

# What's the latest on GMOs and gene-edited foods—and what are the concerns? An expert explains

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Credit: AI-generated image ([disclaimer](#))

Advances in genetic engineering have given rise to an era of foods—including genetically modified organisms (GMOs) and gene-edited foods—that promise to revolutionize the way we eat.

Critics argue these foods could pose risks to human health and the environment. Proponents point to their potential for enhancing yields, reducing [food waste](#), and even combating climate change.

What are GMOs and gene-edited foods? And how are they shaping the future of our [food](#) systems?

## **GMOs and gene-edited foods aren't the same**

GMOs are organisms whose genetic material has been artificially altered by inserting a piece of foreign DNA. This DNA may be synthetic in origin or sourced from other organisms.

Gene editing involves making precise changes to an organism's genome without the integration of foreign DNA elements. Using techniques such as CRISPR/Cas, scientists make precise "cuts" in the DNA to create new genetic variation. Unlike with GMOs, this introduces only minor modifications, which are indistinguishable from natural mutations.

Although GMOs and gene-edited foods have been in circulation for almost three decades, research in this space continues to deliver breakthroughs. These technologies [are being applied](#) to provide a range of benefits, from improved nutrition in food, to reduced food waste and increased crop tolerance against climate stresses.

## **What are the concerns?**

The major criticisms of GMOs are related to the overuse of specific herbicides.

GMOs are mainly used to produce crops that are herbicide-resistant or produce pesticides. Farmers can then use herbicides on those crops to

control weeds more effectively, without the plants themselves dying. This leads to higher yields on less land, and often with less chemicals used overall.

However, these crops rely on the use of said lab-made [chemicals](#). And although the government [regulates](#) them, ethical and safety debates continue. People raise concerns over potential long-term health impacts, impacts on biodiversity and ecosystems, and the [increased corporate control](#) over agriculture.

Concerns generally aren't related to the actual manipulation of the plants' DNA.

## Is genetic modification itself unsafe?

When it comes to the food we eat, how much do we really know about its DNA? Even among experts with genome-sequencing information, most have only one or a few sequenced "reference" varieties, and these often aren't the same as the plants we eat.

The fact is, we don't really understand the genomes of many plants and animals we eat. So there's no reason to suggest tweaking their gene sequences will make consumption harmful. Moreover, there's currently [no evidence](#) regulator-approved GMOs or gene-edited foods aren't safe for human consumption.

In regards to food safety, one valid concern would be the potential creation of new allergens: proteins within the crop the body recognizes and creates an immune response to.

But it's important to remember many foods we eat are already allergenic. Common examples include wheat, peanuts, soy, milk and eggs. Some [common foods](#) are even toxic if consumed in large quantities or without

appropriate preparation, such as rhubarb leaves, raw cassava, raw kidney beans and raw cashews.

Ironically, researchers are using gene editing to work towards eliminating proteins that cause allergies and intolerances. [Gluten-free wheat](#) is one example.

## **GMOs and gene-edited foods are widespread**

Due to inconsistent rules about labeling GMOs and gene-edited foods around the world, many consumers may not realize they're already eating them.

For example, the most [widely used enzyme](#) in cheese-making, [rennet](#), is produced from a GMO bacterium. GMO microbial rennet produces a specific enzyme called chymosin, which helps coagulate milk and form curds. Historically, chymosin was extracted from young cow stomachs, but in the 1990s scientists managed to genetically engineer a bacterium to synthesize it.

GMOs and gene-edited cereal and oilseed products are also widely used in stockfeeds. There is ongoing research to improve feed through enhanced [nutrition](#), and produce crops that will decrease methane [emissions from cattle](#).

When it comes to modifying animals themselves, ethical considerations must be balanced alongside [potential](#) benefits.

In Australia, about 70% of [cattle](#) are genetically polled (hornless). Having polled cows improves meat quality through less injury to meat, and is considered better for animal welfare. In the US, fast-growing [genetically modified salmon](#) has been approved for consumption.

In a horticultural context, the genetically modified rainbow papaya stands out. It was developed in the late 1990s in response to a ringspot virus outbreak that nearly wiped out the global papaya industry.

[Researchers created](#) the virus-resistant "transgenic" papaya, which now makes up the majority of papayas consumed worldwide.

In terms of boosting nutritional content, "[golden rice](#)" biofortified with Vitamin A (GMO) is being cultivated in the Philippines, as are tomatoes [biofortified with Vitamin D](#) (GE) in the United Kingdom, and [GABA-enriched](#) tomatoes (GE) in Japan.

Research is also being done to create [non-browning mushrooms](#), apples and potatoes. A simple gene edit can help inhibit the browning oxidation reaction, leading to a longer shelf-life and less food waste.

## Regulation in Australia and New Zealand

So why don't you see non-browning mushrooms at your local supermarket?

In Australia, the [Office of the Gene Technology Regulator](#) regulates GMOs. It has [approved](#) four GMO crops for cultivation: cotton, canola, safflower and Indian mustard. However, many more are imported for food ingredients (including modified soy, cottonseed oil, corn and sugar beet) and stockfeed (canola, maize and soy).

Gene-edited foods can be cultivated without any regulatory restrictions or labeling in Australia. The Gene Technology Act 2000 [deregulated these products](#) in 2019.

On the other hand, New Zealand's Environmental Protection Authority has maintained regulatory restrictions on both gene-edited foods and GMOs. Divergent definitions have led the bi-national agency Food

Standards Australia New Zealand (FSANZ) to adopt a cautious approach, regulating gene-edited foods and feeds as GMOs.

The lack of alignment in definitions in Australian has confused producers and consumers alike. FSANZ has said it will continue to monitor developments in [gene-editing](#) technology, and will consider reviewing its regulatory approach.

## **Responsible research**

Both GMOs and gene-edited foods offer great promise. Of course there are valid concerns, such as the potential to create new allergens, unintended consequences for ecosystems, and growing corporate control over food. But these can be addressed through responsible research and regulatory frameworks.

Ultimately, the development of future foods must be guided by a commitment to sustainability, social justice and scientific rigour.

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