



## GMO, Bioengineered Labeling, and Non-GMO Food

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### Introduction

The acronym GMO stands for Genetically Modified Organisms. Terms with similar meanings include: Genetically Engineered (GE), Genetically Modified (GM), Transgenic, Biotech, Bioengineered, or Products Made with Modern Biotechnology.

This factsheet, which accompanies a webinar on “Non-GMO, GMO, and bioengineered food labeling”, provides an overview of the definitions of these labels in the United States. The webinar and factsheet are part of the *Virginia Sustainable Farms and Agribusiness Education Initiative* offered by Virginia Tech’s Department of Agricultural and Applied Economics and Virginia Cooperative Extension. More information about the program is available at <https://aacc.vt.edu/extension/va-sustainable-farms-agribusinesses.html>.

More information about GMOs can be found at websites created by Purdue University (2016) and the University of Connecticut (2017), and other references listed at the end of this factsheet.

### What is genetic modification and what is it for?

Genetic modification is the process of changing an organism’s genes using modern biology and technology. It is used to change an organism’s rDNA to better suit the needs of farmers and consumers (Van Eenennaam et al., 2014). Genetic modification allows farmers to plant crops with better resistance to insects, viruses, and pesticides. For example, genetic modification has been used to create apples that don’t brown (Paul, 2017), and to develop potatoes that have smaller amounts of

acrylamide—a chemical in potatoes that may be harmful to humans (Charles, 2015). The process has been used to make seeds that produce more food on less land and require less water and fewer nutrients. Genetic modification can lower the cost of farming, reduce the amount of unsold food, and increase farm profits.

Although there is no scientific evidence that genetically engineered food is harmful to humans (National Academies, 2016), there is still public concern. In fact, public skepticism is the main drawback. In addition, certain types of genetic engineering may increase the speed that pests and weeds build up resistance to pesticides and herbicides (Fernandez-Cornejo et al., 2014). Finally, genetic modification may lead to *gene flow*, which is “a change in the genes of a particular group of plants due to the movement of pollen, seeds, or live plants carrying modified DNA sequences” (Auer, 2017).

### What is the difference between mandatory and voluntary GMO labeling?

There are two main types of labels related to GMOs. Many countries’ governments require labeling of GMO foods as containing GMOs. Some producers of non-GMO foods voluntarily label their food as non-GMO.

### Does the United States have laws about mandatory labeling?

In July 2016, Congress passed a law creating the National Bioengineered Food Disclosure Standard (NBFDS). The law provides a national definition of

bioengineered products, creates a labeling requirement, gives producers options for how to label foods, and develops a procedure for enforcement.

## Definition and exemptions

Under the NBFDS, “bioengineered food” means a food “(A) that contains genetic material that has been modified through in vitro recombinant deoxyribonucleic acid (DNA) techniques; and (B) for which the modification could not otherwise be obtained through conventional breeding or found in nature.”

If manufacturers intentionally use bioengineered ingredients in their food products, the food is required to be labeled. If the use of bioengineered ingredients is “inadvertent or technically unavoidable” then the food requires a label if more than 5% of the ingredient (by weight) is a “bioengineered substance”. There are exemptions for small manufacturers.

## What kinds of food require labeling?

NBFDS requires labeling of (a) foods for which the predominant ingredient is regulated by FDA and (b) foods for which the predominant ingredient is broth, stock, water, or a similar solution and the second-most predominant ingredient is regulated by FDA.

What’s regulated by FDA? Everything except meat, poultry, and egg products (and foods with large meat, poultry, or egg content). Therefore, meat, poultry, and egg products may be exempt from the bioengineered label requirement. Other exemptions include foods sold in restaurants and most alcoholic beverages. Organic certified food is not allowed be produced with bioengineering, so it is also exempt.

## Labeling Requirement

Manufacturers have three main options for labeling bioengineered foods and foods containing bioengineered ingredients. (1) Product packaging may include the text “bioengineered food” or “contains a bioengineered food ingredient”. (2) The circular symbols at right may be used. (3) A QR code like the one at the lower-right corner of the

page, or similar technology, may be used if accompanied with a statement like “Scan here for more food information”. The QR code would link to a website or display a text statement. QR codes (or similar technology) must be accompanied with a phone number that would allow callers to access information. Lastly, small food manufacturers (with less than \$10 million in annual receipts) may comply by providing phone numbers (with language indicating that the phone number provides access to additional information) or website addresses instead of providing any of the three options outlined above.

We note that different labeling causes customers to behave differently. For example, some shoppers may avoid products labeled “Contains GMOs” but be indifferent about the phrase “Bioengineered Food”. Some shoppers may avoid food explicitly labeled “bioengineered” but be indifferent about QR codes that direct them to websites indicating the same information.

## Enforcement procedure

USDA may not recall food for failure to comply with NBFDS and may not issue fines. Compliance is enforced only through audits, examinations, hearings, and public disclosure of the results of audits, examinations, and similar activities.



“Scan here for more food informa/ on”

## What do I need to do to be NBFDS compliant?

“Very small” manufacturers (those with less than \$2.5 million in annual sales) are exempt from NBFDS labeling requirements. Farms whose buyers require non-GMO products should keep detailed records, keep GMO and non-GMO inputs separate (and keep affidavits), and consider looking into a verification service to confirm that products do not contain genetically engineered material. Verification is not necessary unless products are marketed as “organic”.

## Do other countries have mandatory GMO labeling?

At least sixty-five countries around the world have some labeling requirements for genetically engineered foods (Bovay and Alston, 2016). Many of those sixty-five countries with labeling requirements are in the European Union where labels have been required for genetically engineered products since 1997 (Bovay and Alston, 2018; Qaim, 2016). In the European Union, food products with ingredients with more than 0.9% GMO contents require labeling (European Parliament, 2003). In Japan, the tolerance is higher, with food products with more than 5% requiring a label (Umeda, 2014).

## What do non-GMO labels indicate?

Non-GMO labels are voluntarily added to products by their manufacturers (Kuchler et al., 2017). There is no unified national definition of non-GMO, and there are many independent certifiers. The Non-GMO Project is probably the best-known non-GMO label but it is not the only one, and certification is not required for producers who want to make “non-GMO” claims. Just keep in mind that independent standards for “non-GMO” differ from the federal standards for “bioengineered”. There may be some products that meet neither standard, and some products that meet both.

For those selling poultry, meat, or egg products, NBFDS does not apply. But if making a non-GMO claim, additional clarification must be provided. For

example, when claiming “Contains no GMO ingredients,” an asterisk must reference the certification, such as, “Certified by NSF International.” See USDA Food Safety and Inspection Service (2019) for additional details.

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