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Ruling Determination of Genetically Modified Foods (GMF) in Islam

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ABSTRACT

The analysis in this article highlighted the essence of the principle of ruling determination of genetically modified foods (GMF) products in Islam based on the framework of Maqasid Syariah. GM food is a modern food product presently multiplying in the world demand. It is yielded through biotechnological engineering to manipulate plants' and animals' deoxyribonucleic acid (DNA). As a result of the process, there will be food products claimed to be more nutritious because they contain more nutrients than the original products. These GMF products can also be farmed in large quantities and involve minimal cost compared to foods that do not undergo genetic modification. Nevertheless, the products produced still do not have any ruling guidelines for Muslims to be used as a backup. Therefore, this research intended to produce guidelines for determining the ruling of foods that have undergone the process of biotechnological engineering. Furthermore, this study aspired to explain the importance of the guidelines for determining the ruling of genetically modified foods (GMF) to Muslims. In order to complete this study, data collection methods were conducted using qualitative design through descriptive and comparative data collection methods and content analysis of fiqh and scientific sources. The conclusion verified that GM food products could be consumed if they comply with the principles that have been outlined.

Keywords: *genetically modified foods, halal products, Islam, maqasid syariah, modern biotechnology.*

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The boost of food production that delivers genetically modified foods (GMF) is becoming more prevalent because it is more nutritious and feasible by involving lower expenses and producing results in more significant quantities. Nonetheless, according to Islamic law, GMF products do not yet hold a straightforward ruling on whether they are halal or haram. A food that contains a new component requires a new ruling. Consequently, to solve the issues about the ruling of GMF, the food produced must go through a meticulous evaluation process by the authorities such as the government agencies responsible. The evaluation process involves preparation, processing, storage, packaging, handling and transportation.

It is necessary to note that classic foods do not undergo any biotechnological engineering process as GMF. *Halal* comes from the Arabic word, which means allowed or permitted by Islamic ruling. In determining whether the food is halal according to Islamic ruling, food must not consist of or contain parts or things from animals forbidden in Islam to consume or that are not slaughtered per Islamic law (al-Tabari 2000; Ibn Kathir 1999). In addition, the food must be advantageous to health and safe for those who eat it (al-Qurtubi 1998). The food must also be free from incorporating any elements that are considered *najis* (ritually unclean) according to Islamic ruling and not processed using tools that are *najis* or contain *najis* according to Islamic law (Anon 2014).

Nowadays, GMF are marketed world wide and promising with a lot of benefits compared to classic foods. GMF have experienced a genetic engineering process by directly altering the structure and characteristics of genes. Deoxyribonucleic acid (DNA) is manipulated through fusion and separation between the DNA of one organism and the DNA of another organism. This process will produce a new organism that does not exist naturally. Genetically modified foods are foods produced from genetically modified organisms by altering the genes of plants or animals for a specific goal. Genetically modified foods are more economical, resistant to pesticides, and insects, maintain long shelf life and are more nutritious than the original plants or animals. Since ancient times, this genetic modification technique has existed but operates under different methods (Hasim et al. 2020). Some conventional biotechnology techniques that have lived for a long time are using microorganisms to make bread and wine or utilising rennin to make cheese (Wan Jasimah 2002).

Furthermore, modern biotechnology, known as molecular biology, involves the latest sophisticated techniques that authorise scientists to attain the same goals quickly and accurately. Although modern biotechnology has diverse meanings, most international and developed regulations approve that modern biotechnology differs from classical techniques such as breeding and mutagenesis. Modern biotechnology involves the selective and deliberate modification of an organism's DNA with human intervention, whether it concerns the insertion, modification or production of specific genes using molecular biology techniques or recombinant DNA. In the case of protoplasm or cell mixing, only techniques that can overcome the natural physiological reproductive barriers are considered (Lembaga Biokeselamatan Kebangsaan 2006).

One of the techniques that have been widely used is cloning which refers to the process of duplication of DNA, cells or genetically similar organisms. Animal cloning refers to the multiplication of genetically identical animals through Somatic Cell Nucleus Transfer (Bruce A. 2005; Kashim et al. 2021). Genetically modified living organisms (GMOs) are organisms that have been genetically modified through modern biotechnological methods. It transpires through natural reproduction, recombination, or both that do not happen naturally (Rang Undang-undang Keselamatan Bio 2006).

According to the Codex Committee on Food Labeling, representing the joint program of FAO and WHO, which gathered for the 39th time in Quebec City, Quebec, Canada, on 9-13 May 2011, it clarified that GMF includes foods and food ingredients that contain GMOs that produced through modern biotechnological methods (Codex Alimentarius Commissions 2011). This definition of GMF holds similarities with the definition explained by the Food Amendment regulations 2010.

Five transgenics have been approved in Malaysia before the biosafety law was established in the Malaysian legal constitution, namely roundup ready soybeans, MON 810 maize, MON 863 maize and NK 603 maize. They are used to feed the livestock and are involved in the ice-forming protein produced from GM yeast for use in ice cream making (Biotek: Biotechnology in Malaysia 2002).

Genetic engineering is a technology for manipulating DNA or genes. The process strives to improve DNA in a better direction, adding foreign DNA into DNA molecules owned by animals, plants and humans. The objective is to alter the original genetic information to better genetics so that it can produce a new type of protein. Subsequently, this protein will cause the organism to be able to highlight the desired new phenotype (Bokkrags 2006; Kashim et al. 2021). This genetic engineering can also be explained through two applications as follows:

1. The technique of manipulating nucleic acids in vitro involves the process of DNA recombinant and injecting it into cells or organelles.
2. The technique incorporates cells that are unlikely to occur through natural physical reproduction (WHO 2005).

The process will produce several crucial terms leading to food products, namely genetically modified organisms, GMOs and GMFs. GMOs are transgenic organisms, while GMFs are food products derived from GMOs (Hasim et al. 2019). For example, some transgenic organisms are programmed to produce in bulk, specifically in the production of enzymes, antibiotics, nutrients, hormones, and various pharmaceutical products such as drugs and vaccines (Wan Jasimah 2002).

It is crucial to note that the topic of GMF is convoluted and demands careful study. Consequently, the existence of this study will help scholars in determining the ruling more efficiently and aptly. Furthermore, it significantly influences society because this study is not only contributed as a guideline but also allow Muslims to assess whether a food is halal to eat or not. It is an endeavour to guarantee that Muslims' food, beverages, and products comply with Islamic law and are safe for health.

Genetically Modified Food (GMF) Ruling Determination Module

According to the Institute of Language and Literature Dictionary Fourth Edition (2005), a module is a separate unit or part complete with its components that conduct specific functions and can be linked with other units in something larger. However, no specific module examines the determination of genetically modified food (GMF) ruling thoroughly and orderly. Therefore, a party must function in filling the gaps that exist for the benefit of Muslims. Therefore, this module produced aimed to fill the gap by discussing the principles that need to be followed in determining GMF ruling is in line with Islamic law to promote GMF products to be consumed by Muslims without a doubt (Arham et al. 2022). GM food is acceptable if they follow some imperative guidelines to avoid any doubts in society related to the status of the food. Allah has set a standard principle for determining the status of food in the Quran, whether it is halal or haram. Allah says:

Do not falsely declare with your tongues, "This is lawful, and that is unlawful," 'only' fabricating lies against Allah. Indeed, those who fabricate lies against Allah will never succeed. (al-Quran, al-Nahl 16:116)

The above verse describes one of the cultures of the pre-Islamic era that existed at that time, before the time of the Prophet Muhammad. Society at that time forbade and legalised something without examining and referring to the revelation of Allah. They claimed to be followers of the teachings of Prophet Ibrahim. Indeed, Allah strictly forbids following what was done by that society at that time (al-Jaziri 2003). Therefore, in this age, one must examine before establishing a ruling not to repeat what the mentioned group of people in the above verse did. The following

are guidelines in the form of modules set for genetically modified foods to comply with the principles of halal food in Malaysia:

Basic Resources for GMF Production

Allah has instructed Muslims to use superior and clean resources in all matters of their lives, including eating and drinking (al-Zuhayli 1998). The central sources of food are animals, plants, chemicals and microorganisms, and some of them are halal and haram. Therefore, it is vital to attend specific research related to the source of food taken to regard the GMF in question as following Islamic law:

1. *Land Animal-based GMF Sources:* Animals that live on land are known as *al-hayawian al-barriyah*, meaning they can only live on land (al-Zuhayli 1997). Land animals that are halal to eat must be slaughtered first before being consumed, and prior to slaughtering, one needs to mention the name of Allah without associating Him with others. Al-Quran insists: “So eat of that [meat] upon which the name of Allah has been mentioned, if you are believers in His verses [i.e., revealed law]” (al-Quran, al-An’am 6:118).

The verse clearly states that humans can eat every food source that is halal, pure and clean as long as it does not present any sign or evidence stating that it is from a haram source. Moreover, the food must not threaten one’s health and life upon consumption (al-Qurtubi 1998). Islam strictly forbids anyone who tries to forbid something not forbidden by Allah and the Prophet Muhammad. However, the laws and conditions of slaughter are not absolute (can be generalised) to allow all types of animals on this earth to be eaten and utilised by Muslims in eclectic cases (al-Zuhayli 1986).

2. *Aquatic Animal-based GMF Sources:* Furthermore, aquatic animals mean living things that only live in water in the sea or rivers, such as fish, shrimp, crabs, and squid. These animals are more dominant in the water and cannot survive on land (al-Zuhayli 1997: 2790). Al-Quran states: “It is lawful for you to hunt and eat seafood as a provision for you and for travellers. But hunting on land is forbidden to you while on pilgrimage. Be mindful of Allah to Whom you all will be gathered (al-Maidah 5:96)”. The verse proves that all aquatic life is halal to be eaten, and one benefits from it. All GMF products based on aquatic animal DNA are halal to be consumed by Muslims as long as they do not cause harm to humans either in the short or long term (Ibn Abidin 1994; Ibn al-Qudamah 1979). Many pieces of evidence from the Quran or the Sunnah support the determination of such a ruling (Ibn Hajar 2001).

Malaysian Islamic Development Department (Jabatan Kemajuan Islam Malaysia -JAKIM) in the 95th *Muzakarah* Fatwa Committee of the National Council for Islamic Religious Affairs Malaysia convened on 16-18 June 2011 and decided genetically modified food products (GMF) as halal based on aquatic life such as fish and the like as long as it does not harm humans (Anon 2011). Thus, human beings with intellect must identify and attend research so that it does not harm human health and life.

3. *Plant-based Sources of GMF:* All types of plants and their products are halal except those venomous, poisonous, intoxicating, harmful to human health, and produced by modern biotechnological processes sourced from haram substances such as marijuana. Al-Quran mentions:

And He it is who causes gardens to grow, [both] trellised and untrellised, and palm trees and crops of different [kinds of] food and olives and pomegranates, similar and dissimilar. Eat of [each of] its fruit when it yields and gives its due [zakah] on the day of its harvest. And be not excessive. Indeed, He does not like those who commit excess. (al-Quran, al-An’am 6:141)

Next are natural substances such as minerals and water. All natural ingredients are halal except those toxic, intoxicating and detrimental to human health and intermixed with unclean things.

Basics of Hygiene in the Production of Genetically Modified Foods (GMF)

Islam is a religion that places tremendous emphasis on cleanliness. Thus, hygiene is one of the substantial facets of the characteristics of food for Muslims, and it covers various parts starting from personal hygiene, clothing, equipment and processing areas or places to make food. It aspires to ensure that the food produced is pure and harmless to human life. Al-Quran emphasizes: “So eat from the good, lawful things which Allah has provided for you, and be grateful for Allah’s favours if you (truly) worship Him (alone)”. (al-Quran, al-Nahl 16:114).

Islam demands Muslims to use excellent and clean resources in all matters of their lives, including eating and drinking. This verse forbids all kinds of food, drink, and daily use of dirty, disgusting, and contaminated items. Ibn Abbas (1998) described pork, flowing blood, carcasses, alcohol and forbidden in Islam as *al-khaba’ith*. Al-Razi (n.d.) defined *al-khaba’ith* as dirty and disgusting things regarding human habits, be it food, drink, or decoration.

While *al-tayyibat* implies all things that are halal and clean and regarded good by human habits, including food and drink. Furthermore, cleanliness is vital in Islam. The Prophet Muhammad PBUH described it as one of the essential parts of faith (Qazzafiy 2008). Thus, food processing, preparation, and selling premises should guarantee hygiene to avoid dirty and harmful animals such as flies, caterpillars, rats, and lizards. The equipment used must also be washed as often as possible.

All types of *najis* such as pigs, blood and faeces are haram used as food. It applies to pure materials exposed to *najis (mutanajjis)*, such as sewage water and food mixed with ‘*ain najis* (characteristic of faeces). Some *najis*, such as alcohol, fats, and illegal animal DNA, have already been widely used in GMF production. It should be noted that impure material remains impure until purified according to the rules recognised by Islamic law. Ibn Nujaym (1980) expressed fifteen methods for purifying *najis*. Among them are pure water, fire, *samak* (tanning), slaughter, soil, or *istihalah tammah* (perfect transformation).

Basics of Safety in Genetically Modified Foods (GMF)

Preserving life is part of the demands of Islam. On this demand, the Holy Book mentions: “Do not take a human life -made sacred by Allah- except with legal right” (al-Quran, al-Isra’ 17:33). Based on this verse, al-Qurtubi (1967) asserted that anyone who neglects personal safety, whether in life or health, is sinful because he has abandoned the things demanded in Islam (Sayyid Qutb n.d.). Prophet Muhammad says: “There is no harm, and no potential harm act is allowed.” (Malik ibn Anas. n.d. Sahih)

However, with some exceptions, Islam allows its followers to eat forbidden food, like when a person is in an emergency. Al-Quran expalions: “Why should you not eat of what is slaughtered in Allah’s Name when He has already explained to you what He has forbidden to you - except when compelled by necessity?” (al-Quran, al-An’am 116:119). However, the flexibility is not absolute, and it lasts temporarily until the state of emergency is gone. The method of fiqh states:

All things that become *mubah* (originally haram) during an emergency should be taken at the proper rate (minimum but not excessively) (al-Suyuti 2001).

Thus, every GMF product based on animals can be eaten in an emergency, especially those harams to consume. It applies when the circumstances are detrimental to humans, but the food must be of the appropriate proportions (al-Zarqa’ 1980).

In the context of Malaysia, the increasing GMF products reflect a measure to meet the needs and demands of society while improving the quality and quantity of food. Therefore, biotechnology-based food must meet the requirements set by the Malaysian Food Safety & Quality

Division (Kashim et al. 2020). The Food Safety and Quality Division (BKKM) ensures food safety and quality through the Food Safety and Quality Program for the Federal Territory of Kuala Lumpur and Putrajaya. This implementation is per the provisions, procedures and codes of practice specified under the Food Act 1983 and Food Regulations 1985, Food Hygiene Regulations 2009 and Food Regulations (Issuance of Health Certificates for Export of Fish and Fish Products to the European Union) 2009. The Department will convene in the National Coordinating Meeting for Food and Nutrition (Bahagian Keselamatan dan Kualiti Makanan Kementerian Kesihatan Malaysia 2014).

The Malaysian Food Safety & Quality Division encourages operators of biotechnology-based products to consult with them before marketing the product (Kashim et al. 2020). This is very helpful in deciding the steps that need to be taken to ensure that food produced through this modern biotechnological process is safe and legal in terms of law and religion. Operators must place safety features in the genetic modification process, including basic ingredients, as those materials are likely to contain toxic or allergens and compare nutritional levels in genetically modified foods with products produced through normal cultivation processes. The evaluation process is completed when the BKKM is completely satisfied with the safety measures taken and there are no doubts and questions about safety or related issues (Kashim et al. 2020).

Genetically Modified Foods (GMF) Ruling Determination Module

Based on the Quran and al-Sunnah, Muslims have been exposed to explicit guidelines in identifying the ruling status of the types of animals that exist (Kashim et al. 2021b; Zelfeni 2023). Muslims are only allowed to consume halal animals regardless of whether they are alive or dead. However, GMF is novel and calls for a new ruling. GMF products must be carefully scrutinised before their status can be determined whether they are halal or haram. In general, Islam stipulates that as long as there is no evidence to point to the prohibition, the original ruling is *mubah* and halal (Kashim et al. 2020). The method of fiqh clearly states:

The initial (status) of something is allowed (halal) until there is evidence that forbids it (al-Suyuti 2001, 1:60; Ibn Nujaym 1985 1: 109).

Therefore, the current ruling for GMF must be decided to prevent Muslims from eating haram foods according to Islamic ruling and even lead to self-harm. Muhammad Sulaiman al-Ashqar (2006) highlighted that the Islamic authorities should consider food or medical product production. In addition, the need for responsible users of biotechnology must be underscored to fit the role of human beings as responsible caliphs on this earth (Hasim et al. 2022). Therefore, the authorities such as JAKIM Planning & Research Division and JAKIM Halal Hub Division will convene and discuss the GMF ruling. Through this meeting, a decision will be made on whether GM foods are in the halal or haram category.

Principles of Determining the Ruling of Genetically Modified Food (GMF)

Research about the GMF product ruling requires exhaustive analysis. Additionally, the study of the fuqaha's views on the law of food must also be done in detail. Through the study conducted, six principles of determining the ruling of genetically modified foods could be outlined in an orderly fashion to determine the future ruling of GMF products. Prospective scholars, scientists, and researchers could use these principles as the key guideline in determining a ruling related to GMF products. The principles are:

1. *Principles of Halal and Haram Status of the Animals:* A GMF product sourced from animal DNA must comply with Islamic requirements. If the animal that is the primary source of the GMF product is haram consumed, then it will also affect the ruling of the GMF product yielded. If it comes from an animal that is halal to consume, then the ruling of the GMF product is halal to eat

(Kashim et al. 2020). On that ground, every effort to deliver GMF products must first refer to the types of animals used as the basis for the new product. Each category of animals has its ruling. Thus, the animals' halal and haram status principles should be deemed a precautionary measure in offering current food products to Muslims.

2. *Principles of Animal Slaughter*: The *fuqaha* (Islamic jurists) differed in defining the word *al-dhakah*. There is a considerable difference between them to understand the meaning contained in the text or evidence either from the Quran, al-Sunnah and the practice of the companions in performing the slaughtering process (al-Tariqi 1983). In the slaughter process, it is obligatory to cut four important veins, namely *halqum* (respiratory vein), *mary'* (food channel) and *wadajayn* (two blood vessels).

In this context, the Hanafi school of thought believes that the slaughtering process will not be complete until the four crucial veins in the neck of the animal are entirely severed (al-Haskafi n.d.). In contrast, the Maliki school of thought maintains that Muslims must do a slaughter by cutting three of the four crucial veins found in the neck of the animal, namely *halqum* and *wadajayn* (al-Khattab 1328H).

The Shafi'i school, on the other hand, considers that the slaughtering process must be done by only cutting the *halqum* and *mary'* (trachea and esophagus) veins for animals that can be slaughtered. As for the animal that cannot be slaughtered due to its wild nature or involved in any accidental occasion, it is permissible to be killed in any way that leads to death (al-Bujayrimi n.d.). Besides, Hanbali's school of thought underlines that the slaughtering process is only done on terrestrial animals that can be slaughtered and halal consumed by Muslims. However, there are terrestrial animals that are wild and burdensome to slaughter. Hence, it is sufficient to kill them by *al-'aqr* (stabbing) on the animal's body parts (al-Bahuti 1402H; al-Mardawi n.d.). Following the analysis of the principles of slaughter by the four sects, the Hanbalis' school approach is close to perfection. This opinion is even acknowledged by some contemporary scholars, such as `Abd Allah Muhammad al-Tariqi (1983).

3. *The Principle of Not Sourcing Najis*: Hygiene is one of the crucial ingredients of Islam, and this aspect is also applied in producing GMF products. According to Islamic law, various sources can be classified as *najis (faeces)*, including carcasses, i.e. animals that die without being slaughtered. In order to avoid an animal from being classified as a carcass, one must follow some conditions arranged by Islamic law.

Next, blood is also a source that humans typically use for food processing, and there are two types of blood, namely *al-masfuh* (flowing blood) and non-flowing blood (blood clot). These two maintain different rulings. For the flowing blood, the jurists of the four sects have agreed to ban its consumption in all food products. It applies to classical or modern food. However, contrarily for the non-flowing blood, Prophet Muhammad himself declared them halal to consume, which applies to the liver and spleen. al-Nawawi (n.d.) and al-Zuhayli (1998) also added that blood stuck to animal flesh is also halal to eat because it is included in the general matter of *umum balwa* (unavoidable). It is also classified as a blood clot. Consequently, the use of blood clots in the processing of GMF products is halal according to Islamic rulings.

4. *Principle of Istihalah Tammah*: *Istihalah* relates closely with hygiene and purity (*taharah*), especially in the issue of GMF. The Prophet Muhammad described cleanliness as one of the essential elements of faith for Muslims (Qazzafiy 2008). The gravity of the *istihalah tammah* (*perfect transformation*) process in producing animal-based GMF food products is critical because of its function as a method of purification of *najis* or materials that come into contact with *najis*. This process can remove the nature of *najis* from a mass after its conversion to a new mass and is entirely different from the original mass.

The process of *istihalah* can transpire either naturally or with human intervention, converting *istihalah* into a pure substance. In other contexts, materials that were initially haram

to use can now be optimally utilised in various industries. For example, alcohol is haram to drink or put in cooking. Nevertheless, after a complete *istihalah* process that changes its nature to vinegar, the ruling changes to halal either for drinks or food. Furthermore, the properties of alcoholic beverages (*najis*) such as smell, taste, colour, and their identity can no longer be detected or identified in vinegar. Hence, vinegar is halal to consume and utilise in all things.

The *istihalah* process in GMF products is categorised as halal if it occurs in *istihalah tammah* (Kashim et al. 2022) manner. Therefore, the ruling determination of GMF product issues must be made based on the cases studied one by one. It implies that the ruling of GMF can only be determined when studies confirm the substance and effects of *'ain najis* (characteristic of faeces) present in it are absolutely gone. When it is entirely purified from the effects of *najis*, it is proper to accept the GMF product in question as halal.

5. *Principles of Maslahah and Mafsadah*: The scholars of *fiqh* have described *maslahah* with diverse meanings, namely the description of the concept of gaining benefits or rejecting harms (al-Ghazali 1413H). Izz al-Din Abd al-Salam explained that it could be explained in two ways. Firstly, it suggests *haqiqi*, that is, joy and pleasure, and secondly, it presents *majazi*, which is the reason that can lead to joy and pleasure (Ibn Abd al-Salam 2000). al-Shatibi (1997) also defined *maslahah* as a process to ensure the continuity and perfection of human life in all aspects. Some *fuqaha* (jurist) defined *maslahah* as a benefit used by law for human beings to preserve religion, soul, intellect, lineage, and property (Burkab n.d.).

The scholars agreed that only *maslahah* that meets the requirements of Islamic law would be embraced. The *maslahah* must cover the five most vital things that need to be preserved: the care of religion, life, intellect, lineage, and property (al-Shatibi 1997). However, *mafsadah* is a concept contrary to *maslahah*, defined as the benefits required by the Islamic law for human beings from preserving religion, life, intellect, lineage, and property. Therefore, *mafsadah* is the harm rejected by Islamic law because of its adverse consequences on religion, soul, intellect, lineage and property (Ibn Ashur 2007).

Islam always prioritises the *maslahat* (profit) of its followers in all aspects of life, including the subject of GMF. When one studies it, every instruction and prohibition discovered in Islamic law is always bound to the *Maqasid Syariah* (The objectives of Islamic law) of human beings and prevents all kinds of *mafsadah* and damage. Besides, Allah has instructed Muslims to seek good food and stay away from all forbidden foods because of their contaminant, being impure and dangerous nature. Its goal is to preserve the *maslahat* of human life from destruction (al-Dahlawi n.d.), and it is the true essence of *Maqasid Syariah* that must be preserved (al-Buti 2001). Nevertheless, every *maslahah* must meet the conditions set by Islam so that it is not abused.

6. *Principles of Darurah in the Determination of GMF Ruling*: *Darurah* (necessity) implies an emergency that compels anyone to do forbidden things to save religion, soul, intellect, lineage and property (al-Suyuti n.d.). In addressing this issue, the *fuqaha* have agreed to allow anyone in such a situation to do haram (prohibited) things to preserve the five *maqasid* (al-Ramli 1987; Ibn Qudamah 1979).

Hence, the *darurah* approach is always used to change haram status into halal. It even applies in determining the ruling of GMF. Currently, a pressing demand maintains that GMF is needed until it is claimed to reach an emergency. Accordingly, to prevent halal status from being abused and misused, the use of this principle of emergency must comply with the conditions of emergency as defined by Islam (Muhammad Adham 2001).

Halal Logo Requirements for Genetically Modified Foods (GMF) Products

A halal certificate is an important recognition for a product marketed to Muslims. A government-recognised body issues this certificate. JAKIM is the body responsible for issuing halal certificates

in Malaysia. Meanwhile, Brunei Darussalam places the accountability on the Islamic Religious Council of Brunei Darussalam (Anon 2007). The halal certificate confirms that the responsible religious institution has acknowledged a product after a detailed survey and inspection (Kashim et al. 2020).

In Malaysia, the indicators 'Halal', 'Ditanggung Halal' (Incurred Halal) or any argument that could imply that Muslims can consume and use them will indicate that the products of the processing, preparation and sale premises are halal for Muslims (Anon 2011). Ministry of Domestic Trade, Co-operatives and Consumerism Malaysia (2014) reported that the Trade Description Order (Halal Certification and Marking) 2011 only approves that the Malaysian Islamic Development Department (JAKIM) and the Islamic Religious Council for the States (MAIN) are each appointed as the competent authority to certify that food, goods or services are halal according to the Trade Descriptions Order (TAKRIF HALAL) 2011.

Meanwhile, in Singapore, the halal logo is issued by the Islamic Religious Council of Singapore (MUIS) under section 88A of the Islamic Law Act (Cap 3). Every product, service, or activity with a halal logo has met the Islamic law requirements that permit Muslims in Singapore to use it (Anon 2005).

Requirements for Genetically Modified Foods (GMF) Labels

Upon completing each required process and obtaining halal legal status by JAKIM, GMF will be labelled to distinguish between biotechnology-based foods and foods that grow or live naturally. In the United States, the Food and Drug Administration (FDA) encourages operators to put valuable information on labels by declaring that the food has undergone a biotechnological engineering process. The information is imperative to avoid misunderstandings or discrepancies in the information. In addition, the label must state the facts about the essential ingredients of GM food. Any GMF with different nutrients must be differentiated from natural foods (Kashim et al. 2022). Further, if the GMF product holds side effects, it must be noted on the label for consumer convenience (FDA 2001).

In Malaysia, the Bio-Safety Bill (Ministry of Natural Resources and Environment) and amendments to the Food Regulations 1985 (Ministry of Health Malaysia) have stipulated that any food product containing GMOs must be labelled as a product containing GMOs. This is in line with laws in other countries designed to protect consumers and the environment. Furthermore, GMOs may have unknown effects, potentially causing an allergic effect. By labelling, consumers will learn the GMO content in food and hopefully be able to inform those who are concerned about health (Hasim et al. 2020). For instance, if the peanut gene is used in a GMO, the vast majority of consumers who are allergic to peanuts must know the content of the food, and labelling satisfies this requirement.

Labelling is also critical to inform consumers about the content of GMOs, especially for those who focus on religious, ethical and moral issues. For example, if pig genes are used in GMF products, Muslim consumers need to be informed through suitable labels. Similarly, if fish genes are incorporated into GM tomatoes, vegetarians need a label informing them that the food contains non-vegetarian GM genes (FTA 2007).

The guidelines related to the determination of genetically modified foods' ruling (GMF) are paramount in facilitating the authorities such as JAKIM in Malaysia and Islamic organisations worldwide in making decisions related to GMF products. With these guidelines, Muslims can make informed decisions regarding GMF. Similarly, these guidelines can assist the National *Fatwa* Council of Malaysia and the Council of States throughout Malaysia in deciding the ruling on GMF products.

To conclude, this research substantiated that the ruling determination of GMF requires a comprehensive and methodical study to allow Muslims to consume it without doubting its status. This is in line with the *maqasid of syariah*, which intends to preserve the welfare of human beings by benefiting them and avoiding harm. Islam permits its followers from pursuing technological

advancement as long as it does not contradict Islamic law. Based on the above discussion, the GMF ruling determination module is germane to facilitate the responsible parties to set its ruling as its products grow rapidly and widely. GMF products yielded through biotechnology engineering techniques that involve mixing the DNA of impure animals such as pigs are haram to consume. Contrastingly, GMF products that concern mixing between the genes of pure and halal animals are allowed by sharia. Accordingly, Muslims need to be wise in choosing halal GMF products as per Islamic law. Also, the researchers hope that this module can support Islamic organisations make ruling determinations related to GMF products.

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