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DEVELOPING THE HALAL ANIMAL FEED STANDARD: ANALYSIS OF FEED SUPPLY CHAIN ISSUES

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Abstract

Feed ingredients are the most critical aspect in the production of animal feed. Utilization of non-halal ingredients in the production and feeding of animals may lead to animals become non-halal for consumption. Animal feed based on halal ingredients could also become non-halal during the production process because of the use of additives, devices, utensils, machines, or equipment contaminated with non-halal materials. The present study attempts to analyze the halal issues in animal feed supply chain that need to be scrutinized, in order to produce feed that are Shariah-compliant, and therefore could be certified halal by certifying halal authorities. This study utilizes qualitative approach where data are collected through library research. The findings of the study demonstrates that there are few essential issues and aspects in the preparation, production, storage and transport of feed that should be taken into consideration in developing halal animal feed standard to ensure that animal feed could be produced according to the acceptable Halal standard requirements.

Keywords: *Animal, Feed, Supply ,Chain, Standard.*

INTRODUCTION

The halal market is not limited to food and food-related products but also expanded to cover other sectors including the health products, cosmetics, pharmaceuticals, medical devices, as well as logistic (Halim Basari, 2019; Nur Farhani Zarmani et al., 2016). The market is not exclusively for Muslim consumers but has gained huge acceptance among the non-Muslim worldwide, since halal products are not only halal-labeled but also safe, quality and ethical product. This is evident from the participation of many non-Muslim countries in halal food production and trade. Introduction of halal standards in various sectors is among the milestone in the halal industry development in the country.

Malaysia through the Department of Standards Malaysia has developed comprehensive halal standards, widely recognized by other countries (Daud et al., 2011; Mohd Al'Ikhsan Ghazali & Siti Salwa Md. Sawari, 2015). The future development of halal standards will further expand the potential of Malaysia global halal market to the world. Due to the increased demand and purchasing power of the Muslim community in the country, other important and critical products such as animal feed and feed additive should also be certified halal. Nevertheless, there are few halal issues related to the feed supply chain that need to be addressed in order to make sure that halal feed could be produced at the national level. This study therefore attempts to analyze the halal issues in animal feed

supply chain so that appropriate recommendation and measures could be applied for the production of halal animal feed in Malaysia.

METHODOLOGY

The present study applies qualitative research methodology using library research as data collection method. Library research is utilized in gathering data in the form of Quranic verses, Hadith of the Prophet, and Muslim jurist opinions, related acts and regulations, referred journals, articles, books and newspaper article.The research flow for this study was stated in figure 1.

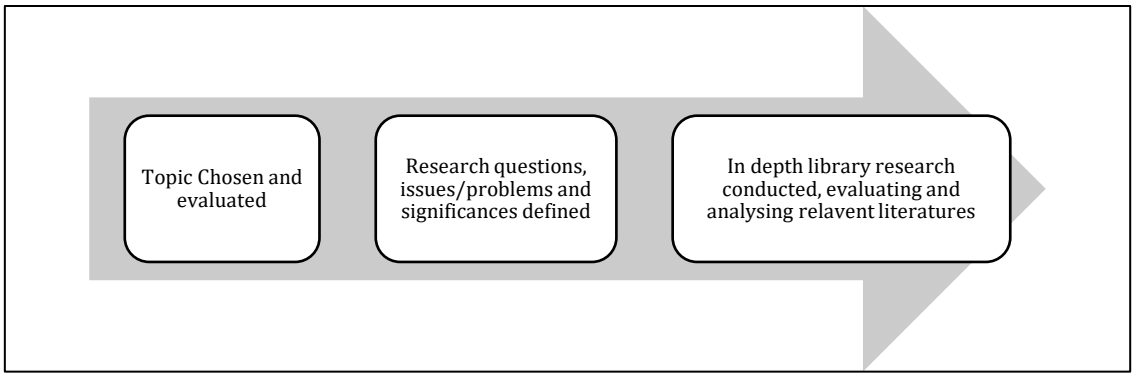

Figure 1: Illustration of library research methodology flow utilised in the present study

RESULTS

There are many common issues related to the safety, quality and Halal integrity of feed along the supply chain. In order to produce animal feed that are free form *najs* (impurities) or non-halal ingredients, there are few issues and aspects that should be observed by those involved in this industry. Among the identified issues in this paper related to animal feed include the feed ingredients, utilization of animal by-products, antibiotics and hormone, the feed production process, and the storage and transport of feed. Besides, the husbandry practices, especially the feeding of animals should also be in line with Shariah (Figure 2).

Fig. 2: Identified issues in animal feed supply chain.

DISCUSION

Among the identified issues in this paper related to animal feed, as explained in the results section include the feed ingredients, utilization of animal by-products, antibiotics and hormone, the feed production process, the storage and transport of feed, and the husbandry practices, which will be elaborated further in this part of the article.

Halal Issues Related to the Feed Ingredients

Feed ingredients are the most critical aspect in the production of animal feed. Animal-based ingredients are of critical emphasis when discussing the halal aspect of feed. This is due to the possibility that the materials may possibly be derived from non-halal animals (especially swine and its derivatives). As the use of blood and meat bone meal (MBM) is still prevalent in animal feed production in the country, possibility exists that feeds sold in the market might contain some traces of this materials. Furthermore, meat and bone meal are made from slaughterhouses wastes and dead animals. The use of this type of feed could compromise the halal aspect of animal feed, and eventually also give impact to the halal status of animals fed with this feed. The continuous use of these sources in feed production could create uncertainties to the halal aspect of the feed produced.

Besides, a study by Suhaiza Hanim Mohd Zailani et al. (2010) found that feed produced from animal-based source (such as animal bones) and a mixture of animal and plant-based ingredients accounts for 21 and 5 percents of the feed production, respectively. According to the study, many of the feed millers in the country were not aware of any halal requirement in feed production since animal feed are not necessary need to be certified as halal.

This issue is even critical at the farm level where farmers are heavily dependent on low quality agricultural by-products, animal waste and animal by-products as feed ingredients to reduce production cost. Ingredients such as rice bran, agricultural by-products, trash fish and chicken entrails are directly fed to the aquaculture fish without prior processing (Roshada Hashim, 2007). Furthermore, according to OIE Aquatic Animal Health Code 2010, these feed ingredients which are commonly prepared in the form of moist feed potentially contain higher levels of pathogens because their ingredients are either in a raw state or subject to minimal treatment (World Organisation for Animal Health, 2010).

Some aquaculture farms were also found to use swine by-products as nutrition for fish (Nazli Ibrahim, 2013; Sabapatty, 2009; Saifullah Ahmad & Muhamad Adzhar Tajuddin, 2014; Saifullah Ahmad & Nurul Mazwana Hamdan, 2014). The continuous utilisation of feed produced from non-halal materials will undoubtedly make the cultured fish to be decreed as non-halal for Muslim consumption. This is so because, the National Fatwa Council committee, which sat on 4th to 6th of April 2006, had decided that fish reared in ponds are prohibited in Islam, if the fish are raised in wastewater (*najs*), or intentionally be fed with *najs* such as pork, carrion and other non-halal materials (Jabatan Kemajuan Islam Malaysia, 2007).

Besides, the use of GM crops as feed ingredients has also invited discussion related to the halal aspect of this plant-based materials, due to the possibility that the 'recombinant DNA' used in the production of this crop could be originated from sources forbidden by the Islamic law. Exploiting non-halal DNA in crop improvement may render the halal status of the GM crop due to the introduction of non-halal gene into the genetic makeup (genotype) of the crop.

Utilization of Animal By-Products, Antibiotics, and Hormones in Feed

The utilisation of non-halal (*najs* elements) and hazardous ingredients in animal feed could indirectly compromise the objectives of Shariah in preserving the religion and human life or soul. This is so because the affected animals will eventually be consumed by human as the end users of the food supply chain. Consuming farm animals that have been given animals by-products, antibiotics and hormones in their diets or as nutrition could be hazardous to the human health.

In Islam, the purpose of *Maqāsid al-Shari'ah* is to preserve the five *Maqāsid* of human life, the religion, life, intellect, lineage and property, in maintaining the *maslahah* and avoiding from the *mafsadah*. In order to preserve these basics, Islam has allowed the consumption of halal and safe foods and prohibited non-halal and unhealthy foods as sustenance. This is supported by explicit proof from the Qur'anic verses where consumption

of halal and good foods is made permissible (al-A'rāf: 157; al-Mā'idah: 1, 4, 5, 96) while clear restriction has been stated on the consumption of some materials, foods and drinks that are believed to be harmful and that are deemed as unclean from the perspective of Shariah (al-Baqarah: 173; al-An'ām: 145).

While there is a clear prohibition on feeding filth ingredients to animals (Jabatan Kemajuan Islam Malaysia, 2007; Majelis Ulama Indonesia, 2012; Mohammad Aizat Jamaludin et al., 2011), there are many other issues related to feed production and feeding practices arises due to modernisation in livestock production today as mentioned below:

1. Animal By-Products

The main issue that arises concern on the halal and safety aspect of animal feed is the utilisation of animal by-product as ingredients in feed production. The utilisation of the Meat and Bone Meal (MBM), the blood meal, and other by-products as raw materials may cause spreading of certain fatal diseases such as BSE in ruminants and Jacob disease in human consuming the contaminated meat (Brown et al., 2001; Kusama et al., 2009; Paul et al., 2007). The situation becomes even critical when essential supplements used in animal feed are extracted from swine (animal that is categorized as *Najs al-Mughallazah)*, or any other non-Halal animals under the Shariah Law.

The prohibition against utilization of pork, dead animals and blood has been mentioned in the Qur'an, where Allay says;

﴿ قُل لَّآ أَجِدُ فِي مَآ أُوحِيَ إِلَيَّ مُحَرَّمًا عَلَىٰ طَاعِمٍ يَطْعَمُهُۥٓ إِلَّآ أَن يَكُونَ مَيْتَةً أَوْ دَمًا مَّسْفُوحًا أَوْ لَحْمَ خِنزِيرٍ فَإِنَّهُۥ رِجْسٌ أَوْ فِسْقًا أُهِلَّ لِغَيْرِ ٱللَّهِ بِهِۦ ۚ فَمَنِ ٱضْطُرَّ غَيْرَ بَاغٍ وَلَا عَادٍ فَإِنَّ رَبَّكَ غَفُورٌ رَّحِيمٌ﴾

"*I do not find within that which was revealed to me [anything] forbidden to one who would eat it unless it be a dead animal or blood spilled out or the flesh of swine - for indeed, it is impure - or it be [that slaughtered in] disobedience, dedicated to other than Allah. But whoever is forced [by necessity], neither desiring [it] nor transgressing [its limit], then indeed, your Lord is Forgiving and Merciful"* (al-Quran. Al-An'ām: 145).

Referring to the above Quranic verse, it is clear that pork, dead animals and blood are prohibited for Muslim consumption. Muslim scholars are of the opinion that every part of swine is impure and prohibited (*haram*) under all circumstances. With reference to this, any sale, purchase and income derived from swine and its by-products, blood, and dead animals are also *haram* from the perspective of Shariah. Similarly, it is impermissible to utilize, mix or trade swine and its by-product, blood and dead animals as ingredients in animal feed production.

Besides, the use of unprocessed animal by-products, as seen in aquaculture production in our country (Roshada Hashim, 2007; Titik Budiati et al., 2013) may also promote susceptibility to disease because the unprocessed by-products are known to contain a higher percentage of bacteria and mould which could infect the animals consuming such feed ingredients and eventually reach human through food consumption (Jędrejek et al., 2016).

In addition, the practice of using animal by-products as a mixture in feed production could affect the halal status of the animals fed with such feed. This is particularly so because the MBM may be derived from swine element or other non-halal animals. In fact, some of the MBM available in the international market are made from a mixture of meats and bones of a few species of animals of unknown halal status (Amir & Mona, 2013).

Inappropriate feeding of animals or fish with non-halal and filthy animal by-products may also cause them to be hazardous to human, in term of food safety aspect. Hence, utilisation of these animal by-products, which have possibility to infect animals and through meat consumption could subsequently cause certain fatal diseases (e.g. Jacob disease) to human, is clearly contradicted with the spirit of *Maqāsid al-Shari'ah* which aims to protect human life and lineage, and reject any introduction of *mafsadah* against human.

This is in line with the legal maxim الضرر يزال which means that harm must be eliminated. This maxim signifies that harm, regardless of its nature, origin, or cause should be removed or eliminated (Abd al-Karim Zaydan, 2015). With regard to animal feeding, based on these potential hazards, utilization of animal by-products, especially that of non-halal sources shall not be permitted to eliminate potential disease transfer to human.

2. Hormone Utilisation

There is also a rising concern on the use of steroid hormones as growth promoter to increase milk production, feed conversion ratios, and growth rate in animals. Researchers believe that this common practice in animal production may lead to hormone residues accumulation in milk and meat of the treated animals. These hormone residues, if not properly monitored could increase the risk of cancer in human, due to long-time exposure to the oestrogen and steroid hormones (Lawley et al., 2008; Malekinejad & Rezabakhsh, 2015).

Besides, scientific assessment of the effects of hormone-treated meat on human health, as reported by The Scientific Committee on Veterinary Measures Relating to Public Health's 1999 includes potential developmental, neurobiological, reproductive, and immunological effects on human, as well as potential immunotoxicity, genotoxicity, and carcinogenicity (The Humane Society of the United States, 2016).

Similarly, the practices of introducing synthetic hormones in animal production for 'economic consideration', to yield more milk in dairy cattle is seen as unacceptable conduct due to the possibility of this hormone to be excreted into the milk, or remain in the meat of the farm animals, if the withdrawal period are not respected. Possible health impact recorded on human include provoking of breast, prostate and endometrial tumours (Malekinejad & Rezabakhsh, 2015). This practice, which violates the animal rights, is also not according to the spirit of the *Maqāsid al-Shari'ah* which aims to protect the human life. Introducing *mafāsid* or hazards through the utilisation of synthetic hormone is not an acceptable conduct from the Islamic point of view, though it promises a more lucrative profits to the farmers. This is in line with the principle of Islamic law where harm, where possible should be eliminated (الضرر يزال), and one should not introduce any harm to others, by any means (Abd al-Karim Zaydan, 2015).

3. Antibiotic as a Growth Promoter

Utilisation of antibiotic as a growth promoter in animal production is another concern related to animal feed and feeding in Malaysia. Yet, the use of antibiotic for medicinal purposes is essential in the agriculture sector to treat diseases related to bacterial infections. This is crucially important in preventing the spread of disease from food-animals to human. Nevertheless, due to the possibility of adulteration among feed manufacturers and farmers, utilisation of antibiotics should be carefully monitored to prevent unnecessary usage.

This is consistent with the Islamic principle that *mafsadah* shall be removed without the replacement of any other equivalent harm, which is based on the Islamic legal maxim "الضرر لا يزال بمثله" which denotes that damage cannot be removed by the commission of a similar injury. In the context of antibiotic utilization in animal production, though its utilization is needed for prevention of disease, the benefits of its usage should outweigh risks that could be introduced due to its application. This is due to the fact that antibiotics are not only being used to treat disease in animal production, but also extend its functions to also serve as a growth promoter and diseases prevention in animal production. Thus, strict monitoring through specific regulation under the Feed Act 2009 should be carried out by the authorities to ensure minimum effect of its utilisation to the animals and human health.

Though utilisation of antibiotic as medication in animal production is crucial, many argue that its utilisation as growth promoter may increase the emergence of antibiotic resistant bacteria in animals, which can cause risk not only to the human health but also the

surrounding environment (Dibner & Richards, 2005; Health Action International Asia Pacific [HAIAP], 2013).

Nevertheless, utilisation of antibiotic for medicinal purpose is undeniably, needed as there is element of *dharurah*, whereas its utilisation as growth promoter only falls within *kamaliyyah*. In this condition, the excessive utilisation of antibiotic in animal production, especially as a growth promoter, is indeed not according to the principle of *Maqāsid al-Shari'ah* which aims to protects human life and lineage, and reject any introduction of *mafsadah* against human. It is therefore important for aquaculture farmers and livestock breeders to make sure that specific withdrawal period in accordance to that specified in the product labelling are respected.

The Feed Production

The production process is another critical stage in the manufacturing of animal feed. Animal feed based on halal ingredients could become non-halal during the production process because of the use of additives, devices, utensils, machines or equipment contaminated with non-halal materials.

During feed production, the binding agent is very useful as a pelleting aid for the pelleting process of the aquaculture feed (Fashina et al., 2019). The binding agent binds to the feed ingredients to produce harder and more durable structure of feed, in the form of blocks, cubes or pellet, while simultaneously improving the water stability of the pelleted feed. Though the plant-based pellet binder such as molasses, food starch and lignin are commonly used, there are few animal-based binding agents derived from plasma and gelatin of animals used in the pelleting process of feed which include for instance the Pro-Bine (Porcine Gelatin Binder). The used of non-halal additive in this process may render the halal status of the halal feed into non-halal.

Besides, another critical step in feed production that could introduce non-halal contaminants is the packaging stage. Utilization of non-halal packaging materials could also render the feed non-halal. This is supported by Clause 4.7 of the MS 1500:2019 where in the production of halal food, the packaging should also fulfil specific requirements of halal (Department of Standards Malaysia, 2019). In addition, utilisation of hazardous materials which could affect the quality and safety of the animal feed could also taint the halal aspect of the feed products. Also, in the labelling processes, the use of labelling materials contaminated with non-halal elements, such as ink containing pork fat, or toxic materials, is yet another issue that should be observed by the feed manufacturer to ensure that the feed produced is continuously halal from the raw materials to the finished products.

Logistics: The Storage and Transportation of Feed

The halal issue of feed is not only critical at the sources or raw ingredients and the production processes but also extend to the whole supply chain. Another critical point in feed production that should be considered by the manufacturers is the storage and transportation of the manufactured feed. Integrated storage and transportation of feed with non-halal feed or other non-halal products could render the status of halal feed to non-halal.

The emphasis on the logistic aspect is significant to maintain the halal status of the feed products because the certified halal products could still become non-halal due to mixing with other non-halal products or elements during the storage, transportation and distribution of the halal products. The important of halal logistics could be perceived from the introduction of the Malaysia halal logistic standard, the MS2400:2010 (Revision MS2400:2019). According to Tarmizi et al. (2014), shifting from conventional to halal logistics operations may ensure the halal and *tayyiban* aspect of the halal-certified food products along the supply chain.

The Feeding Practices

Another concern on halal issues related to animal feed is the application of the integrated farming system in animal production. Integrated farming is a farming system where

"*integration occurs when outputs (usually by-products) of one production sub-system are used as inputs by another, within the farm unit*" (Csavas, 2002). This system has long been practised by farmers in China, since the Ming Dynasty (Csavas, 2002). Among the types of integrated systems include poultry-fish, ruminant-fish, pork-fish and livestock-crustacean integration.

For Muslims, the integrated pork-fish system may perhaps be the most unacceptable system in the production of aquaculture fish for consumption. This is due to the fact that, this type of farming system, which utilised the swine offal or waste as fish nutrition, is not only unethical but also unacceptable from the Islamic perspective. This is also in line with the Fatwa from National Fatwa Council Committee which decreed cultivated fish which intentionally be raised in wastewater or deliberately be fed with pork, carcass or other similar materials as not halal for Muslim consumption (Jabatan Kemajuan Islam Malaysia, 2007).

Besides, according to Dan et al. (2020), swine wastewater contains high concentrations of organic compounds, nutrients (nitrogen and phosphorus), heavy metals, and residual antibiotics that have negative impacts on the water environment. In this context, there is an increased possibility of the spreading of resistance bacteria, active antibiotics, or active metabolites (of antibiotic) through the feeding of animals and fish with manure. In fact, the main health risks of aquaculture products are biological, especially for aquaculture fish produced in water receiving of animal and human wastes (Erondu & Anyanwu, 2005).

In addition, the reality in our livestock industry reveals that some of the farm operators are found to be ignorant, while more than forty percent (40%) of them are unaware of the importance of halal aspect in animal production, especially on feeding practices. The finding is based on the research conducted by FAMA in 2010, against 400 poultry producers, 300 livestock and 100 fish growers (Suhaiza hanim Mohd Zailani et al., 2010). This situation is rather alarming since majority of farmers involve in aquaculture operation are non-Muslim, who are not really aware of the importance of halal feed in the production of halal fish for Muslim consumption.

CONCLUSION

Having reviewed the issues on safety, quality and halal integrity of animal feed along the supply chain, perhaps, it is timely for the halal authorities to develop a specific standard on the production and use of halal animal feed. The establishment of halal animal feed standards will give livestock breeders the choice to use halal certified animal feed. In terms of handling and storage, the use of halal animal feeds could facilitate Muslim breeders in feed management while eliminating the uncertainties due to the possibility of handling animal feed consisting of non-halal substances especially those containing traces of swine by-products. Besides, the use of halal feed could enhance the value of animal-based halal food products because of the preserved integrity of halal food from the feeding and breeding stage of animal production.

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