes was exposed for selling pizzas in the UK made with GMO ingredients. At the time, Dominoes said that the use of the GMOs was temporary and due to the lack of availability of non-GM ingredients (in largely GM-free Europe). There was a media and public outcry demanding the chain revert to non-GMO ingredients.

Surveys regularly show that citizens in the UK do not want to buy or eat GMOs. This mistrust is rooted in questions of safety and the appropriateness of using GMO ingredients in food, as well as concerns over lack of customer choice.



As part of its Stir the Pot initiative, in 2017, Beyond GM conducted a survey into customer attitudes to GMOs in the restaurant food chain. This revealed that the vast majority of UK customers (82%) see GMOs as a crucial issue in sustainability, traceability and authenticity – and they want chefs, and restaurants, to keep GM food off the menu. When asked what they would do if a restaurant menu indicated GMO ingredients, the majority (56%) said they would find somewhere else to eat.

# NOT SO GMO-FREE



The most commonly used GMO products in the UK are oils – made from either soya, corn or rapeseed. Restaurants that cook with GM oil are legally required to indicate this on the menu, but the majority fail to do so.



Processing ingredients found in dressings and sauces, including lecithin and other soya derivatives, corn starch and syrup, artificial sweeteners (e.g. aspartame), can be GMO. Even some honeys can contain 'unintentional' GMO contamination up to a level of 0.9% without needing to be labelled.

Conventionally reared beef, chicken, milk and eggs in the UK comes from animals raised on GM feed. The feed the farmer uses is labelled GMO, the supermarket knows if it is GMO, but there is no labelling required to alert customers of this fact.



Most large supermarkets have an American foods aisle which will include cookies, sweets, sauces, dressings and marinades that include GMO ingredients. By law these imported foods must be labelled as GMO.



Imported American spirits – for example, some popular bourbons – are made from GMO corn. Some US and Mexican beers can contain GMO additives – mostly dextrose and corn syrup made from genetically modified corn, but some use GM corn as an adjunct grain.



Some North American wines make use of genetically modified yeasts (ML01 and ECMo01, P1Y0). None of this is declared on the label.



# STIRRING THE POT

GMOs are not the only food issue, but they are an important one, not least because so much of their use is hidden and because so often they are left out of important public discussions on food, farming and policy. Chefs provide an important interface between the food system and consumers and they can be powerful advocates.

In the US chef Alice Waters was one of the first to engage. In 2013 she encouraged 1300 chefs to sign on to an open letter supporting mandatory GMO labelling in California. Chef Tom Colicchio, has since become a powerful chef advocate for food issues including GMOs as the founder of Food Policy Action

– a group whose mission is to "change the national dialogue on food policy" and "hold legislators accountable on votes that have an effect on food and farming."

The FPA's recent petition in support of mandatory GMO labelling notes: "As chefs, we have a fundamental right to know what's in the food we cook and serve to our customers. We urge you to reject any attempt to prevent the mandatory labeling of genetically modified food." A staggering 4,200 chefs from over 46 states have signed on.

Europe generally lags behind in chef and food service activism, but in 2016, Franck Pinay-Rabaroust, a former editor of the Michelin Guide, initiated an open letter, expressing concern about GMOs and the corporate takeover of the food chain. It was signed by more than 330 French chefs, hoteliers, restaurateurs and others in the food industry.

The UK is home to an estimated 250,000 professional chefs working in everything from fish and chip shops, to contract catering to Michelin starred restaurants and on TV, radio and online cookery programmes. Yet there is no similar advocacy in our chef community.

We believe there is a need to encourage UK chefs to join the conversation at a much higher level and that there is room for our chefs to work together, and with chefs from other countries, to raise the levels of understanding and debate on food issues that affect us all.

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Stir the Pot is a Beyond GM initiative. For more information on this and other activities see: [www.beyond-gm.org](http://www.beyond-gm.org)

