We have discussed halal laws in detail throughout this book. God requires us to eat halal foods (Pickthall, 1994):

(Saying): Eat of the good things wherewith We have provided you, and transgress not in respect thereof lest My wrath come upon you; and he on whom My wrath cometh, he is lost indeed.

Chapter XX, Verse 81

All things are considered good except the ones specifically prohibited, which are very few in number. This chapter will look at genetically modified organisms (GMO) and biotechnology using some of the basic principles from Al-Qaradawi (2007) as discussed in Chapter 2.

Everything is halal unless specifically prohibited. There is no specific mention of altered, modified, or genetically engineered foods and ingredients in the Quran or the traditions of Muhammad (PBUH), because these scientific developments are very recent. However, genetically modified or engineered products from prohibited animals are prohibited. For example, because pork is prohibited, by extension, any products made from genetically altered pigs are prohibited too (MS 1500, 2009).

• God is the only one who has the power to legislate for humans.
• A scientist can explain a new development, and a religious scholar can only try to interpret whether the development violates any of the tenets of Islam. Permitting haram and prohibiting halal is similar to shirk, meaning ascribing partnership with God. It would be most serious if GMO were clearly haram, and Muslim scholars interpreted them as halal. This certainly is not the case.
• Haram is usually associated with what is harmful and unhealthy.
• If it is determined beyond doubt that any of the foods or ingredients developed through genetic modifications are harmful and unhealthy, they will not be approved by governments and, therefore, they become haram.
• There is always a better replacement for something that is haram. There are better replacements for haram ingredients using biotechnology. Until the mid-1980s, porcine pepsin was used in some cheese manufacture. Since the introduction of GM chymosin, the use of pepsin as a replacement for calf
rennet has practically vanished. This is a big plus for the use of biotechnology to help increase the availability of prepared halal foods.

- To proclaim something halal that is not halal is also haram. Again, if GM food was clearly haram, scholars would have a huge issue with it. The items that are not halal are clearly mentioned in the Quran and the traditions.
- Good intentions do not make haram into halal. This applies to pigs and other haram animals, even if scientists try to make pig cleaner and disease-free or grow pig organs for food in the lab; such organs are still haram.
- Doubtful things should be avoided. This is perhaps the most significant guideline. Muslims are required to avoid doubtful things. There is a clear tradition of the Prophet avoiding doubtful things. If Muslim consumers feel that GM foods are doubtful, they must avoid them. Presently, doubtful GMO are the ones modified using genes from prohibited animals.

Biotechnology is an extension of plant and animal breeding and genetics, which have been practiced for decades, and, in some cases, for centuries. One example of animal breeding dates back to prehistoric times when a donkey and a mare were crossbred to produce a mule. The meat of a donkey is not accepted as halal food, and therefore neither is the meat of a mule. Plants have always been bred with closely related plants and animals with closely related animals (Papazyan and Surai, 2007). In modern times, genes for a specific protein product have been identified and scientists also learned how to take a gene from one species and move it to another species. Currently, genes from fish or insects or pigs can be introduced into plant species without affecting the appearance or taste, while making the plants more resistant to diseases or nutritionally better compared with the conventional products available (Nelson, 2001a,b). This modern technology was not available at the inception of Islam. Muslim scholars are, therefore, striving to come to an acceptable decision on some of the issues raised by these new technologies. At the inception of Islam, almost 14 centuries ago, Islamic dietary laws in most countries were the only regulations dealing with the safety and wholesomeness of food products because there were no governmental food safety regulations. Currently, food safety is the responsibility of the government agencies with help from organizations such as the United Nation’s Food and Agriculture Organization, and the World Health Organization. Issues relating to the safety of GM foods are deferred to such agencies; so only those concerns related to the religious aspects of GMO need to be discussed (Nelson and Bullock, 2001). The underlying principle for halal acceptability is that food has to be halal and tayyab, meaning permissible, and wholesome or good. For example, two government agencies in Malaysia, the Institute Kefahaman Islam Malaysia (IKIM) and Jabatan Kemajuan Islam Malaysia (JAKIM), concur that GM food is halal as long as it is from halal sources using halal methods of production (Kurien, 2002).

Several additional points can be considered, such as the concept of change. Is there any change taking place in a gene transfer from a prohibited animal to a permitted animal? Does the gene change the character of the recipient animal or plant enough to make it prohibited? If not, then istihala (change of state) has not taken place. Most GM products and ingredients fall within this concept. Is the porcine gene then acceptable? This remains a controversial issue.
Even if the GMO product is safe, if Muslim consumers feel that introducing pig genes into plants violates their religious responsibility, then such food is considered doubtful. The consumer has the right to accept or reject the reasoning behind the change. However, the industry, government agencies, and scholars have an obligation to educate the consumers about such issues (Man and Sazili, 2010).

The next point to be made concerns religious prohibition versus personal inhibition. People might not find a basis to call the food prohibited because that is the right of God alone. But they might still not want to eat something because they are not sure or it makes them feel uneasy. This will not make GM foods haram, but the concerns of the consumer must be respected.

Does the condition of necessity overrule prohibitions of GM foods? Hunger is still prevalent in the world. GM foods certainly offer tangible alternatives that may increase the food supply. Most Americans believe that biotechnology will benefit them or their families in the next five years, according to a survey conducted by the International Food Information Council. Consumers expect benefits from GMO plants such as improved health and nutrition; improved quality, taste, and variety of foods; reduced chemical and pesticide use on plants; reduced cost of food; and improved crops and crop yields (Langen, 2002). However, officials in some European countries do not share these views.

Islam teaches caution and moderation to Muslims when eating food. GM foods and GM ingredients may not be haram, but many Muslims may avoid them anyway because they do not feel comfortable consuming them. The introduction of animal genes into plants presents a considerable ethical challenges and difficulties for consumers, Muslims and non-Muslims alike.

Theoretically, a donor gene can be from any of biological source, such as plants, microorganisms, insects, fish, or other animals (Zailani et al., 2010). How does the source of donor gene affect the acceptability of the resultant GM products?

- A plant-to-plant gene transfer that makes a plant increase the amount of a conventional food ingredient it produces that is then purified and does not contain genetic material is acceptable.
- A plant-to-plant gene transfer where the resulting crop is consumed which, therefore, includes the genetic material also is acceptable.
- A transfer of an animal gene from a halal animal to bacteria that then is used to manufacture enzymes and other bioactive ingredients is also acceptable as long as the safety of such ingredients is established beyond doubt and the production process is halal. Many of the enzymes produced these days use this new technology.
- The plant or bacteria contain genes from a prohibited animal, such as the pig. These are probably not acceptable even when used on an animal and not directly used on humans. The use of porcine somatotropin for muscle mass buildup in beef cattle falls in this category (Chaudry and Regenstein, 1994).

GM rennet, called chymosin, is so widely used in cheese making that it has become the major coagulant. According to David Berrington of Chr. Hansen, Inc., about 80% of the cheese produced in the U.S. and UK, and 40% of the world’s
cheese, is now made with genetically engineered chymosin (Avery, 2001) although newer non-GMO microbial enzymes are also being widely used. This process has been accepted as halal as long as the production is halal.

The use of genes from haram animals put into halal animals or plants is going to be hard to gain acceptance. It will be difficult to convince Muslim consumers about the benefits of these GMO. It is better for the industry to avoid such products (MS 1500, 2009). Other biotechnology-related issues such as cloning animals for food use and designing new species of animals are going to be equally challenging for Muslims. There is no official information yet about how Muslim opinions on these issues will develop. It will be necessary for GM products with foreign genetic material from non-halal animals to be reviewed and evaluated by religious scholars.

A purely synthetic gene made through recombinant technology, which is similar to a porcine lipase, may be acceptable to produce halal GM products, because there is really no porcine material in the gene but the mere fact that it is a porcine gene may cause Muslims to reject it. Again, this will require extensive study by religious scholars.

REFERENCES