



WORLD HEALTH ORGANIZATION

Genetically Modified Organisms Update

By Horatio Thomas

Introduction

During the past 50 years, the world's population has more than doubled, from 2.5 billion in 1950 to 6.2 billion in 2000. Although the production of foods, medicines, and necessities has advanced significantly, these increases in productivity lag behind the rate of population growth. As biomedical technology has progressed, pharmaceutical companies have attempted to use living systems to synthetically grow important compounds. For example, scientists manipulated **gene expression** in bacteria to produce proteins, turning these organisms into living factories. This technology enables farmers to dramatically increase crop yields, improve the production of medicines, and simplify current farming practices. Biotech firms can accomplish this goal by genetically engineering corn that resists viruses or engineering goats to produce a needed drug in their milk. The possibilities are virtually limitless, and would enhance agriculture's ability to deliver important nutrients.

Gene expression—the process by which DNA is translated into proteins.

Summary of the Problem

The announcement of **genetically modified** foods (GM foods) has been met with mixed responses. While the United States, Canada, and Argentina have moved forward rapidly with developing this technology, many other countries remain skeptical about the safety of genetic engineering, even seeking to block the trade of GM foods. Europe has taken the lead in adamantly refusing to use GM food products as an alternative to naturally grown crops. As time progresses, however, biotech firms have improved their bioengineering methods, and other countries continue to join the endeavor to expand these programs. The general sentiment of the international community seems to be leaning toward a decreasing fear of using genetically modified foods as their potential becomes more apparent.

Genetically modified—genetic material that has been altered using genetic engineering techniques, which combine molecules to create a new set of genes.

Recent Developments

GTC Biotherapeutics Drug Delivery System

In the United States, the Food and Drug Administration approved a new method developed by GTC Biotherapeutics, that uses goats to produce a human protein called antithrombin. Currently 1 in

5000 individuals produce an insufficient amount of antithrombin, and treating patients with this protein significantly reduces blood **coagulation**, preventing internal blood clots. Antithrombin is currently marketed under the brand name Thrombate, but the medicine is often in short supply. Traditionally, pharmacologists could only produce the drug by extracting antithrombin from human plasma, which holds minute concentrations of the protein and is donated too infrequently to produce a significant supply. GTC Biotherapeutics claims that it can mass produce the drug with its herd of 200 goats, and the availability of the compound can be modified by controlling the size of the goatherd. This company has essentially replicated a technique that was used for development of insulin, a protein used to treat diabetes that is secreted by cows and pigs. Other companies intend to build on the precedent set by GTC Biotherapeutics and produce medicine in the milk of other animals. Pharming, a company based in the Netherlands, is pursuing approval of a drug that has been developed to be produced in the milk of rabbits.

Coagulation—to thicken into a coherent mass, in this case blood clots.

Zeng Rice

Farmers usually grow rice in low-lying valleys where fields can be easily flooded; this flooding provides the proper irrigation necessary for rice seeds to sprout. However, rice fields are generally delicate and can survive few other stresses. Zeng Yawen, a Chinese biotech firm, has genetically engineered rice that will grow in the hills of southern China. This technology will enable farmers to grow rice in cool temperatures, at high altitudes, and in relatively dry soil, and makes crop yields much less sensitive to ecology. In spite of the relative poor quality of the new farming conditions, the crops produce rice that is rich in calcium, iron, and vitamins.

Although few nations outside of the west have embraced the use of genetically modified foods, Zeng argues that these foods will become a necessity in the future if the world intends to sustain a continuously growing population and higher food costs. After much initial hesitation, China has joined the exploration of genetically modified food. Zeng's rice is simply one part of China's \$2.9 billion program, started in July 2008, to promote the use of genetically modified crops and livestock. Other nations in the area have already accepted some GM foods, such as South Korea which allows importation of GM soybeans. Some countries such as Vietnam have begun following China's aggressive initiative to develop safe GM foods. In spite of the increasing excitement surrounding GM foods and their potential bolstering of the current food supply, European countries continue to respond with **skepticism** toward GM foods, going as far as to dismiss the potential of Zeng's Rice.

Skepticism—an attitude of doubt or disbelief.

Korea's Mixed Signals

The South Korean government has hesitantly shown some approval of GM foods in the past by importing GM soybeans. Consumers have continued to overwhelmingly purchase more natural alternatives to the GM foods. South Korea's reluctant acceptance of GM foods remains controversial as civic groups call for stricter regulations on GM food products. Currently, South Korean law only requires companies to label food products that consist of a 3% or greater concentration of GMO food products. Food makers have repeatedly asserted that GMO are safe and inexpensive, but because of reports from organizations such as Greenpeace that assert that GMO can potentially weaken reproductive health, consumers still remain suspicious of the products. In response to the recent activist attempts to tighten regulations for GMOs, the Grand National Party (South Korea's current majority party) has endorsed stricter regulations. Representative Won Hee-mok believes that consumer confidence can only increase when the people feel fully informed about the contents of their food and its effects.

Focus of the Debate

Most of the complaints regarding GMOs stem from one issue: uncertainty about their impact on human health. Consequentially, the most important question regarding GMOs is whether or not they improve human health without creating negative side effects. Thus far, all reports regarding GMOs have been tainted by some sort of bias, either through support by biotech firms that create these technologies or through criticism by groups that are concerned with GMOs impact on the environment. However, good policy must discuss how to assess food safety. In addition, it should specify how and who will determine whether the results of these tests make these foods suitable for human consumption. How should governments regulate the presence of GM foods within their border? For crops and "**pharm animals**" that meet these prescribed conditions, a resolution should address how firms and governments can collaborate to increase consumer confidence in these products. In addition to thinking about this technology's impact on human health, consider the possible implications of genetic engineering for the environment. Will it negatively impact a large portion of a local ecosystem? Which environmental effects are permissible, and which ones make GMOs unacceptable? As you consider all of these questions, your resolution should come to conclusions about whether there is a benefit to pursuing GMO foods.

Pharm animals—*animals that are genetically modified by biotech firms to mass produce a compound that will later be used as a drug.*

Questions for Policymakers

Policymakers must decide if any GMOs are safe, and determine a procedure for answering that question. Depending on the results, then policymakers can begin a program either promoting or prohibiting GMOs. What would be the most effective ways to do so? How will safety be tested? How will policymakers enforce such regulations? How will policymakers persuade the public to purchase GMO products?

Conclusion

GMOs remain controversial in the international community today. While they show many signs of improving many people's quality of life through enhanced drug treatments and increased food output, many remain skeptical about how these drugs will affect people in the long-term. Some individuals suspect that long-term consumption for GMO food will cause undesirable side effects, such as **infertility** and cancer. With all of the uncertainty, it is clear that both research and regulation is needed to ensure the future of safe GMOs and their acceptance by the public. The research will allow scientists to develop GMOs and more completely assess their risk to the public. Some believe that regulations and full disclosure will give consumers the information and the security they need to acclimate GMO foods into their repertoire. A reputable international body like the WHO should be able to help steer the future of GMOs successfully.

Infertility—*incapable of successfully becoming pregnant.*

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