

Annex II

FAQs

Q1. Why is genome editing being used to generate new crop varieties?

Genome editing enables scientists to make small alterations in the existing DNA of a crop to impart useful properties for agriculture and food. All organisms naturally experience such small variations in their DNA when a new generation is bred from their parents. For thousands of years, farmers have been selecting crops with useful properties based on these naturally occurring DNA variations. However, this traditional selection process is imprecise and requires decades of continual breeding. Genome editing is able to expedite the breeding of desirable crops that could have been achieved using traditional methods, allowing such crops to be obtained in approximately 1 – 5 years.

Useful crop properties that have been obtained using genome editing so far include resistance to disease, faster maturation time, longer shelf life and improved nutritional content. These crops provide consumers with more choices in the food products that are available on the market. Genome edited crops can also bring benefits for farmers. Certain genome edited crops that are resistant to plant pests allow farmers to reduce the use of pesticides.

Q2. Is genome editing the same as gene editing? What are other terms that refer to genome editing?

Genome editing is used interchangeably with gene editing by scientific researchers and by various food agencies all over the world. Both terms have the same meaning, and genome editing is the term used by SFA for consistency.

Genome editing can fall under terms used by other food safety agencies. These terms include but are not limited to:

- New Genomic Techniques (NGT)
- New Breeding Techniques (NBT)
- Precision breeding

Q3. Is genome editing the same as genetic modification?

From SFA's perspective, genome editing is not the same as genetic modification. While both genome editing and genetic modification refer to the use of modern biotechnology tools to alter an organism's genome, genome editing represents a

more recent set of tools that allow researchers to make precise changes to an organism's genome. Many of these changes could have been made via conventional breeding techniques, though genome editing can speed up the process of making these desired changes relative to conventional breeding.

In contrast, genetic modification generally involves insertion of foreign DNA, generating organisms that could not have been produced via conventional breeding. SFA has in place a GMO pre-market safety assessment and approval process: <https://www.sfa.gov.sg/food-import-export/commercial-food-imports>

Q4. How might more recently developed genome editing techniques, such as base editing, prime editing or retron editing, be regulated under this framework?

SFA focuses on the product when looking at the food safety of GEd crops. Products generated using very recent or other genome editing techniques not developed at the point of writing can still be eligible for notification (**Pathway A**) as long as the final crop is equivalent to a conventionally bred crop and does not contain foreign DNA, nucleotides, and/or proteins.

Q5. Foreign DNA, nucleotides, and/or proteins were introduced into the host crop during genome editing. Does this disqualify the host crop from notification?

SFA is aware that transient introduction of foreign DNA, nucleotides, and/or proteins is often used during the genome editing process to make the necessary genomic alterations. If said DNA, nucleotides and/or proteins remain in the GEd final crop, the crop would be subject to the GMO pre-market safety assessment. If said DNA, nucleotides and/or proteins are completely removed from the final crop, and removal was verified using standard molecular biology methodologies, the product would be eligible for notification (**Pathway A**).

Q6. Does SFA require raw chemical and biological analysis data for the information requested?

For first submission of the Information Checklist, summary figures or tables of the characterisation data would be preferred. Nonetheless, if further information is needed to clarify if the crop contains foreign DNA, SFA may request for companies to provide further data, including raw data from chemical and biological analysis.

Q7. Will SFA implement a similar framework for the use of GEd animals for use in food and feed?

SFA notes that GE^d animals for use in food and feed are a more recent scientific development compared to crops. SFA is monitoring international developments in regulations concerning GE^d animals for use in food and feed and will conduct a public consultation in due time.