



## Definition of Genetically Modified Food

In essence, GM foods are organisms whose genomes have been engineered in the laboratory in order to favor the expression of desired physiological traits or the production of desired biological products. According to World Health Organization (WHO), Genetically modified foods are foods derived from organisms whose genetic material (DNA) has been modified in a way that does not occur naturally, e.g. Through the introduction of a gene from a different organism. The technology is often called “modern biotechnology” or “gene technology”, sometimes also “recombinant DNA technology” or “genetic engineering”. It allows selected individual genes to be transferred from one organism into another, also between nonrelated species.

## Process of Genetic Modification in Foods

Following cloning, these copies are inserted into plant cells by various methods, either via bacterial carriers or through physical methods like 'gene guns' which shoot microscopic gold particles coated with copies of the trait-carrying gene into plant tissue or single plant cells under high pressure. After insertion, cells are cultured in a laboratory where they develop into plants. Through these intricate processes, we obtain genetically modified (GM) plants which can then be grown on an industrial scale to produce GM foods. It's important to note that each new genetically modified food must undergo extensive safety assessments before it can enter the market.

## Types and Examples of Genetically Modified Foods

GM also extends to animals; AquAdvantage salmon provides an excellent example in this regard. These fish have been genetically modified to grow at twice the rate compared with traditional salmon breeds by introducing growth hormone regulating genes from two other species - Pacific Chinook Salmon and Ocean Pout. Work continues on engineering pigs with omega-3 fatty acids – fats usually derived from fish and beneficial for heart health – thus improving their nutritional profile substantially.

## Historical Evolution of Genetically Modified Foods

The historical evolution of GM foods is marked by several milestones. In 1994, Calgene Inc introduced 'Flavr Savr', a delayed ripening tomato which was the first commercially grown genetically engineered crop approved for sale in U.S markets. By late 20th century, crops like soybeans, corn and canola had been engineered for traits such as increased resistance to pests or disease and improved nutritional content. As our knowledge deepened and techniques refined over time, we have seen an increase in both variety and quantity

of GM foods available globally today.

## **Applications and Benefits of Genetically Modified Foods**

GM foods have the potential to combat malnutrition prevalent in developing countries by bio-fortification – genetically modifying crops to increase their nutritional value. An example is Golden Rice which contains beta-carotene - an essential nutrient for producing Vitamin A often lacking in diets within poverty-stricken regions. This serves as a cost-effective solution for Vitamin A deficiency related health problems like night blindness and weak immunity among millions globally.

## **Controversies and Ethical Concerns Surrounding Genetically Modified Foods**

On the other hand, critics raise valid concerns about safety issues related to human health and environmental impacts. Skeptics question whether GM foods might induce allergies in humans or develop resistance to antibiotics over time due to their altered genetic makeup. Environmentalists worry about possible biodiversity loss if GM crops cross-pollinate with wild species. Ethical issues emerge when considering animal welfare in relation to genetically modifying animals for human consumption. This broad spectrum of concerns ensures that this topic remains heatedly debated in scientific circles and beyond.