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**APPLICATION OF MAQASID AL-SHARIAH ON ANIMAL-  
BASED GENETICALLY MODIFIED ORGANISMS (GMOs)  
ISSUES**

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## ABSTRACT

Synthetic biology, or SynBio, is a fast-growing technology, that combines biology, chemistry, computer science, and engineering, producing synthetically modified organisms (SMOs), in which organisms for which a large part or the entire genome has been designed using computer-aided design tool and chemically synthesized. SMOs are considered the advancement of genetically modified organisms (GMOs). Concern arises when (*deoxyribonucleic acid*) DNA constructs are made up of impure (*najs*) substances in Shariah as raw material, like transfer of engineered pig cells with modified genomes. As there is no explicit information about genetic modified technology in the Qur'an or Sunnah of the Prophet Muhammad PBUH, other considerations, like the level of *maslahah* (interest/ benefit), the theory of *al-Intiqal* (the transition) and the theory of *al-Istihalah* (the transformation) can assist Muslim jurists in determining legal rulings on particular Halal contemporary issues in modern biotechnology. This study aims to study the application of maqasid al-Shariah on animal-based GMOs issues, identify the technique of animal-based GMOs production from science perspective, examine the Islamic legal rulings on the usage of synthetic DNA from the theory of *al-Intiqal* and *al-Istihalah*, and to propose a guideline on GMOs production from the view of Shariah and science. Qualitative methods were applied including library research, fiqh adaptation (*al-takyif al-fiqhi*), semi structured in-depth interview, and content analysis. Study shows that the unrestricted interest, or better known as *al-maslahah al-mursalah*, is where the application of modern science and technology intervention is located, as well as two divisions of *al-Intiqal* (the transition) can be applied within SMOs productions, which are *al-Intiqal al-sahih* (the accepted transition) and *al-Intiqal al-fasid* (the damaged transition). Study concludes that synthetic spider silk and recombinant milk protein are permissible (Halal) as their raw materials are considered pure (*tahir*) and their transition processes had completely occurred in Shariah. Besides, synthetic spider silk in textile industry is categorized as *al-Tahsiniyyat* (the luxuries), while it is categorized as *al-Hajah al-Khasah* (the special need) for the patient and medical team when it is used as medical suture in medicine, whereas recombinant milk protein in dairy industry is categorized as *al-Hajiyyat* (the needs) for human life. Nonetheless, humanized pig organ is impermissible (Haram) as the raw material and its recipient organism are impermissible (Haram) and its transition process had not completely occurred in Shariah, except for emergency (*darurah*) case with some provisions.

### Keywords

*Al-Intiqal, Al-Istihalah, Al-Maslahah, Genetically Modified Organisms (GMOs), Maqasid al-Shariah, Synthetic Biology, Synthetically Modified Organisms (SMOs).*

## INTRODUCTION

Along with the advancement of science and technology, new methods are utilized within the production process with a variety of ingredients, and hence challenges may arise in determining its Halal status (Salahudin et al., 2017). In ascertaining the status of genetic modified products, determinations of Halal must be supported by other considerations because there is no straightforward information concerning genetic modified technology in the Qur'an or Hadith (Idris et al., 2020). In fact, scientists now can generate organisms with whole new gene clusters (Garthwaite, 2014), and hence they can design completely novel proteins that self-assemble into predicted shapes using computational methods (Ljubetic et al., 2017) producing synthetically modified organisms (SMOs), in which organisms for which a large part or the entire genome has been designed using a computer-aided design tool and chemically synthesized (Randall & Andrew, 2017). Concern occurs when (*deoxyribonucleic acid*) DNA constructs are made up of impure (*najs*) substances in Shariah as raw material, like transfer of engineered pig cells with modified genomes. The concept of *maslahah* (interest/ benefit) in maqasid al-Shariah, the theory of *al-Intiqal* (the transition), as well as the theory of *al-Istihalah* (the transformation) can help Muslim jurists in determining legal rulings on some Halal contemporary issues in genetic modified products.

The objectives of this study are to study the application of maqasid al-Shariah on animal-based GMOs issues, identify the technique of animal-based GMOs production from science perspective, examine the Islamic legal rulings on the usage of synthetic DNA from the theory of *al-Intiqal* and *al-Istihalah*, and to propose a guideline on GMOs production from the view of Shariah and science. Qualitative approaches have been applied including library research, fiqh adaptation (*al-takyif al-fiqhi*), and semi structured in-depth interview. Study reveals that the unrestricted interest, or better known as *al-maslahah al-mursalah*, is where the application of modern science and technology intervention is located, as well as two divisions of *al-Intiqal* (the transition) can be applied within SMOs productions, which are *al-Intiqal al-sahih* (the accepted transition) and *al-Intiqal al-fasid* (the damaged transition). Study reports that synthetic spider silk and recombinant milk protein are permissible (Halal) as their raw materials are considered pure (*tahir*) and their transition processes had completely occurred in Shariah. Besides, synthetic spider silk in textile industry is categorized as *al-Tahsiniyyat* (the luxuries), while it is categorized as *al-Hajah al-Khasah* (the special need) for the patient and medical team when it is used as medical suture in medicine, whereas recombinant milk protein in dairy industry is categorized as *al-Hajiyyat* (the needs) for human life. Nonetheless, humanized pig organ is impermissible (Haram) as the raw material and its recipient organism are impermissible (Haram) and its transition process had not completely occurred in Shariah, except for emergency (*darurah*) situation with certain requirements.

## BACKGROUND

### Problem Statement

The development of modern biotechnology in agriculture, healthcare, and food industry grows rapidly in this day and age. It is also noticeable, in the practice of genetically modified organisms (GMOs), some concerns may arise, especially when (*deoxyribonucleic acid*) DNA constructs are made up of impure (*najs*) substances in Shariah as raw material, like transfer of engineered pig cells with modified genomes, has to be further addressed. A question whether DNA extracted from live animals can be consumed or not in producing GMOs products is also ambiguous. The level of *maslahah* (interest/benefit) in maqasid al-Shariah pertaining to synthetically modified organisms (SMOs) products needs to be further examined, whether the product is included within the level of *maslahah al-Tahsiniyyat* (the luxuries), or *al-Hajiyyat* (the needs), or can be consumed within the case of *al-Daruriyyat* (the essentials). In fact, a further investigation in the theory of *al-Intiqal* (the transition) and *al-Istihalah* (the transformation) in genetic modified products should be further addressed, in order to strengthen the Islamic legal rulings on the particular Halal issues, as there is no explicit rulings about genetic modified technology within the primary sources of Islamic law. The results from Islamic scholars and science experts can minimize the concerns among Muslim society in the subject of *syubhah* (uncertain).

In addition, the discussion of the health issue of toxicity and pathogenic in genetic modified products is also required and we still need more clarification regarding the threat of toxicity from releasing GMOs. A strict compliance to biosafety guidelines is still required in many developing countries and these rules are still impractical in many countries, thereby a stringent guideline from Shariah and biosafety must be examined pertaining to GMOs production. As a Muslim practitioner, we cannot simply make a conclusion whether GMOs are fully dangerous to the human health, as well as to the environment and other species. An analysis study of GMOs production from the view of the level of *maslahah* within maqasid al-Shariah, the theory of *al-Intiqal* (the transition) and *al-Istihalah* (the transformation), biosafety, as well as *fatwa* from the Muslim jurists should be addressed before any Islamic legal ruling is made.

### Research Questions

This study is conducted to answer the following questions:

- i. How can we apply the three levels of *maslahah* in maqasid al-Shariah pertaining to animal-based GMOs issues?
- ii. What is one of the techniques used to produce animal-based GMOs production from science

perspective?

- iii. How can we examine the Islamic legal rulings on the usage of synthetic DNA from the theory of *al-Intiqal* and *al-Istihalah*?
- iv. How can we propose a guideline on GMOs production from the view of Shariah and science?

## OBJECTIVES

The objectives of this study are:

- i. To study the application of maqasid al-Shariah on animal-based GMOs issues
- ii. To identify the technique of animal-based GMOs production from science perspective
- iii. To examine the Islamic legal rulings on the usage of synthetic DNA from the theory of *al-Intiqal* and *al-Istihalah*
- iv. To propose a guideline on GMOs production from the view of Shariah and science.

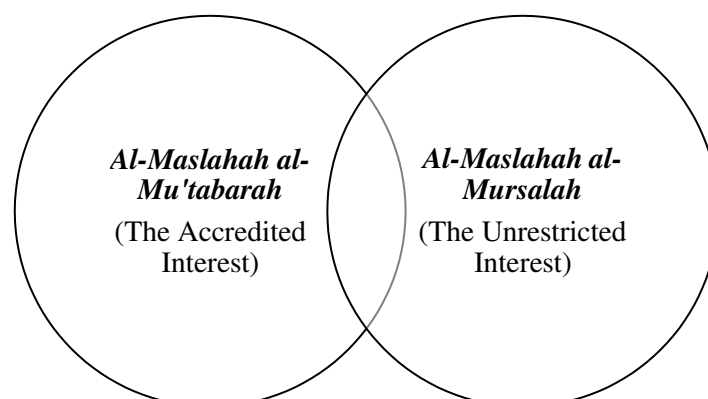
## METHODOLOGY

Firstly, the data were collected using library research from both antecedent and contemporary evidences from Muslim jurists and scholars, as well as the scientists. Next, fiqh adaptation (*al-takyif al-fiqhi*) is applied, in which to link the laws that have been determined by previous scholars to be discussed in the similar scope, and hence it has been applied in Islamic research methodology as alternative to conventional literature review (Khairuldin et al., 2020). In this study, the researchers adapted the previous legal rulings on clothes made up of silk, for instance from silkworm yarn, to be applied on spider silk production, and adapted the previous legal rulings on organ and tissue donation and the usage of impure (*najs*) materials, such as pig, as a medication purpose, from Muslim jurists and various *fatwa* institutions, to be applied on humanized pig organ production. Besides, semi structured in-depth interview is applied, in which the informants that have been identified are based on their credibility according to the subject of research interest, and hence six experts from Shariah law and biotechnology backgrounds have been interviewed by the researchers. The contents were analysed in accordance with the research problems, research questions, and research objectives, along with the identification of the theme and sub themes using the key or subject of interest, before it will then be analysed. The results will then be displayed in figure models.

## FINDINGS

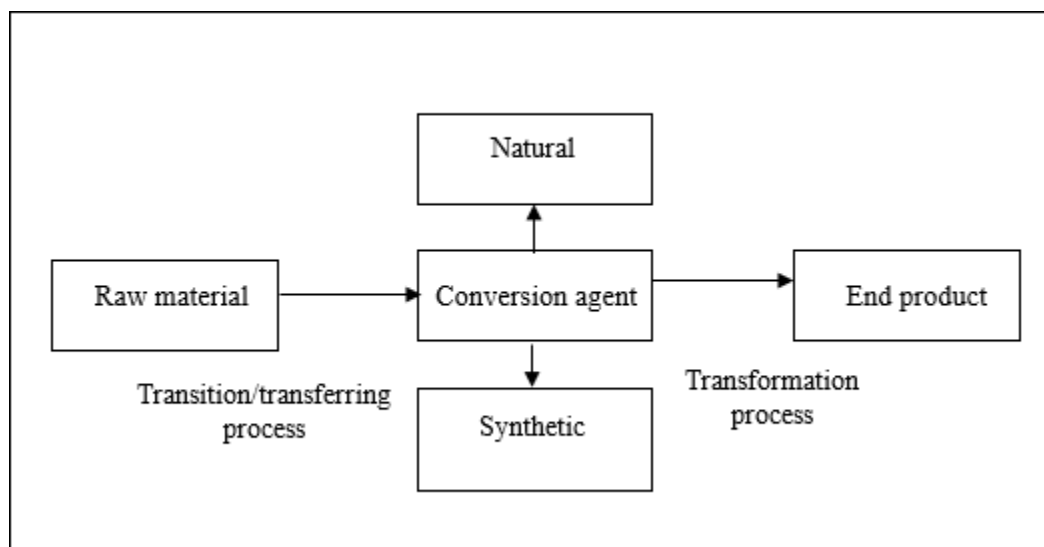
Shariah, which is the law and wisdom ordained and revealed by Allah the Almighty for the guidance of mankind, focuses on attaining good, welfare, benefits, and interests, while rejecting harm, evil, damage, bad, injury, and loss. Maqasid al-Shariah, often known as the objectives of Islamic law, is comprehensive and includes ethical concepts that may be directly integrated within current biotechnology approaches. Within the concept of maqasid al-Shariah, all human actions are deemed lawful, permissible, and ethical, must obtain its five major principles, which are, the protection of faith (*hifz al-din*), the protection of life (*hifz al-nafs*), the protection of intellect (*hifz al-aql*), the protection of lineage (*hifz al-nasbl/ hifz al-nasl*), as well as the protection of wealth (*hifz al-mal*).

Furthermore, Shariah is all about grasping the notion of *maslahah* (interest/ benefit) in all rulings and preventing harm (*mafsadah*) in all cases, and the scope of *maslahah* (interest) is divided into three main groups, which are firstly (i) *al-maslahah al-mu'tabarah* (the accredited interest), secondly (ii) *al-maslahah al-mulghah* (the invalidated interest), and thirdly (iii) *al-maslahah al-mursalah* (the unrestricted interest). The accredited interest is one that has been discovered in the fundamental text of Shariah, either the Qur'an, or the hadith of the Prophet Muhammad PBUH, whereas the invalidated interest is one that has been nullified by the Qur'an or Sunnah, either explicitly or implicitly. On the other hand, the unrestricted interest, or often known as *al-maslahah al-mursalah*, is where the application of current science and technology intervention is placed. The researchers discovered that jurists referred to it as "*mursalah*" due to the absence of textual evidence for its support or rejection from Shariah texts. Many ancient and contemporary scholars debated the importance of maqasid al-Shariah as a method for deriving legal rulings, as *maslahah* and purposes of the law were the *rationes legis* (reason of the law) for all Shariah rulings, and these *rationes legis*, were rationally perceptible and noticeable, with the exception of ritual worship (*ibadat*) rulings.



**Figure 1:** The Classifications of *Maslahah* (Interest/ Benefit) in Terms of A Textual Authority That Are Deemed Applicable to Be Practised from Islamic Jurisprudence View

*Al-Intiqal* (the transition) and *al-Istihalah* (the transformation) are the alternative verification methods of Shariah law in determining the Halal status of some contemporary issues, in which *al-Intiqal* can be defined as the transition or transferring process from one state to another, or from one location to another, and this transferring process gives impact towards the status of the end product, either permissible (Halal) or impermissible (Haram), whereas *al-Istihalah* is the transformation process which involves the transformation of one mass to another without the possibility of returning to its original form. In today's world, the growth of science and technology has demonstrated that the manufacturing process could be complicated, which makes assessing the legal ruling of some products difficult. In Islamic jurisprudence, *al-Istihalah* (the transformation) is the general term for all transformations that occurred within the scope of Halal and Haram issues, whereby *al-Intiqal* (the transition) is the specific term to be used within the scope of Halal and Haram in the biotechnology processing, and both of these methods have similar structure.



**Figure 2:** The Structure of *al-Intiqal* (the transition) (Jamaludin et al., 2012)

Synthetically modified organisms (SMOs) are the advancement of conventional genetically modified organisms (GMOs), with SMOs bringing the delineation of the organisms for which a large section or the whole genome has been constructed with computer-aided design software and chemically synthesized. The distinction between genetically modified organisms (GMOs) and synthetically modified organisms (SMOs) is that the scientists extract the genes from the living organism in creating GMOs, whereas the scientists design the desired genes with computer-aided design program in creating SMOs. As we can observe, the basic production method of these modern products in biotechnology engineering includes a lot of transition or transferring procedures from one place to another that may physically and chemically convert the raw material into another substance in the finished product. This necessitates the alternative verification method of Shariah law in determining the legal ruling of such

products because there is no specific ruling about genetic altering technology within the Qur'an or Sunnah. Basically, *al-Intiqal* is divided into three groups, which are *al-Intiqal al-sahih* (the accepted transition), *al-Intiqal al-fasid* (the damaged transition), and *al-Intiqal al-batil* (the nullified transition). The majority of the contemporary scholars, including the National Council Fatwa Committee for Islamic Religious Affairs Malaysia, Selangor State Fatwa Committee, and Indonesian Ulama Council (MUI), have agreed that genetically modified products and genetic engineering are permissible (Halal/ lawful) with certain provisions.

In general, the basis ruling for synthetic material and chemical synthesis of (*deoxyribonucleic acid*) DNA are permissible (Halal/ lawful), which is consistent with the Islamic legal maxims, as such: “*the original ruling of something is constant to what it is before*”, and “*the norm in regard to things is that of permissibility until there is a clear prohibition against it*”. Study shows that two divisions of *al-Intiqal* (the transition) can be applied within synthetically modified organisms (SMOs) productions, which are *al-Intiqal al-sahih* (the accepted transition) and *al-Intiqal al-fasid* (the damaged transition). Study concludes that synthetic spider silk and recombinant milk protein are permissible (Halal) as the raw materials are considered pure and their transition processes had completely occurred in Shariah. Besides, synthetic spider silk production in textile industry can be categorized as *al-Tahsiniyyat* (the luxuries) for human life and synthetic spider silk production as medical suture in medicine can be categorized as *al-Hajah al-Khassah* (the special need) to the patient and medical team, whereas recombinant milk protein production in dairy industry can be categorized as *al-Hajiyyat* (the needs) for human life based on maqasid al-Shariah. Nonetheless, humanized pig organ is impermissible (Haram) as the raw material is impermissible (Haram) and its transition process had not completely occurred in Shariah, except for emergency (*darurah*) case with certain provisions. Laboratory works are crucial in providing a rigorous elucidation on particular matters. The theory of *al-Intiqal* (the transition) and maqasid al-Shariah (the objectives of Shariah) are pertinent in addressing current concerns pertaining to the Halal status and Halal issues of certain products in accordance with the scientific and technological advancements.

No doubt, the secondary sources of Islamic law, such as *maslahah* (interest/ benefit) and *sadd al-dhara'i* (preventive measures), together with the Islamic legal maxims (*Qawaid Fiqhiyyah*), the objectives of Shariah (maqasid al-Shariah), *al-Istihalah* (the transformation) and *al-Intiqal* (the transition) methods, as well as *fatwa* (legal ruling given by a qualified jurist), shall be referred to in determining the legal rulings on GMOs or any genetic modified products. In addition, to govern the release, importation, exportation, and contained use of living modified organisms (LMOs), and the release of products of such organisms in Malaysia, with the goals of protecting human, plant and animal health, the environment, and biological diversity, and where there are possible threats of irreparable



damage, lack of complete scientific data shall not be used as a rationale not to take precautions to ward off such harm, as well as to issue for matters connected therewith, Laws of Malaysia Biosafety Act 2007 (Act 678) is introduced (Biosafety Act, 2007). According to Department of Biosafety (2012), in September 2003, Malaysia ratified the Cartagena Protocol on Biosafety, whereby a Biosafety Act was approved to regulate the release, importation, and contained use of the LMOs and the products of such organisms in 2007, and hence the Act will make sure that the potential detrimental effects of modern biotechnology are minimized and controlled in a way that does not negatively affect both human health and biodiversity. This scientific guideline is in line with the *maslahah* (interest/ benefit) concept in Islamic law, where in any products, before the determination of its Halal status can be decided, the Islamic scholars and the people of knowledge (*ahl al-zikr*) must investigate the *maslahah* (interest/ benefit) of consuming it, and the *maslahah* (interest/ benefit) must be larger than the *mafsadah* (harm). In Shariah, any products which deemed Halal (permissible), must be free from any harmful effects to the human health.

## **FUTURE PLAN OF THE RESEARCH**

The future plans of this study are as follows:

1. A study that includes a more detail justification from the scientific processes about some production processes of the Halal contemporary issues, specifically within the biotechnology processing, such as vaccines.
2. Propose to the *Muzakarah* of the *Fatwa* Committee of the National Council and *fatwa* institutions to draft a decision regarding Halal status of synthetically modified organisms (SMOs) production.

## **Limitation of the Study**

In this study, the researchers divided the chapter into five main chapters, firstly, in chapter one, the concept of maqasid al-Shariah in modern biotechnology was discussed, simultaneously the researchers focused on the literal and technical meaning of maqasid al-Shariah in Islamic jurisprudence, the relationship between *maslahah* and maqasid al-Shariah, the classification of maqasid al-Shariah, a brief introduction to modern biotechnology, how maqasid al-Shariah plays its roles in modern biotechnology, and significance of maqasid al-Shariah as contemporary method of deriving legal rulings. Secondly, in chapter two, the development of genetically modified organisms (GMOs) was examined, simultaneously the researchers focused on the overview of genetically modified organisms (GMOs), the synthetic biology process, the theory of *al-Intiqal* (the transition/transferring), the theory of *al-Istihalah* (the

transformation), and fatwa pertaining to genetically modified organisms (GMOs). Thirdly, in chapter three, the researchers focused on the application of maqasid al-Shariah on synthetically modified organisms (SMOs). Within this chapter, the researchers included the discussion regarding the examples of genetically modified organisms (GMOs) products, both conventional GMOs and synthetic GMOs, as well as the researchers included the examination of the three levels of *maslahah* in maqasid al-Shariah pertaining to synthetically modified organisms (SMOs) products. Fourthly, in chapter four, the researchers focused on the guidelines on genetically modified organisms (GMOs) production from Shariah and science perspectives. Within this chapter, the researchers took into account the secondary sources of Islamic law, such as *maslahah* (interest/ benefit) and *sadd al-dhara'i* (preventive measures), together with the Islamic legal maxims (*Qawaid Fiqhiyyah*), the objectives of Shariah (maqasid al-Shariah), *al-Istihalah* (the transformation) and *al-Intiqal* (the transition) methods, as well as *fatwa* (legal ruling given by a qualified jurist), in listing and providing the guidelines on genetically modified organisms (GMOs) from Shariah perspective, whereas from biosafety perspective, the researchers focused on particular guidelines on living modified organisms (LMOs) and genetically modified organisms (GMOs) through the observation, specifically approval for release and import activities involving LMOs, notification for export, contained use, and import for contained use activities involving LMOs, risk assessment, risk management reports, and emergency response plan involving LMOs and products of such organisms, as well as information required concerning LMOs intended for direct use as food or feed, or for processing, from the Laws of Malaysia Biosafety Act 2007 (Act 678) and Cartagena Protocol on Biosafety to the Convention on Biological Diversity. Lastly, in chapter five, the study has been concluded in a comprise manner, the limitations of the study was listed, as well as the recommendations are added by the researchers for the future studies.

## CONCLUSION

In summary, the research has found that the modern biotechnology, specifically genetically modified organisms (GMOs) and synthetically modified organisms (SMOs), falls within the category of *al-maslahah al-mursalah* (the unrestricted interest), in which, *maslahah* (interest or benefit) that has not been directly commanded or mentioned in the Qur'an and Sunnah of the Prophet Muhammad PBUH. The researchers have found that the jurists named it as "*mursalah*", which gives it a meaning of being free from any specific evidence that indicates its acceptance or rejection, nevertheless it still has general evidence (*dalil kulli*) for its support, and in the other word, it has been supported by the general posture of law, or purposes of Islamic law. Besides, research had found that in Islamic legislation, *maslahah* and purposes (maqasid) of the law were the *rationes legis* (reason of the law) for all rulings, and these *rationes legis*, were rationally discernible, with the exception of rulings pertaining to ritual worship (*ibadat*). Secondly, the research has found that synthetically modified organisms (SMOs) fall within the

development of genetically modified organisms (GMOs), in which, the synthetic constructs are designed and manipulated using computer-aided design software, before it is chemically synthesized and sequence-verified, cloned into an expression vector, transformed into a cell, and be modified until a (*deoxyribonucleic acid*) DNA construct is obtained that produces the desired function.

Besides, the researchers have found that this technique is similar to one of the alternative verification sources of Shariah law, namely *al-Intiqal* (the transition), which gives impact towards the status of the end product, either permissible (Halal) or impermissible (Haram). The theory of *al-Intiqal* (the transition) is related to the theory of *al-Istihalah* (the transformation) in Shariah law, as the basis of the accepted transition (*al-Intiqal al-sahih*) and the damaged transition (*al-Intiqal al-fasid*) processes within the issue of Halal and Haram is identified by investigating the transformation (*al-Istihalah*) within the production processes. Basically, it is considered permissible (Halal), if the raw material until the finished product are not considered impure (*najs*) or *mutanajjis* (contaminated with the impure), or if the impurity (*najs*) of the raw material had completely transformed into pure (*tahir*) in the end product both physically and chemically, and vice versa. Study concludes that synthetic spider silk and recombinant milk protein are permissible (Halal) as their raw materials are considered pure (*tahir*) and their transition processes had completely occurred in Shariah. Besides, synthetic spider silk in textile industry is categorized as *al-Tahsiniyyat* (the luxuries), while it is categorized as *al-Hajah al-Khasah* (the special need) for the patient and medical team when it is used as medical suture in medicine, whereas recombinant milk protein in dairy industry is categorized as *al-Hajiyyat* (the needs) for human life. Nonetheless, humanized pig organ is impermissible (Haram) as the raw material and its recipient organism are impermissible (Haram) and its transition process had not completely occurred in Shariah, except for emergency (*darurah*) circumstance with some requirements.

### **Recommendations of the Study**

Firstly, when examining the Halal status of genetic modified products, the researchers employed some secondary sources of Islamic law, such as *maslahah* (interest/ benefit) and *sadd al-dhara'i* (preventive measures), the alternative verification method of Islamic law, such as *al-Intiqal* (the transition), *Qawaid Fiqhiyyah* (Islamic legal maxims), *maqasid al-Shariah* (objectives of Islamic law), and *fatwa* from the Muslim jurists, such as *fatwa* from Indonesian Ulama Council and Selangor State Mufti Department. To help enhance the justifications of the legal rulings, the researchers recommended future studies to include the *fatwa* from any other Muslim jurists or *fatwa* institutions, as well as to relate the legal rulings on the particular issues to the five major preservations within the objectives of Islamic law. Secondly, the researchers acknowledged that laboratory works are crucial in assisting the Muslim jurists to deduce the legal rulings on the particular issues, hence the researchers recommended future studies to include a

more detail justification from the scientific processes about some production processes of the Halal contemporary issues.

## **OUTPUT OF RESEARCH**

### **Journal Article**

(1) Siti Nur Hamizah Ramli, Mohammad Aizat Jamaludin, Noor Faizul Hadry Nordin, Muhamad Shirwan Abdullah Sani. Application of *al-Intiqal* (the transition) on Synthetically Modified Organisms (SMOs): An Analysis from Shariah and Science Approaches. *UMRAN International Journal of Islamic and Civilisational Studies*.

Status: Accepted for Publication (currently in journal copyediting stage)

(2) Siti Nur Hamizah Ramli, Mohammad Aizat Jamaludin, Muhamad Shirwan Abdullah Sani, Noor Faizul Hadry Nordin. Spent Brewer Yeast Status in Halal Food Industry: An Analysis from Shariah and Science Perspectives. *Food Research*.

Status: Accepted for Publication (currently in journal copyediting stage)

(3) Siti Nur Hamizah Ramli, Mohammad Aizat Jamaludin, Noor Faizul Hadry Nordin, Muhamad Shirwan Abdullah Sani. Black Soldier Fly Larvae As Alternative to Conventional Animal Feed: An Islamic and Science Perspective. *Journal of Halal Industry and Services*.

Status: Peer-Review (currently in journal peer-review stage)

### **Academic Book Chapter**

(1) Siti Nur Hamizah Ramli, Mohammad Aizat Jamaludin, Noor Faizul Hadry Nordin, Azura Amid. Application of Maqasid al-Shariah on Animal-Based Genetically Modified Organisms (GMOs) Issues.

Status: Complete Write-Up (currently in the stage of submission to academic book publisher)

### **Proceeding/ Conference**

(1) Siti Nur Hamizah Ramli, Mohammad Aizat Jamaludin, Muhamad Shirwan Abdullah Sani and Noor Faizul Hadry Nordin. (2021). *Spent Brewer Yeast Status in Halal Food Industry: An Analysis from Shariah and Science Perspectives* [Paper presentation]. Virtual International Halal Science

Conference'21, Kuala Lumpur, Malaysia, 39-40. <http://irep.iium.edu.my/97652/2/Programme-Book-12072021.v3.pdf>

Status: Published

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