

Gene Editing, Food, Farming & Trade

Now we have left the EU, genetically modified (GM) food is back on the agenda under a new name.

The UK government has launched its public consultation on the deregulation of gene editing, the latest version of genetic modification (GM), in England. The consultation is open to everyone within the UK and is running until 17th March 2021. Deregulation would mean no or few safety checks and probably no GM labelling for gene-edited products, even though scientists warn that they could be dangerous for human health and the environment.

What does the science tell us about gene-editing and genetic modification? Do we need gene-edited crops and animals?

What are the current regulations concerning gene-editing and genetic modification? How might these regulations change? Is there a corporate agenda? Are corporations putting pressure on politicians? What would be the impact on farmers and farming of deregulating gene-editing?

What impacts would there be on health and the environment of deregulating gene-editing? What are the implications for trade of deregulating gene-editing?

How do we answer these questions?

Gene editing differs from older GM techniques in that it only moves genes between members of the same or closely related species whereas the older techniques move genes between different species. The claim is that gene-editing is precise, predictable and works the same way as traditional, natural breeding, making changes that can occur in nature.

An ability to make a required change to a particular attribute of a plant or animal using gene-editing relies on the assumption that a gene or genes can be accurately identified and targeted for editing without extra unintended or unwanted impacts.

Rather than working in isolation, genes function as a highly co-ordinated network, such that adding a new gene or altering the function of a single gene has far-reaching consequences in the network. That is, the whole is greater than the sum of its parts, so that studying the parts cannot predict the function of the whole. Thus the function of all genes is required to affect complex traits such as drought resistance, disease resistance or crop yields.

Neither is the gene-editing process reliably accurate. It is prone to produce mutations at the target gene or in other genes or both. There can be unintended side effects from an intended alteration. Mutations can combine to change the function of many genes, leading to altered plant biochemistry, including the production of toxins and allergens.

The attempt at developing crops and farm animals using gene-editing is particularly flawed when aimed at increasing production. While human hunger is widespread, enough food is produced to feed over 14 billion people, more than the projected peak population of 9 billion in 2050. More than half of this food is wasted. The greatest

waste is feeding legumes and grains to factory farmed animals. It requires greater resources in land and water to produce protein for human consumption in this way than by providing humans with an equivalent amount of protein directly from legumes and grains.

Hunger is a result of the poverty caused by political and social failures. Gene-edited crops are not needed, serving only to provide an expensive distraction from solutions which lie in conventional breeding and agroecology. Conventional breeding is more cost effective than gene-editing, while breeding a new crop variety takes 10 to 15 years, less time than it can take to develop a marketable gene-edited variety.

Agroecology brings advantages of soil-building with organic matter, seed selection, biological pest control, legume crops to improve soil nitrogen content, companion planting and crop diversity and rotation.

Following the UK leaving the EU at the end of 2020, the EU is still regulating approval, safety checks, traceability and labelling requirements for GM (genetically modified) seeds, food and animal feed. Individual member states are able to opt out of GM crop cultivation. Although the EU currently treats gene-editing as GM, some member states are trying to get this changed with a report due by 30th April 2021. In September 2019 legislation was slipped through in the UK undebated, leaving GM regulation similar to EU regulation, except for requiring GM regulations to be reviewed and revised every 5 years with the first report due in September 2024.

In order to avoid regulation of their products, developers are claiming that gene-editing produces plants and animals that can be produced in nature by conventional breeding. Companies developing plants and animals by using gene-editing also wish to patent them as this would give them exclusive rights to charge farmers for licences to buy and use their patented products. However, patenting a gene-edited plant or animal requires proving that it is a unique, novel invention, contradicting any claim that the patented products do not need regulating.

Seed patents add financial costs for farmers as well as costs to society and the environment. Licensing agreements imposed as a condition of sale prevent farmers from saving seeds from their crops. Where a crop variety has been engineered to depend on, and be resistant to, a particular herbicide or pesticide, a farmer can be tied into a dependency on a particular corporate seed and pesticide supplier. This trap can become compounded by damage to soil organisms and structure, leading to a requirement to apply ever more artificial fertiliser, yet another cost to the farmer, while a gain to corporate profits.

A current example of a commercialised gene-edited crop is an oilseed rape crop engineered to survive being sprayed with the herbicide imidazoline, carrying risks to the environment, wild life and human health. Whether GM crops are grown commercially or in allegedly "controlled" field trials, they have a record of contaminating non-GM crops. This contamination can occur via cross-pollination, spread of GM seed by farm machinery or inadvertent mixing during storage. Given that contamination has not been prevented on continental North America, there is no guarantee it can be prevented on our much smaller island of Britain.

Since Mexico is the biological centre for the origin of maize, providing a genetic reservoir of varieties adapted to different localities and conditions, GM maize planting has been banned there. However, Mexican maize has been contaminated by US GM maize imports. Contamination from GM oilseed rape has made it virtually impossible

to cultivate non-GM organic oilseed rape in Canada. With the availability of gene-edited oilseed rape, there is a potential for the same problem in Britain should gene-edited crops be allowed in England.

An example of a commercialised gene-edited farm animal is a super-muscly pig which has uncontrolled muscle growth, causing animal welfare problems by animals having problems moving and giving birth. Thus gene-editing animals extends the existing problems of breeding unnatural, maladapted animals to maximise profits from intensive factory farming and exacerbates poor animal welfare and environmental damage.

We cannot know if gene-edited foods are safe to eat since no feeding studies have been carried out in humans or animals. Animal feeding studies with older GM crops have shown ill-effects including organ damage, immune responses and altered blood chemistry and gut bacteria. Some farmers have stopped using feed produced from GM crops because they observed adverse effects on their animals.

Independent research on the health and safety of GM crops is made virtually impossible by GM companies restricting access to seeds for research and reserving the right to block publication of research results as a condition of supplying seeds.

In North America, where most GM meals are consumed, there are claims that humans have eaten trillions of GM meals with no ill effects. However, since GM foods are not labelled in America, it has not been possible to carry out the epidemiological studies (studies of health effects in a population) necessary to show whether or not these foods are harmful. Since GM crops were introduced in the mid-1990s, the health of Americans has declined. It is not known if this is linked with GM foods.

GM food and crop deregulation could be devastating for trade within the UK and between the UK and EU. This is on top of existing problems getting food delivered to Northern Ireland and obstacles to continuing vital food trade with the EU. Scotland could be forced to sell GM food if England changes the law going against Scotland's ban on GM food and crops. Wales would be in the same position.

The UK government's push to deregulate GM food and crops is part of a push for a free trade with the US. A trade agreement based on the model the US has pursued for decades is destructive, promoting a corporate model of agriculture. Such a US-UK trade deal will put pressure on the UK and US to deregulate standards, entrenching current US problematic practices such as intensive factory farming of animals, uncontrolled GM crops with heavy use of pesticides.

There is a movement within the US to improve food, farming and environmental standards. Some states, such as California, have pushed ahead with improving standards, for example, with plans to ban battery hen cages. Locking existing US standards into a US-UK trade deal would make it extremely difficult to move towards more progressive standards within the US while pushing the UK to regress towards much weaker standards. Current mainstream policy in the US is decided on a bipartisan basis with congress members representing big agribusiness farms wanting to sell their low standard food to the UK.

To summarise

Deregulating food and farming standards, including deregulating gene-editing to accommodate a free trade deal with the US, will exacerbate the existing problems of trade within the UK and between the UK and the EU caused by Brexit. At the same time it will entrench the obstacles to improving food, farming and environmental standards in the US.

Introducing gene-edited food and crops in the UK will bring the same environmental and health problems to the UK that GM food and crops have caused where they have already been established. By developing gene-edited crops companies can patent the seeds which enables them to profit by applying restrictive licences as a condition of sale, while increasing the costs to farmers who buy the gene-edited seeds.

There is no shortage of food to feed the current or projected human population. Conventional breeding techniques are producing improved crop varieties. Legume crops grown as part of agroecology can provide people with a plentiful source of vegetable protein. We do not need gene-edited crops.

The science does not support the claim that gene-editing is equivalent to changes made in nature or by conventional breeding. On the contrary, the science demonstrates that gene-editing is a method of genetic modification. Thus the same regulations, safety checks, traceability and labelling currently applied to GM need to be applied to gene-editing.

Information sources for gene-editing

Here are some links to sources of information used in the above article.

The following link is to a video of a recent webinar about the dangers of gene-edited foods, providing an overview of genetics, how gene-editing works and its implications.
https://www.gmwatch.org/video/Dangers_of_Gene_Edited_Foods.mp4

UK: Public consultation on de-regulating gene editing launched
<https://www.gmwatch.org/en/news/latest-news/19653-uk-public-consultation-on-de-regulating-gene-editing-launched>

Gene editing of British produce could cause problems for exports to the EU
<https://www.gmwatch.org/en/news/latest-news/19659-gene-editing-of-british-produce-could-cause-problems-for-exports-to-the-eu>

Link to programme including an interview with a US senior attorney at the institute of agriculture and trade policy, an organisation which works to ensure fair and sustainable food, farm and trade systems.
Stranded Sheep, US Trade Deal, Vertical Farming
<https://www.bbc.co.uk/sounds/play/m000r32q>

GMWatch <https://www.gmwatch.org/en/>
GM Freeze <https://www.gmfreeze.org/gm-in-the-uk/>
Beyond GM <https://beyond-gm.org/>