



Implications and Challenges in Implementing Halal Standard of Animal Feed and its Marketability

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Abstract: The increasing global demand for Halal animal products has spurred interest in Halal animal feed, driven by consumer preferences for ethically and religiously compliant goods. Despite its marketability, the implementation of Halal standards in animal feed faced significant challenges, as limited countries have an established Halal Standard for this sector. The objective of this article is to highlight the implications, and its challenges associated with Halal animal feed, along with assessing the potential Halal global economic marketability. This study employs a scoping review methodology, analyzing eight articles from 2016 to 2024, sourced from databases such as Scopus and Google Scholar to assess the current state of Halal animal feed standards and market dynamics. The review identified several key challenges, such as the difficulty of controlling impurities in feed ingredients, lack of comprehensive Halal integrity within the feed supply chain, and insufficient awareness and understanding of Halal principles among farmers. These issues complicate the certification process and create significant barriers to the widespread adoption of Halal animal feed standards. This paper filled a gap for the need of international cooperation in developing unified Halal standards for animal feed. It also proposes that increased education and awareness among stakeholders could potentially boost the integrity and credibility of the Halal supply chain. In conclusion, establishing an impressive Halal Standards and promoting education among farmers and industry players are essential towards impacting the growth and sustainability of this niche market.

Keywords: Halal animal feed, feed ingredient, Halal integrity, Halal marketability, Halal standard

Abstrak: Permintaan global terhadap produk haiwan Halal yang semakin meningkat telah menarik minat terhadap makanan haiwan Halal. Ia didorong oleh pengguna yang mengutamakan barangan yang mematuhi etika dan agama. Walaupun wujud permintaan, pelaksanaan standard Halal dalam makanan haiwan menghadapi cabaran yang ketara, kerana hanya beberapa negara yang telah membangunkan standard Halal dalam sektor ini. Objektif artikel ini adalah untuk mengkaji implikasi dan cabaran yang berkaitan dengan makanan haiwan Halal dan menilai potensi kebolehpasaran ekonomi global Halal. Kajian ini menggunakan metodologi semakan skop, iaitu dengan meneliti lapan artikel yang diterbitkan antara 2016 dan 2024 untuk menilai keadaan semasa standard makanan haiwan Halal dan dinamik pasaran. Berdasarkan kajian terdahulu beberapa cabaran utama telah dikenal pasti, seperti kesukaran mengawal kesucian dalam bahan makanan, kekurangan integriti Halal yang komprehensif dalam rantai bekalan makanan, dan kesedaran dan pemahaman yang tidak mencukupi tentang prinsip Halal di kalangan penternak. Isu-isu ini merumitkan proses pensijilan dan mewujudkan halangan yang ketara terhadap penggunaan standard makanan haiwan Halal secara meluas. Artikel ini memenuhi jurang untuk mengisi keperluan kerjasama antarabangsa dalam membangunkan satu standard Halal bagi makanan haiwan. Ia juga mencadangkan bahawa peningkatan pendidikan dan kesedaran di kalangan pihak berkepentingan berpotensi meningkatkan integriti dan kredibiliti rantai bekalan Halal. Kesimpulannya, mewujudkan standard Halal yang bagus dan menggalakkan pendidikan di kalangan petani dan pemain industri adalah penting ke arah memberi kesan kepada pertumbuhan dan kemampanan pasaran ini.

Kata Kunci: Makanan haiwan Halal, Makanan Haiwan, Integriti Halal, kebolehpasaran Halal, Standard Halal

Introduction

Halal, an Arabic term meaning "permissible," refers to what is allowed under Islamic law, encompassing not only food and drink but also lifestyle and ethical practices¹. The principle of halal originates from the foundational sources of Islamic law, the Qur'an and the Sunnah². In the context of food, Halal standards ensure products are free from any prohibited substances and prepared according to specific Islamic guidelines³. The market for Halal products has seen significant growth in recent years, driven by increasing Muslim populations and demands for

¹Mohd Izhar Ariff Izhar Mohd Kashim, et.al., "Principles Regarding the Use of Haram Sources in Modern Food Products: An Islamic Perspective," *Journal of Critical Reviews* 7, no. 6 (2020), p. 1017–24.

²M. Nurul Irfan, et.al., "The Urgency of the Halal Industry in Light of Islamic Legal Philosophy," *Al-Manahij* 19, no. 2 (2025).

³Yusof Al-Qadhrawi, *Al-Halal wa al-Haram fi al-Islam*, Dar al-Hadith: Qaherah, (2012), p. 98-101.

ethically sourced and high-quality goods. Halal-certified products provide consumers with a sense of trust assurance that the food complies with the principles of Shariah law⁴. This market extends beyond food and beverages to include pharmaceuticals, cosmetics, fashion, and finance, reflecting a comprehensive lifestyle choice for many consumers⁵. Given that Islam encompasses every aspect of human existence, Muslim are expected to integrate its principles into all dimensions of their lives⁶. The current global Halal market is valued at trillions of dollars, with key regions such as Southeast Asia, the Middle East, and parts of Europe and North America thanks to their robust demand⁷. The appeal of Halal products is apparently not only limited to Muslim consumers; but also, to non-Muslims who seek products that are perceived as clean, ethical, and superior⁸. As a result, the Halal industry anticipates expansion, concurrently offering new opportunities for businesses and shaping consumer trends on a global scale.

Although the Halal market is diverse and continues to expand across various industrial sectors, food remains the dominant sector, constituting the largest share of the Halal market⁹. The demand for Halal-certified food products is has resulted in a wide range of Halal food options, including packaged goods, meats, and ready-to-eat meals, including the feeds used for the animals. Halal animal feed is vital to maintain the integrity of Halal-certified products, which is essential for Muslim consumers who adhere to Islamic dietary laws¹⁰. It enhances consumer trust and broadens accessibility to the lucrative global Halal market, catering to a growing demand for ethically sourced products. Additionally, Halal feed has been known to promote cleaner and healthier animal rearing practices, as it prohibits the use of impure and harmful ingredients. This can lead to higher quality end products, benefiting both consumers and producers by ensuring a consistent, reliable supply of Halal-compliant goods.

⁴Khusniati Rofiah, et.al., “Legal Awareness of Halal Products Certification among East Java Business Operators and Society,” *JURIS* 23, no. 1 (2024).

⁵Md. Siddique E Azam and Moha Asri Abdullah, “Global Halal Industry: Realities and Opportunities,” *International Journal of Islamic Business Ethics* 5, no. 1 (2020), p. 47–59.

⁶Nurdeng Deuraseh and Nurulhuda Asilah Asli, “Issues on Halal Foods with Special Reference to Fatwa on Halal Pet Food for Cats in Islamic Law,” *El-Mashlahah* 12, no. 2 (2022).

⁷Mohd Izhar Ariff Izhar Mohd Kashim, et al., “PCR-Based DNA Detection of Bovine on Medium of Cultured Meat for Consumption: Religious Perspective,” *International Journal of Religion* 5, no. 10 (2024), p. 1917–26.

⁸Kashif Randeree, “Demography, Demand and Devotion: Driving the Islamic Economy,” *Journal of Islamic Marketing* 11, no. 2 (2020), p. 301–19.

⁹Rafiqi Rafiqi, et.al., “Consumer Behavior Model: Brand Equity Mediated by Halal Awareness and Religiosity of Herbal Products Islamic Law Perspective,” *Al-Risalah* 24, no. 1 (2024).

¹⁰Nurulaina Saidin, et.al., “Animal Feed: Halal Perspective,” *International Conference on Humanities, Social Sciences and Education* (2017), https://www.researchgate.net/publication/316988900_Animal_Feed_Halal_Perspective.

In Islamic countries such as Indonesia, Pakistan, and Iran, the issue of halal animal feed has gained significant attention due to its crucial role in ensuring the halal integrity and safety of animal-derived products. The composition and production of feed directly determine the halal status of meat, milk, and eggs, as the inclusion of impure or non-halal substances may compromise Shariah compliance and undermine consumer confidence. Recognized as a critical control point within the halal food supply chain, halal feed forms the foundation for maintaining the authenticity and purity of animal-based foods to improve human quality of life¹¹. Furthermore, the quality of feed has important health implications, as contamination or the use of harmful additives can negatively affect animal welfare and human health. Different countries establish distinct frameworks for halal certification, with variations in implementation and oversight carried out by either government authorities or independent organisation¹². In Indonesia, a well-structured regulatory framework grounded in Islamic principles ensures that all aspects of feed production align with halal requirements. Halal certification in Indonesia was originally implemented on a voluntary basis, nevertheless. Following the enactment of Law No. 33 of 2014 concerning Halal Product Assurance, the certification process transitioned into a mandatory legal requirement¹³. The plays a key role in implementing certification processes that evaluate raw materials, additives, and production practices¹⁴. This system enhances transparency, traceability, and consumer trust within the halal industry. Nevertheless, several challenges persist, including contamination risks, inconsistent monitoring, and limited technical expertise in feed management. On the other hand, the increasing domestic demand for halal products in Indonesia presents opportunities for further development of the halal feed sector. As Indonesia aims to position itself as a global halal hub, strengthening certification standards and technological innovation becomes essential. To ensure sustainable growth and global recognition, Islamic nations must enhance regulatory frameworks, foster collaboration among stakeholders, and invest in research that supports safe, ethical, and Shariah-compliant feed production.

As animals constitute an essential component of human existence, Islam places upon mankind the duty to ensure their sustenance, welfare, and humane treatment. The significance of Halal animal feed lies in its adherence to Islamic

¹¹Syaikhu, et.al., "Animal Conservation Sustainability in the Perspective of Normative Law and Maqasid Sharia," *El-Ussrah* 7, no. 2 (2024).

¹²Supriyadi Supriyadi, et.al., "Legal Effectiveness of Halal Product Certification in Improving Business Economics in Indonesia and Malaysia," *Al-Ahkam* 34, no. 1 (2024).

¹³Musataklima, "Self-Declare Halal Products for Small and Micro Enterprises: Between Ease of Doing Business and Assurance of Consumer Spiritual Rights," *De Jure: Jurnal Hukum dan Syariah* (2021).

¹⁴Asep Saepudin Jahar and Thalhah Thalhah, "Dinamika Sosial Politik Pembentukan Undang-Undang Jaminan Produk Halal," *Al-Ihkam* 12, no. 2 (2018).

dietary laws, ensuring that the entire supply chain, from feed to final product, complies with Halal standards. This is crucial for maintaining the integrity of Halal-certified animal products, which are the prime factor for Muslim consumers worldwide¹⁵. Halal animal feed must be free from prohibited substances such as pork products, blood, and other impure materials. Nonetheless, the industry remains challenging, as some, due to the intentional use of non-Halal ingredients by some farmers, particularly in aquaculture, where feed containing pig-derived substances and blood meal is sometimes used to cut costs or enhance growth¹⁶. Such practices do not only violate Halal principles but also undermine consumer trust and the overall integrity of the Halal certification process. These issues further compound the need for stringent regulations, better monitoring, and increased awareness among farmers to ensure that the entire production chain remains compliant with Halal standards, thereby protecting both religious and ethical consumer values.

This article aimed to explore the implications and challenges associated with the Halal animal feed, as well as assessing its potential marketability in the global Halal economy. By addressing these challenges, the article seeks to provide a comprehensive understanding of the complexities involved in ensuring Halal compliance in animal feed production. Additionally, it provides insights on the growing market potential for Halal animal feed, driven by increasing consumer demand for ethically and religiously compliant products. Through this exploration, the article intends to highlight the opportunities and strategies for expanding the Halal animal feed sector, ultimately contributing to the broader Halal economy. The methodology for the scoping review is based on Arksey and O'Malley's (2005) five-stage framework, which emphasizes a transparent and systematic process. This approach enhances the replicability of the search strategy and boosts the reliability of the study's outcomes. The five stages outlined in Arksey, and O'Malley's framework include: (1) formulating the initial research questions, (2) identifying pertinent studies, (3) selecting studies, (4) organizing and charting the data, and (5) compiling, summarizing, and presenting the results.

Three major databases were searched for studies on: Web of Science (WoS), Scopus and Google Scholar. All peer-reviewed publications in full text from 2016 to 2024 were collected in these databases. "Halal" AND "Animal" AND "Feed" were included in the list of keywords used. The Google Scholar search yielded a total of 8550 relevant articles. Scopus and Web of Science (WoS) search results were 7 and 99, respectively, and a thorough screening process was used to exclude duplicate and unrelated articles. Eight articles identified to be

¹⁵Mohd Helmi Ali, et al., "Food Supply Chain Integrity: The Need to Go Beyond Certification," *Industrial Management & Data Systems* 117, no. 8 (2017), p. 1589–1611.

¹⁶Aamir Iqbal, et.al., "Looking at Some Animal Feeds with Respect to Halal Concept," *Journal of Animal Science and Products* 2, no. 1 (2019), p. 46–53.

relevant for this study. The results are summarised in Table 1 with a focus on implications and challenges of Halal animal feed. The potential of marketability was also investigated in this study.

The implications and challenges of Halal animal feed

The implications and challenges associated with Halal animal feed are significant, highlighting the need for comprehensive standards and regulations. The findings, with a focus on the implication and challenges in Halal animal feed is summarised in Table 1. One major implication is the necessity of implementing legislation to control chemical compounds in poultry feed, as discussed by Mohd Ashraf et al.¹⁷ This underscores the importance of developing specific Halal standards for poultry feed production in Malaysia to address potential hazards and ensure the safety and quality of feed ingredients. The implications of this study underscore the urgent need to strengthen the regulatory and institutional framework governing halal animal feed production in Malaysia. Firstly, it is imperative to implement comprehensive legislation for chemical compound control in poultry feed, ensuring that all additives, enhancers, and supplements used comply with both safety and halal standards. This legal foundation should be complemented by the development of a dedicated Halal Standard for Poultry Feed Production in Malaysia, establishing clear and enforceable benchmarks for halal compliance across the feed manufacturing sector. Such measures are essential to safeguard the integrity of the halal food supply chain, given that halal animal feed serves as the foundation for halal meat production.

From a global perspective, understanding the composition and regulation of animal feed provides valuable insights into international best practices, which can inform Malaysia's own halal feed governance. This highlights the need for strict adherence to Islamic guidelines in every stage of animal feed production from sourcing and processing to storage and distribution. Therefore, comprehensive guidelines for halal feed production and use must be established, outlining responsibilities among all stakeholders, particularly farmers, who play a key role in ensuring the halal integrity of livestock production. Additionally, the use of clean and uncontaminated organic waste for Black Soldier Fly (BSF) larvae cultivation should be enforced to mitigate contamination risks. Collaboration with halal authorities throughout the feed supply chain would further enhance consumer confidence and ensure continuous compliance with halal principles.

Moreover, the quality and safety of animal feed should be reinforced through robust regulatory oversight, aligning halal assurance with broader food safety objectives. This preference among consumers for products with clear and

¹⁷Amalina Mohd Ashraf and Fadilah Abd Rahman, "Hazards in Poultry Feed Production: An Appraisal from the Halal Perspective," *Journal of Fawa Management and Research* 27, no. 2 (2020), p. 1–16.

reliable halal certification reflects a growing demand for transparency and religious compliance¹⁸. In aquaculture, specific attention must be given to determining the *istiḥālah* (transformation) period for patin fish that have consumed non-halal substances such as pig offal, and to promote the *al-istibrā'* method as a purification process that can bolster the credibility and sustainability of Malaysia's aquaculture industry. *Istiḥālah* is defined as the transformation of the impure substance into a pure one whereby the final product differs completely in nature and characteristics from its original form¹⁹. Collectively, these recommendations point towards the need to improve the legal framework governing halal animal feed regulation and to include animal feed as part of JAKIM's certifiable halal products. It is essential as it is aimed at safeguarding Muslim consumers by verifying that the product comply with halal standard and preventing unintentional violation of religious obligations²⁰. Such strategic enhancements would not only fortify Malaysia's position as a global leader in halal assurance but also ensure that the entire halal food production ecosystem, from feed to final product, remains authentic, ethical, and compliant with Shariah principles.

The challenges such as maintaining Halal integrity in the feed supply chain and ensuring that feed is sourced from permissible origins pose significant obstacles as aforementioned. These issues point to the need for robust safety management systems and clear guidelines to safeguard the Halal status of animal products. The source of animal feed is a crucial criterion for Halal certification, as it directly determines the Halal status of the final animal product. Halal authorities, such as JAKIM and the Fatwa Department, rigorously evaluate the sources of feed ingredients to ensure compliance with Islamic dietary laws. This evaluation process involves verifying that all ingredients come from permissible (*halal*) sources, free from any prohibited (*haram*) substances, and ensuring that no cross-contamination occurs throughout the supply chain. Authorities conduct thorough audits, inspections, and testing of the production and storage facilities to confirm adherence to Halal standards. Complete transparency is required from feed producers, including documentation on sourcing and production methods, before Halal certification is granted, ensuring the integrity and compliance of the animal feed.

Another critical implication is the central role that animal feed plays in the Halal food supply chain, as it serves as the initial control point for ensuring Halal

¹⁸Endeh Suhartini, et.al., "Analysis of Halal Certification for Micro and Small Business Actors from the Perspective of Maslahah Principles and Legal Certainty," *Al-Adalah* 21, no. 2 (2024).

¹⁹Abd. Rauf Muhammad Amin, et.al., "Between *Ḍarūrah* and Halal Integrity: MUI Fatwas on Harm-Derived Vaccines and Medicines," *Samarah* 8, no. 2 (2024).

²⁰Ramlan and Nahrowi, "Sertifikasi Halal sebagai Penerapan Etika Bisnis Islami dalam Upaya Perlindungan bagi Konsumen Muslim," *Ahkam: Jurnal Ilmu Syariah* 14, no. 1 (2014).

compliance. Rahim et al. emphasizes that ensuring the Halal integrity of animal feed is crucial for the overall Halal status of food products, as it directly impacts the safety and permissibility of the end products.²¹ Few challenges may arise from the potential contamination of feed compositions with non-Halal ingredients, which can occur intentionally or unintentionally²². The act of storing halal food alongside non-halal products is strictly prohibited, as it may lead to contamination; therefore the direct use of non-halal sources in food production is even more unacceptable from the halal integrity standpoint²³. For instance, the use of pig intestines and carcasses in fish feed, as highlighted by Iqbal et al.²⁴, poses a significant threat to maintaining Halal standards. Additionally, the lack of uniform regulations across different regions complicates monitoring and enforcement, further exacerbating the risk of Halal breaches.

The complexity of maintaining Halal integrity extends to specific issues like the use of Black Soldier Fly (BSF) larvae as animal feed, as noted by Jamaludin et al.²⁵ The larvae's diet, which may include faeces, raises concerns about the Halal status of meat products derived from animals fed with BSF larvae. The absence of clear fatwas and guidance from Islamic authorities on this matter complicates decision-making for producers and consumers alike. Furthermore, the legal framework in Malaysia, as discussed by Saidin et al.²⁶, lacks specific provisions for Halal animal feed, highlighting the need for regulatory improvements to ensure the integrity of the Halal food supply chain. The suggestion to include animal feed in JAKIM's certifiable products for Halal certification, as proposed by Saidin and Rahman²⁷, reflects the ongoing efforts to enhance the regulatory landscape and uphold the standards required for Muslim consumption.

²¹Syed Fazal ur Rahim and Muhammad Abdullah Masood, "Global View of Animal Feed in Halal Perspective," *GSC Advanced Research and Reviews* 11, no. 1 (2022), p. 37–69.

²²Syed Fazal ur Rahim and Muhammad Abdullah Masood, "Global View of Animal Feed in Halal Perspective," *GSC Advanced Research and Reviews* 11, no. 1 (2022), p. 37–69.

²³Haryati, et.al., "The Debate on the Aesthetics of Business Brand Innovation among the Millennial Generation for the Issuance of Halal Certification," Nuraini: *Jurnal Kajian Syariah dan Masyarakat* (2024).

²⁴Aamir Iqbal, et.al., "Looking at Some Animal Feeds with Respect to Halal Concept," *Journal of Animal Science and Products* 2, no. 1 (2019), p. 46–53.

²⁵Mohammad Aizat Jamaludin, et.al., "Black Soldier Fly Larvae as Animal Feed: Implications on the Halal Status of Meat Products," *Halalsphere* 1, no. 1 (2021), p. 32–42.

²⁶Nurulaina Saidin, et al., "A Critical Analysis of the Legal Framework on Animal Feed in Malaysia: With Special Reference to the Feed Act 2009," *International Journal of Engineering & Technology* 7, no. 2.10 (2018), p. 21–25.

²⁷Nurulaina Saidin and Fadhilah Abd Rahman, "Halal Feed for Halal Food: An Exploratory Study of the Malaysian Legal and Regulatory Framework on Animal Feed," in *Contemporary Issues and Development in the Global Halal Industry* (2016), p. 141–52.

The commercialization and implementation of Halal standards in the animal feed sector face several challenges, impacting various stakeholders including breeders, consumers, JAKIM (the Malaysian Halal Authority), and the Fatwa Department. Inconsistent Halal standards across the world create regulatory difficulties for JAKIM and the Fatwa Department, making it hard to align national guidelines with international standards²⁸. This inconsistency also confuses breeders, who struggle to comply with different requirements when entering various markets, thus hindering their ability to export Halal feed. Consumers, in turn, may lose confidence in the integrity of Halal products due to the varying certifications, which undermines trust in the Halal supply chain²⁹.

Another significant challenge lies in ensuring the integrity of the Halal supply chain, which impacts both breeders and the authorities. Breeders face difficulties controlling contamination and impurities in feed ingredients, which is crucial to maintaining Halal compliance³⁰. This issue is further complicated by the lack of transparency and effective monitoring, making it hard for JAKIM and the Fatwa Department to certify that the entire supply chain meets Halal requirements. Consumers are also affected by this lack of supply chain transparency, which can lead to doubts about the authenticity of the products they purchase, diminishing their trust in Halal certifications.

A third challenge is the gap in awareness and education regarding Halal principles among stakeholders. Many farmers and feed producers lack sufficient knowledge about Halal requirements, leading to unintentional non-compliance. JAKIM and the Fatwa Department face challenges in providing adequate education and resources to these groups, further complicating the adoption of Halal standards. This lack of awareness also impacts consumers, who may not fully understand the importance of Halal animal feed in ensuring Halal end products, thereby slowing demand for certified products³¹. Additionally, varying market dynamics and the absence of unified international Halal standards make it difficult for breeders to enter new markets and for Halal authorities to establish

²⁸Amalina Mohd Ashraf and Fadilah Abd Rahman, "Hazards in Poultry Feed Production: An Appraisal from the Halal Perspective," *Journal of Fatwa Management and Research* 27, no. 2 (2020), p. 1–16.

²⁹Syed Fazal ur Rahim and Muhammad Abdullah Masood, "Global View of Animal Feed in Halal Perspective," *GSC Advanced Research and Reviews* 11, no. 1 (2022), p. 37–69.

³⁰Aamir Iqbal, et.al., "Looking at Some Animal Feeds with Respect to Halal Concept," *Journal of Animal Science and Products* 2, no. 1 (2019), p. 46–53.

³¹Nurulaina Saidin, et al., "A Critical Analysis of the Legal Framework on Animal Feed in Malaysia: With Special Reference to the Feed Act 2009," *International Journal of Engineering & Technology* 7, no. 2.10 (2018), p. 21–25.

global certification systems, which limits the global marketability of Halal animal feed.³²

The Marketability of Halal Animal Feed

The marketability of halal animal feed is becoming increasingly important due to the expanding global Muslim population and the growing demand for products that are certified as halal³³. As consumer awareness of halal products continues to increase, obtaining halal certification has become essential as it enhances the product's credibility and market appeal³⁴. Halal animal feed is crucial for meeting the dietary requirements of Muslim consumers and has also acquired popularity among non-Muslims because of its perceived attributes of safety, quality, and ethical standards³⁵. The halal market, which extends beyond food to include sectors like health products and cosmetics, has seen substantial growth over the years. Furthermore, with over 1.8 billion Muslims worldwide, the demand for halal products, including animal feed, is expanding. This trend is further supported by the recognition that halal products are often viewed as safer and more ethical, appealing to a broader audience beyond just Muslim consumer³⁶.

The halal animal feed marketability, however, become one of the challenges in maintaining the halal food supply chain. While animal be the most highly usage as raw materials in food products, the scrutiny of the animal feed is important to ensure the halal species animal produced. If the halal animal feed unable to be in market due to nonapproved of halal certification, it exposes the halal food supply chain to various systemic risks. Therefore, the halal certification can help much as one of the risk management tools. For example, the certificate helps to minimize the raw materials risk because the food manufacturers have trusts that the purity of raw material can be guaranteed by halal certification. At

³²Nurulaina Saidin, et al., "A Critical Analysis of the Legal Framework on Animal Feed in Malaysia: With Special Reference to the Feed Act 2009," *International Journal of Engineering & Technology* 7, no. 2.10 (2018), p. 21–25.

³³"Halal Animal Feed Production Enters New Markets," Feed Strategy, last modified January 2, 2020, <https://www.feedstrategy.com/business-markets/feed-production-by-region/article/15440965/halal-animal-feed-production-enters-new-markets>.

³⁴Dedi Sunardi, Azri Bhari, and Muhammad Najib Bin Abd Wakil, "Legal Awareness of Micro and Small Enterprise Operators Regarding Halal Certification: A Maslaha Perspective," *Ijtihad* 24, no. 1 (2024).

³⁵Nurulaina Saidin, Fadilah Abd Rahman, and Mohd Ashrof Zaki Yaakob, "Developing the Halal Animal Feed Standard: Analysis of Feed Supply Chain Issues," *Al-Qanatir: International Journal of Islamic Studies* 28, no. 2 (2022), p. 83–91.

³⁶Nurulaina Saidin, Fadilah Abd Rahman, and Mohd Ashrof Zaki Yaakob, "Developing the Halal Animal Feed Standard: Analysis of Feed Supply Chain Issues," *Al-Qanatir: International Journal of Islamic Studies* 28, no. 2 (2022): 83–91, <https://al-qanatir.com/aq/article/view/572>

one hand, the input of suppliers must come from halal species if the manufacturers produce the animal-based product. In another, the product based on marine, plant, minerals, and chemicals should be permitted in Sharia law or authorized by authority body in the origin country³⁷. With halal certification, it can reduce the risk of non-marketable halal animal feed in markets.

Halal certification is crucial for animal feed as the animal productions itself, ensuring that all ingredients and production processes comply with Islamic dietary laws. The certification process involves rigorous scrutiny of the feed's ingredients, production methods, and storage conditions to guarantee that they are free from haram (*forbidden*) substances³⁸. This certification not only assures compliance with religious standards but also enhances marketability by opening new avenues for sales in countries such as Indonesia with a staggering 200 million Muslim population or Japan, who are actively tapping into the halal market³⁹.

There are few things that need to be considered to increase or create an opportunity for Halal animal feeds. For example, one needs to understand what contributes between Halal and Halalan-Toyyiban and its applicability from animal feeds up until animals' production. Though the term Halal and Halalan-Toyyiban are often used interchangeable, they carry distinct meanings. Halal refers to adherence to basic Syariah principles, whereas Halalan-Toyyiban extends beyond these fundamentals, emphasising qualities that ensure something is good, pure, and wholesome⁴⁰. For instance, agricultural animal-based foods from fungi essentially complied with halal requirements, but there are cases where aflatoxins from fungi-based animal feeds posed harmful threats to both animals and humans⁴¹. Due to the risks, it may no longer considered Halalan-Toyyiban⁴². Thus, it is encouraged that all links in the food supply chain to pursue safe practices to guarantee marketability by implementing halal-compliant detection methods, regulatory control measures, and appropriate methods, where applicable

³⁷Fadhlor Rahim Azmi, et.al., "Type of Risks in Halal Food Supply Chain: A Literature Review," *International Journal of Supply Chain Management* 9, no. 4 (2020), p. 36–42.

³⁸Nurulaina Saidin and Fadilah Abd Rahman, "Halal Feed for Halal Food: An Exploratory Study of the Malaysian Legal and Regulatory Framework on Animal Feed," in *Contemporary Issues and Development in the Global Halal Industry* (2016), p. 141–52.

³⁹"Halal Animal Feed," Halal Certification Services, accessed August 9, 2024, <https://www.halalcs.org/animal-feed>

⁴⁰"Difference between Halal and Halalan-Toyyiban," *New Straits Times*, last modified April 14, 2018, 9:49 a.m., <https://www.nst.com.my/opinion/columnists/2018/04/357046/difference-between-halal-and-halalan-toyyiban>

⁴¹El Zubeir, "The Incidence of Aflatoxins in Feedstuff and Foodstuff and Its Significances on the Wholesomeness of Halal Food," in *Halal and Kosher Food*, ed. Ahmed Osman O. and Moneim Elhadi Sulieman A. (Cham: Springer, 2023), p. 27–30.

⁴²Emi Normalina Omar, et.al., "Halalan Toyyiban Supply Chain of the Food Industry," *Journal of Emerging Economies and Islamic Research* 1, no. 3 (2013), p. 23–33.

to prevent non-halal contamination, consequently, to guarantee Halalan-Toyyiban.

The integration of existing technologies, concurrent with the advancement in the recent engineering could also potentially increase the market growth for halal animal feed. For example, a team of researcher managed to introduce a blockchain-based halal traceability system applications for halal chicken meat-based food supplies, with the implementation of product scanning via Quick Response (QR) codes⁴³. Granted that the system was aimed for food supplies, and not animal feeds, but the core element remains the same. The assimilation of advanced technologies into halal animal feed systems presents considerable promise. These systems can deliver crucial, transparent information such as product transfer data, halal assurances, and certification details, all of which are readily accessible to consumers. Additionally, incorporating future innovations, including secure automated validation, geographic mapping, and product imaging, could further enhance the framework for maintaining halal integrity⁴⁴. These advancements would provide policymakers with a robust concept for ensuring halal compliance and addressing the ongoing challenge of halal assurance in food production.

The marketability of halal animal feed is poised for growth, driven by increasing consumer awareness and demand for halal-certified products⁴⁵. However, to capitalize on this potential, stakeholders in the animal feed industry must navigate certification processes and address the challenges as well as incorporating recent advancements inherent in maintaining halal integrity throughout the supply chain. As halal standards continue to evolve, they will likely play a pivotal role in shaping the future of the global animal feed market.

While the halal food industry emphasis on halal governance which is compliance with the Shariah law and industry regulation⁴⁶, the halal animal feed industry is seen to experience the same challenges. Both are believed in struggling to emphasis on external factors i.e. market forces and competition and internal

⁴³Aries Susanty, et.al., "Design of Blockchain-Based Halal Traceability System Applications for Halal Chicken Meat-Based Food Supply Chain," *International Journal of Information Technology* 16 (2024), p. 1449–73.

⁴⁴Aries Susanty, et.al., "Design of Blockchain-Based Halal Traceability System Applications for Halal Chicken Meat-Based Food Supply Chain," *International Journal of Information Technology* 16 (2024), p. 1449–73.

⁴⁵"Halal Animal Feed Production Enters New Markets," Feed Strategy, last modified January 2, 2020, <https://www.feedstrategy.com/business-markets/feed-production-by-region/article/15440965/halal-animal-feed-production-enters-new-markets>

⁴⁶Nurulhuda Noordin, et.al., "Strategic Approach to Halal Certification System: An Ecosystem Perspective," *Procedia – Social and Behavioral Sciences* 121 (2014), p. 79–95.

factors i.e. business strategy and corporate culture⁴⁷ to comply with the halal regulations. Thus, to navigate the certification processes for the demand and expand the halal animal feed marketability, it should consider both Shariah compliance internal and external factors as well as the halal governance as the best practice.

Table 1. Summary of Implication and Challenges of Halal Animal Feed

No	Article Focus	Implication	Challenges	Result	Reference
	<ul style="list-style-type: none"> ● Implement comprehensive legislation for chemical compounds control in poultry feed. ● Develop a Halal standard for Poultry Feed Production in Malaysia. 	<ul style="list-style-type: none"> ● Implement comprehensive legislation for chemical compounds control in poultry feed. ● Develop a Halal standard for Poultry Feed Production in Malaysia. 	<ul style="list-style-type: none"> ● Hazards in poultry feed production ● Importance of halal integrity in feed supply 	<ul style="list-style-type: none"> ● The paper reviews the hazards in poultry feed production. ● It suggests implementing feed safety management systems and developing a Halal standard for poultry feed production. 	Mohd Ashraf et al. (2022)

⁴⁷Juliana Anis Ramli, et.al., “Governance of Malaysian Halal Food Industry: Conventional Governance vs Shariah Requirements,” in *Proceedings of the International Symposium & Exhibition on Business and Accounting 2022 (ISEBA 2022)*, 28 September 2022, Malaysia, vol. 1 (2023), p. 83–94.

	<ul style="list-style-type: none"> Animal feed plays a crucial role in the Halal perspective as it is the initial control point in the Halal food supply chain, ensuring it is from permissible sources and safe for consumption. 	<ul style="list-style-type: none"> Halal animal feed crucial for food supply chain integrity. Global view on animal feed compositions and regulations provided. 	<ul style="list-style-type: none"> Halal integrity concerns over feed compositions Ensuring feed is from halal source and safe for humans 	<ul style="list-style-type: none"> Animals not bound by religion; human responsibility for welfare. Animal feed crucial in Halal food supply chain. 	<p>Rahim et al. (2022)</p>
	<ul style="list-style-type: none"> Halal animal feed is crucial for ensuring the authenticity of halal meat production, aligning with Islamic guidelines to maintain quality and uphold religious beliefs regarding animal welfare and food consumption. 	<ul style="list-style-type: none"> Emphasizes importance of halal animal feed for halal meat production. Calls for adherence to Islamic guidelines in animal feed production. 	<ul style="list-style-type: none"> Impurity in animal feed ingredients Mischief in animal handling during production, transport, and slaughter 	<ul style="list-style-type: none"> The paper emphasizes the importance of halal animal feed in halal meat production. It suggests implementing halal control points to ensure the authenticity and quality of 	<p>Iqbal et al. (2020)</p>

				animal-based food products	
	<ul style="list-style-type: none"> Animal feed plays a crucial role in ensuring halal integrity in the food supply chain. It is essential to guarantee the quality, safety, and halal status of animal feed for halal food production. 	<ul style="list-style-type: none"> Guidelines for halal feed production and use Responsibility on farmers to ensure halal integrity of animal production 	<ul style="list-style-type: none"> Uncertainties in halal, quality, and safety of animal feed. Use of pig intestines and carcasses in fish feed. 	<ul style="list-style-type: none"> Guidelines for halal feed production based on Islamic principles. Responsibility on farmers to ensure halal integrity of animal production. 	Iqbal et al. (2019)
	<ul style="list-style-type: none"> Feeding animals with Black Soldier Fly larvae raises concerns in halal food production due to their diet containing faeces, potentially compromising the halal status of meat products. 	<ul style="list-style-type: none"> Use clean waste for BSF larvae to avoid contamination risks. Involve halal authority in feed supply chain for assurance. 	<ul style="list-style-type: none"> Halal status of animals fed with BSF larvae Lack of Islamic institution fatwas on this issue 	<ul style="list-style-type: none"> BSF larvae as animal feed do not affect meat quality. Islamic scholars discuss the halal status of animals fed BSF. 	Jamaludin et al. (2021)

	<ul style="list-style-type: none"> The legal framework in Malaysia lacks specific provisions for halal animal feed. Developing halal standards for feed preparation, production, and distribution is recommended to ensure halal integrity. 	<ul style="list-style-type: none"> Strengthening halal animal feed production in Malaysia. Ensuring quality and safety of animal feed through regulations 	<ul style="list-style-type: none"> Lack of provision for halal standards in animal feed production Ambiguity in regulations between regions affecting monitoring and enforcement 	<ul style="list-style-type: none"> No provision for halal standards in animal feed production. Suggested development of halal standards for animal feed in Malaysia. 	<p>Saidin et al. (2018)</p>
	<ul style="list-style-type: none"> Halal animals can become contaminated (al-jallālah) if fed with najasa like pig organs. Quarantine for 24 hours with water purification can purify fish like patin (<i>pangasius sutchii</i>) for consumption. 	<ul style="list-style-type: none"> Determine istihālah period for patin fish after feeding pig offal. Al-istibra method enhances Malaysia aquaculture industry. 	<ul style="list-style-type: none"> Halal animals fed with najas require quarantine for purification. Istihālah process for patin fish after feeding pig offal. 	<ul style="list-style-type: none"> DNA porcine not detected in fish stomach after 20 hours. Al-istibra method enhances Malaysia aquaculture industry. 	<p>Abidin (2017)</p>
	<ul style="list-style-type: none"> The Malaysian legal framework 	<ul style="list-style-type: none"> Improve legal framework for halal 	<ul style="list-style-type: none"> Halal integrity of animals 	<ul style="list-style-type: none"> Malaysian legislation lacks 	<p>Saidin & Rahman (2016)</p>

	lacks specific regulations on halal animal feed, highlighting the need for improvements to ensure the integrity of animals for Muslim consumption .	animal feed regulation in Malaysia. <ul style="list-style-type: none"> • Include animal feed in JAKIM's certifiable products for halal certification. 	fed with non-halal feed. <ul style="list-style-type: none"> • Lack of specific legislation addressing halal animal feed issues. 	specific regulations on halal animal feed. <ul style="list-style-type: none"> • Suggestions include amending certification procedures for halal animal feed. 	
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Conclusion

In conclusion, the Halal animal feed industry faces a range of intricate challenges that affect the integrity of the Halal food supply chain and its marketability. Major concerns include the absence of unified legislation and standardised guidelines, the risk of contamination with non-Halal substances, and the responsibility of farmers and producers in upholding rigorous Halal standards. Nevertheless, the growing demand for Halal products offers substantial market opportunities, particularly as consumer awareness grows and regulatory frameworks evolve. Addressing these challenges requires a coordinated effort to implement clear regulations, strengthen Halal certification procedures, and promote greater industry-wide understanding. Successfully addressing these challenges will ensure the authenticity and quality of Halal animal feed, fulfilling both the ethical and religious expectations of consumers while supporting the expansion of the broader Halal economy.

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