Genetically Engineered Organisms – Perspective A

General Information – Genetically engineered (GE) plants and animals have the potential to be one of the greatest discoveries in the history of farming. Improvements in crops so far relate to improved insect and disease resistance and weed control. Those improvements using bioengineering or GE technology lead to reduced cost of food production. Future GE food products may have health benefits.

Scientific Impact – Genetic engineering is a technique that has been used to produce food products that are approved by the Food and Drug Administration (FDA). Genetic engineering has brought new opportunities to farmers for pest control and in the future will provide consumers with nutrient-enhanced foods. GE plants and animals have the potential to be the single greatest discovery in the history of agriculture. We have just seen the tip of the iceberg of future potential.

Human Impact – The health benefits from genetic engineering can be enormous. A special type of rice called Golden Rice has already been created and has higher levels of vitamin A. This rice could be very helpful because vitamin A deficiency (VAD) is devastating in third-world countries. VAD causes irreversible blindness in more than 500,000 children and is also responsible for more than one million deaths annually. Because rice is the staple food in the diets of millions of people in the third world, Golden Rice has the potential for improving millions of lives a year by reducing the cases of VAD. The FDA has approved GE food for human consumption, and Americans have been consuming GE foods for years. Although every food product may pose risks, there has never been a documented case of a person getting sick from GE food.

Financial Impact – Genetically engineered plants have reduced the cost of food production, which means lower food prices, and that result can help feed the world. In America, lower food prices help decrease the number of hungry people and also let consumers save a little more money on food. Worldwide, the number of hungry people has been declining, but increased crop production using GE technology can also help further reduce world hunger.

Environmental Impact – GE technology has produced new methods of insect control that can reduce chemical insecticide application by 50 percent or more. This change means less environmental damage. GE weed control is providing new methods to control weeds, which are a special problem in no-till farming. Genetic engineering of plants has the potential to be one of the most environmentally helpful discoveries ever.

Adapted from A. Tegene, W. Huffman, M. Rousu, and J. F. Shogren, "The Effects of Information on Consumer Demand for Biotech Foods," Technical Bulletin No. 1903, U.S. Department of Agriculture, April 2003, www.ers.usda.gov/publications/tb1903/.

Genetically Engineered Organisms – Perspective B

General Information – Genetic engineering is one of the most dangerous things being done to your food sources today. There are many reasons that genetically engineered (GE) foods should be banned, mainly because unknown adverse effects could be catastrophic! Inadequate safety testing of GE plants, animals, and food products has occurred, so humans are the ones testing whether or not GE foods are safe. Consumers should not have to test new food products to ensure that they are safe.

Scientific Impact – The process of genetic engineering takes genes from one organism and puts them into another. This process is very risky. The biggest potential hazard of genetically engineered foods is the unknown. This process is a relatively new technique, and no one can guarantee that consumers will not be harmed. Recently, many governments in Europe assured consumers that there would be no harm to consumers over mad cow disease, but, unfortunately, their claims were wrong. We do not want consumers to be harmed by GE food.

Human Impact – Genetically engineered foods could pose major health problems. The potential exists for allergens to be transferred to a GE food product that no one would suspect. For example, if genes from a peanut were transferred into a tomato, and someone who is allergic to peanuts eats this new tomato, that individual could display a peanut allergy.

Another problem with genetically engineered foods is a moral issue. The foods are taking genes from one living organism and transplanting them into another. Many people think it is morally wrong to mess around with life forms on such a fundamental level.

Financial Impact – GE foods are being pushed onto consumers by big businesses, which care only about their own profits and ignore possible negative side effects. Those groups are actually patenting different life forms that they genetically engineer and have plans to sell them in the future. Studies have also shown that GE crops may get lower yields than conventional crops.

Environmental Impact – Genetically engineered foods could pose major environmental hazards. Sparse testing of GE plants for environmental effects has occurred. One potential hazard could be the effect of GE crops on wildlife. One study showed that one type of GE plant killed monarch butterflies. Another potential environmental hazard could come from pests that begin to resist GE plants that were engineered to reduce chemical pesticide application. The harmful insects and other pests that get exposed to such crops could quickly develop tolerance and wipe out many of the potential advantages of GE pest resistance.

Adapted from A. Tegene, W. Huffman, M. Rousu, and J. F. Shogren, "The Effects of Information on Consumer Demand for Biotech Foods," Technical Bulletin No. 1903, U.S. Department of Agriculture, April 2003, www.ers.usda.gov/publications/tb1903/.

Genetically Engineered Organisms – Perspective C

General Information – Bioengineering is a type of genetic engineering where genes are transferred across plants or animals, a process that would not otherwise occur (in common usage, genetic engineering means bio-engineering). With bioengineered pest resistance in plants, the process is somewhat similar to the process of how a flu shot works in the human body. Flu shots work by injecting a virus into the body to help make a human body more resistant to the flu. Bioengineered plant-pest resistance causes a plant to enhance its own pest resistance.

Scientific Impact – The Food and Drug Administration (FDA) standards for genetically engineered (GE) food products (chips, cereals, potatoes, etc.) are based on the principle that they have essentially the same ingredients, although they have been modified slightly from the original plant materials. Oils made from bioengineered oil crops have been refined, and this process removed essentially all the GE proteins, making them like non-GE oils. So even if GE crops were deemed to be harmful for human consumption, it is doubtful that vegetable oils derived from GE crops would cause harm.

Human Impact – Although many genetically engineered foods are in the process of being put on your grocer's shelf, there are currently no foods available in the United States where genetic engineering has increased nutrient content. All foods present a small risk of an allergic reaction to some people. No FDA-approved GE food poses any known unique human health risks.

Financial Impact – Genetically engineered seeds and other organisms are produced by businesses that seek profits. For farmers to switch to GE crops, they must see benefits from the switch. However, genetic engineering technology may lead to changes in the organization of the agribusiness industry and farming. The introduction of GE foods has the potential to decrease the prices to consumers for groceries.

Environmental Impact – The effects of genetic engineering on the environment are largely unknown. Bioengineered insect resistance has reduced farmers' applications of environmentally hazardous insecticides. More studies are occurring to help assess the effect of bioengineered plants and organisms on the environment. A couple of studies reported harm to monarch butterflies from GE crops, but other scientists were not able to recreate the results. The possibility of insects growing resistant to GE crops is a legitimate concern.

Adapted from A. Tegene, W. Huffman, M. Rousu, and J. F. Shogren, "The Effects of Information on Consumer Demand for Biotech Foods," Technical Bulletin No. 1903, U.S. Department of Agriculture, April 2003, www.ers.usda.gov/publications/tb1903/.

Detecting Bias

Tips for Effectively Evaluating Information

- Question each argument. Imagine you are involved in a debate, and think about how you would present the story from a different side.
- If the sources of facts are listed, go back to the original source and interpret it for yourself. Does your interpretation agree with that of the author?
- Read other articles on the same topic. Seek out sources that disagree, and evaluate then their arguments.
- Realize that authors often unintentionally produce biased material. Critically evaluate everything you read, regardless of the source. Even scientists, doctors, teachers, and politicians can produce biased material.

Questions that Can Help You Detect Bias

Where is the source from? The location of the source can often give you information about its potential for **bias**. It is important to remember that even sources that claim to be neutral (such as newspapers or news programs) can often be biased in the way they choose to present information.
Types of sources include the following:

- Newspaper–In theory, the news articles are supposed to be neutral and to present both sides of the story. But factors such as choice of language, headline, and placement can all influence a reader.
- Magazine–Magazines often depend on selling ads for revenue, so their articles can be influenced by companies that choose to advertise in their pages.
- Peer-reviewed journal–Peer-reviewed journals contain articles that have been assessed and accepted by other experts in the field. Although those types of articles are generally thought to be factual and neutral, they can still contain forms of bias.
- Internet–All the types of sources listed earlier, in addition to others (blogs, websites, etc.), can be found on the Internet. Although the Internet can be an excellent source of information, it is extremely important that you evaluate the information for yourself because anybody can post information, whether or not it is factual.

Who is the author? If you know who the author is, you can potentially assess his or her level of expertise or knowledge. You don't have to know authors personally; you can "know" them through their job title, by becoming familiar with other examples of their work, or through their public reputation. Consider the following:

- Does the article you are using list the author, or is it anonymous?
- Which would you trust more: an article with an author's name associated with it or one that lists the author as "anonymous"?
- Under what circumstances would you accept information from an anonymous source?
- What about information from encyclopedias?
- Is there a group or society that is linked to the article?
- Is there an author for each entry?
- Would you accept an argument or a conclusion from an author simply because of his or her qualifications?

Are facts or opinions being stated? Facts can be proved true or false with data, whereas opinions cannot. Consider the following:

- Does the author attempt to use opinions as facts?
- Are opinions backed up with facts that can be independently evaluated?

Detecting Bias (continued)

Are all sides being addressed? Ask yourself if the story being presented is balanced. Consider the following:

- Are all sides of the story being presented? Note that there can be more than two sides to an issue (not everything is black or white; there are often various shades of gray).
- Why would only some sides be presented?
- Is there evidence that the author is slanting the article (picking and choosing certain facts that support his or her argument)?

Use of language. Evaluate the author's choice of language. Choice of words can influence how we feel about an event. Consider the following:

- Does the author use words that are charged with emotion?
- Ask yourself how the author's choice of words has influenced how you feel about the story.

Are the arguments logical? Break down each argument presented, and ensure that the logic makes sense.

- Is the author using circular reasoning (supporting a premise with another premise)?
- Are there facts and, importantly, sources for those facts presented?
- Authors use citations as a way of sharing with you where they learned the information they are presenting. Although citations are not necessarily appropriate in every type of writing, most academics will use them. Newspapers generally cite their sources of information; ideally, reporters will check out the validity of information gained through their sources.

Should all writing and reporting be free of bias? Can you think of situations where presenting a biased argument is appropriate? Do you think it is possible to be completely free of bias, either as an author or as a reader?