INSLA E-PROCEEDINGS
مقالات المؤتمر العالمي في الشريعة والقانون
E-ISSN: 2735-1742

Vol. 7, No. 1, pp. 92-99 | 2024
INSLA E-Proceedings

DETECTION OF HIDDEN CONTAMINANTS IN HALAL FOOD PRODUCTS: ANALYSIS OF THE CASE OF SYARIKAT ABDUL GHAFFAR TRADING SDN BHD V SOCIETE AGRO-EXPORT SAHEL-SAGES [2022] MLJU 298

[i,*] Nurin Afrina Mohd Fazlee

[i]Faculty of Syariah and Law, Universiti Sains Islam Malaysia (USIM), 71800, Nilai, Negeri Sembilan, Malaysia

*(Corresponding author) e-mail: nurinafrinamfaz@gmail.com

Article history:
Submission date: 1 September 2024
Received in revised form: 30 October 2024
Acceptance date: 7 November 2024
Available online: 10 December 2024

Keywords:
Halal food products; Hidden contaminants; Halal authentication; Food safety; PCR; Malaysia halal certification; Food fraud; Detection technologies.

Funding:
This research did not receive any specific grant from funding agencies in the public, commercial, or non-profit sectors.

Competing interest:
The author(s) have declared that no competing interests exist.

Cite as:
Mohd Fazlee, N. A. (2024). Detection of hidden contaminants in halal food products: Analysis of the case of Syarikat Abdul Ghaffar Trading Sdn Bhd v Societe Agro-Export Sahel-Sages [2022] MLJU 298. *INSLA E-Proceedings*, *7*(1), 92-99.

ABSTRACT

The increasing complexity of global food supply chains has heightened the risk of hidden contaminants entering halal food products, posing significant challenges to both food safety and halal integrity. This paper examines the nature of hidden contaminants, including porcine-derived ingredients, alcohol residues, heavy metals, microbial contamination, and cross-contamination, which may compromise the halal status of food products and reduce consumer confidence. It also discusses the importance of modern laboratory technologies in halal authentication, focusing on analytical methods such as Polymerase Chain Reaction (PCR), DNA barcoding, Enzyme-Linked Immunosorbent Assay (ELISA), Gas Chromatography–Mass Spectrometry (GC-MS), Liquid Chromatography–Tandem Mass Spectrometry (LC-MS/MS), and Fourier Transform Infrared Spectroscopy (FTIR). A Malaysian case study, Syarikat Abdul Ghaffar Trading Sdn Bhd v Societe Agro-Export Sahel-Sages [2022] MLJU 298, is analysed to demonstrate the legal and commercial implications of food contamination, including product recalls, financial losses, and reputational damage. Furthermore, the paper reviews Malaysia's halal governance framework, including the Food Act 1983, Food Regulations 1985, MS1500:2019, and the Malaysian Halal Certification Procedure administered by JAKIM. The study concludes that integrating advanced scientific detection methods with effective regulatory enforcement, comprehensive halal assurance systems, and robust supply chain management is essential to preserving halal integrity, protecting consumer health, and strengthening public confidence in halal-certified food products.

Introduction

The global halal food industry has expanded rapidly over the last decade, driven by the increasing demand from Muslim consumers as well as non-Muslim consumers who associate halal-certified products with higher standards of hygiene, quality, and food safety. The halal market is no longer limited to traditional food products but now encompasses processed foods, beverages, pharmaceuticals, cosmetics, and nutritional supplements. As international trade becomes more complex, food supply chains involve multiple manufacturers, suppliers, and distributors from different countries. This complexity increases the possibility that hidden contaminants may enter halal food products during sourcing, processing, transportation, or storage, making effective monitoring and detection increasingly important (Rahman et al., 2023).

Hidden contaminants refer to substances that are not intentionally disclosed or may be present without consumers' knowledge. These contaminants include porcine-derived ingredients, alcohol residues, non-halal emulsifiers, prohibited enzymes, microbial contamination, pesticide residues, heavy metals, and cross-contamination with non-halal materials during food processing. Such contaminants not only threaten consumer health but also compromise the halal integrity of food products. For Muslim consumers, consuming food that contains prohibited ingredients violates Islamic dietary requirements, making halal authentication a critical aspect of food safety and consumer confidence (Ismail et al., 2024).

Malaysia has established itself as one of the leading countries in halal governance through the implementation of comprehensive halal certification standards administered by the Department of Islamic Development Malaysia (JAKIM). Malaysian halal certification is internationally recognised due to its strict requirements covering raw materials, production processes, storage, logistics, packaging, and distribution. In addition to halal certification, food manufacturers must also comply with national legislation such as the Food Act 1983, Food Regulations 1985, and the Malaysian Standard MS1500:2019, which provides detailed guidelines for the preparation, handling, and storage of halal food. These regulations aim to ensure that halal products remain free from prohibited substances and harmful contaminants throughout the production chain.

Despite these comprehensive regulations, several incidents involving contaminated or questionable halal food products continue to occur globally. Advances in food manufacturing have introduced increasingly sophisticated processing methods, making it difficult to identify hidden contaminants using conventional inspection techniques alone. Ingredients such as gelatin, flavour enhancers, stabilisers, emulsifiers, and food additives may originate from animal sources that are not halal-compliant unless verified through scientific testing and supply chain documentation. Consequently, laboratory-based analytical techniques have become indispensable in halal authentication and food quality assurance (Norizan et al., 2022).

Modern analytical technologies have significantly improved the ability of scientists and regulatory authorities to detect hidden contaminants in food products. Molecular techniques such as Polymerase Chain Reaction (PCR) and DNA barcoding enable laboratories to identify trace amounts of porcine DNA in processed food products. Immunological methods such as Enzyme-Linked Immunosorbent Assay (ELISA) are widely used to detect specific proteins derived from prohibited animal species. Meanwhile, sophisticated analytical instruments including Gas Chromatography-Mass Spectrometry (GC-MS), Liquid Chromatography-Mass Spectrometry (LC-MS/MS), and Fourier Transform Infrared Spectroscopy (FTIR) provide accurate identification of chemical compounds, alcohol residues, and adulterants that may otherwise remain undetected (Hashim et al., 2023).

Background of Hidden Contaminants in Halal Food Products

The integrity of halal food extends beyond the absence of pork and alcohol. In contemporary food production, halal assurance also requires that every ingredient, processing aid, packaging material, and manufacturing practice complies with Islamic principles while meeting food safety standards. As food supply chains become increasingly globalised, manufacturers often source ingredients from multiple countries, making it more difficult to verify the origin and composition of every component. Consequently, the risk of hidden contaminants entering halal food products has become a growing concern for regulators, food producers, and consumers alike (Azam & Abdullah, 2023).

Hidden contaminants are substances that may be unintentionally introduced into food products during production, processing, transportation, or storage without being clearly identified on product labels. These contaminants may include prohibited animal-derived ingredients, harmful chemical residues, pathogenic microorganisms, heavy metals, allergens, or other foreign substances that compromise both halal status and food safety. While some contaminants originate from accidental cross-contamination, others result from economically motivated food adulteration intended to reduce production costs or improve product appearance and shelf life (Rahman et al., 2024).

One of the most frequently reported halal-related contaminants involves porcine-derived ingredients. Pork derivatives are widely used in the food industry because they are inexpensive and possess desirable functional properties. Gelatin extracted from porcine skin is commonly found in confectionery, desserts, pharmaceutical capsules, yoghurt, and bakery products. Likewise, porcine-derived emulsifiers, shortening, and enzymes may be incorporated into processed foods without consumers being aware of their origin. Since these ingredients are often highly processed, visual inspection alone cannot determine whether they are halal compliant. Scientific laboratory analysis therefore becomes essential to verify their authenticity (Hashim et al., 2023).

Another significant concern is alcohol contamination. Although alcohol may be intentionally added as a solvent, preservative, or flavour carrier in certain processed foods, beverages, sauces, chocolates, and confectionery products, it may also be produced naturally through microbial fermentation during food processing. The presence of alcohol must therefore be carefully assessed to determine whether it complies with halal standards and national regulations. Even small quantities may raise concerns among Muslim consumers if the source and manufacturing process are not properly documented (Ismail et al., 2024).

Cross-contamination during food production also represents a major challenge for halal assurance. Shared manufacturing equipment, transportation vehicles, storage facilities, or packaging lines may expose halal products to non-halal materials when adequate cleaning and segregation procedures are not implemented. In large food manufacturing facilities producing both halal and non-halal products, failure to establish effective sanitation protocols may result in contamination despite the use of halal-certified ingredients. Such incidents have occasionally led to product recalls, financial losses, and reputational damage for food manufacturers (Rahman et al., 2023).

Besides religious concerns, hidden contaminants may also threaten public health. Heavy metals such as lead, cadmium, mercury, and arsenic can accumulate in food products due to environmental pollution, contaminated water, or agricultural practices. Similarly, excessive pesticide residues, veterinary drug residues, mycotoxins, and pathogenic bacteria such as *Salmonella*, *Listeria monocytogenes*, and *Escherichia coli* pose serious health risks if consumed above permissible limits. These contaminants affect all consumers regardless of religion, demonstrating that halal assurance is closely linked with food quality and safety management (World Health Organization [WHO], 2024).

Food fraud further complicates halal verification. Economically motivated adulteration occurs when manufacturers intentionally substitute premium ingredients with cheaper alternatives while maintaining misleading product labels. For example, beef products may be adulterated with pork, premium edible oils may be mixed with lower-quality animal fats, and seafood products may be substituted with cheaper species. Such practices not only violate halal principles but also undermine consumer trust and distort fair market competition. Advances in analytical chemistry have revealed that food fraud continues to occur in many countries despite increasingly strict regulations (Soon et al., 2023).

Case Study: Detection of Hidden Contaminants in Halal Food Products

Food contamination incidents involving halal products have attracted significant public attention because they affect not only food safety but also religious compliance and consumer confidence. In Malaysia, halal certification is widely regarded as a symbol of quality and trust. Therefore, any issue involving contaminated or non-compliant halal food products may have serious consequences for manufacturers, distributors, retailers, and regulatory authorities. This case study examines how hidden contaminants can affect halal food products and highlights the importance of scientific testing, quality assurance, and legal compliance.

One relevant Malaysian case involved **Syarikat Abdul Ghaffar Trading Sdn Bhd v Societe Agro-Export Sahel-Sages [2022] MLJU 298**. The dispute arose after large quantities of imported Tunisian dates supplied to the Malaysian importer were found to have quality problems following complaints from retailers and consumers. Acting under the authority of the Ministry of Health Malaysia pursuant to the Food Act 1983, approximately **109 metric tonnes of dates were recalled from the Malaysian market**. The plaintiff argued that the supplied products were not of merchantable quality and suffered substantial financial losses due to product recalls, disposal costs, and damage to its business reputation.

Although the case primarily focused on food quality rather than halal authentication, it clearly illustrates how contamination or product defects can undermine consumer confidence and disrupt the food supply chain. The court proceedings emphasised that food manufacturers and suppliers have a legal responsibility to ensure that products entering the market meet acceptable safety and quality standards. Failure to comply with these obligations may result in legal disputes, product recalls, financial compensation, and long-term reputational damage.

The recall also demonstrates the importance of traceability within modern food supply chains. Imported food products frequently pass through multiple stages before reaching consumers, including harvesting, processing, packaging, shipping, storage, and retail distribution. At any of these stages, contamination may occur due to poor hygiene practices, improper storage conditions, insect infestation, microbial growth, or inadequate quality control procedures. Once contamination is detected, authorities must rapidly identify affected product batches and remove them from the market to minimise public health risks.

Apart from physical contamination, halal food products are also vulnerable to hidden non-halal ingredients that cannot be identified through visual inspection alone. For example, processed meat products, confectionery, dairy products, sauces, and nutritional supplements may contain porcine-derived gelatin, emulsifiers, flavour enhancers, enzymes, or stabilisers. In some cases, manufacturers may unknowingly purchase raw materials from suppliers that fail to disclose the true origin of certain ingredients. Such situations highlight the importance of supplier verification, halal documentation, and routine laboratory testing before products are released to consumers (Rahman et al., 2024).

Another challenge involves economically motivated food adulteration. Unscrupulous manufacturers may intentionally substitute expensive halal ingredients with cheaper non-halal alternatives to reduce production costs. Meat adulteration is one of the most widely reported forms of food fraud worldwide. Several international studies have demonstrated that processed meat products labelled as beef or lamb occasionally contain undeclared pork DNA. Since these products often undergo extensive processing, consumers cannot distinguish authentic ingredients without scientific laboratory analysis (Soon et al., 2023).

Modern laboratory technologies have significantly strengthened the ability of regulatory authorities to detect such hidden contaminants. Polymerase Chain Reaction (PCR) is one of the most reliable molecular techniques used to identify species-specific DNA, even after food has been subjected to heat processing. This method enables laboratories to detect trace amounts of porcine DNA in processed food products with high sensitivity and accuracy. Similarly, DNA barcoding provides genetic identification of animal species, making it valuable for detecting food substitution and adulteration (Hashim et al., 2023).

Detection Technologies and Laboratory Methods

The increasing complexity of food production has made conventional inspection methods insufficient for identifying hidden contaminants in halal food products. Many prohibited ingredients, such as porcine-derived gelatin, emulsifiers, enzymes, alcohol, and adulterated animal fats, cannot be recognised through visual examination because they undergo extensive processing before being incorporated into food products. As a result, scientific laboratory techniques have become essential tools for verifying halal authenticity and ensuring food safety. Modern analytical technologies provide highly accurate and reliable results that support regulatory authorities, food manufacturers, and halal certification bodies in protecting consumer confidence (Hashim et al., 2023).

One of the most widely used techniques is **Polymerase Chain Reaction (PCR)**. PCR is a molecular biology method that amplifies specific DNA sequences, allowing laboratories to detect even trace

amounts of animal DNA in processed food products. This technique is particularly effective for identifying porcine DNA in meat products, confectionery, dairy products, pharmaceutical capsules, and other processed foods. Even when food has been subjected to high temperatures or extensive manufacturing processes, PCR can still identify species-specific genetic material with a high degree of accuracy. Due to its excellent sensitivity and specificity, PCR has become one of the preferred methods for halal authentication in accredited laboratories (Rahman et al., 2024).

Another important molecular approach is **DNA barcoding**, which identifies biological species by analysing standard genetic markers. Unlike conventional DNA testing that focuses on detecting a single species, DNA barcoding enables researchers to distinguish among multiple animal species simultaneously. This technique is especially useful in detecting food adulteration involving meat substitution, seafood mislabelling, and mixed processed food products. Regulatory agencies increasingly utilise DNA barcoding because it provides reliable species identification while supporting food traceability across complex supply chains (Soon et al., 2023).

In addition to DNA-based techniques, **Enzyme-Linked Immunosorbent Assay (ELISA)** is widely applied in halal food testing. ELISA detects specific proteins originating from animal tissues through antigen-antibody interactions. This method is relatively rapid, cost-effective, and suitable for routine laboratory screening of processed food products. ELISA is frequently used to identify prohibited animal proteins and food allergens in commercial food production. Although protein degradation during intense heat processing may occasionally reduce its sensitivity, ELISA remains an important complementary technique for food quality control and halal verification (Ismail et al., 2024).

Chemical analytical instruments have also become indispensable in identifying hidden contaminants. **Gas Chromatography-Mass Spectrometry (GC-MS)** is commonly employed to detect volatile organic compounds, alcohol residues, flavouring substances, and chemical contaminants. The chromatography component separates complex mixtures into individual compounds, while the mass spectrometer identifies each compound based on its molecular structure. GC-MS provides highly accurate qualitative and quantitative analyses, making it valuable for verifying compliance with halal standards and food safety regulations (Azam & Abdullah, 2023).

Similarly, **Liquid Chromatography-Tandem Mass Spectrometry (LC-MS/MS)** has become one of the most advanced analytical platforms for food authentication. Unlike GC-MS, LC-MS/MS is capable of analysing larger and less volatile molecules, including peptides, veterinary drug residues, food additives, mycotoxins, and prohibited chemical substances. Its high sensitivity enables laboratories to detect contaminants at extremely low concentrations, even in highly processed food matrices. Consequently, many food safety laboratories utilise LC-MS/MS as part of comprehensive contaminant monitoring programmes to strengthen halal assurance and regulatory compliance (Hashim et al., 2023).

Another rapidly developing technique is **Fourier Transform Infrared Spectroscopy (FTIR)**. FTIR identifies chemical compounds by measuring the absorption of infrared radiation at different wavelengths. Each substance produces a unique spectral fingerprint that allows scientists to distinguish between different oils, fats, and chemical compositions. Within the halal industry, FTIR is frequently applied to identify the presence of porcine fat mixed with vegetable oils or other edible fats. Compared with conventional laboratory methods, FTIR offers rapid analysis, minimal sample preparation, and relatively low operating costs, making it suitable for routine industrial screening (Rahman et al., 2024).

Besides laboratory technologies, effective halal verification also depends on systematic quality management throughout the food production process. Many halal-certified manufacturers implement **Hazard Analysis and Critical Control Point (HACCP)** and **Good Manufacturing Practices (GMP)** alongside halal assurance systems to minimise contamination risks. These management systems identify critical control points where contamination may occur, establish preventive measures, maintain proper documentation, and ensure traceability from raw materials to finished products. When combined with advanced laboratory testing, these quality management systems significantly enhance consumer protection and strengthen the credibility of halal certification (JAKIM, 2024).

Overall, advances in analytical science have transformed the way hidden contaminants are detected in halal food products. Molecular biology, immunological testing, spectroscopy, and chromatography each

provide unique strengths that complement one another in halal authentication. By integrating these technologies with comprehensive quality management systems and regulatory oversight, food manufacturers and certification authorities can effectively minimise contamination risks, preserve halal integrity, and maintain public confidence in halal-certified food products.

Detection Method	Main Purpose	Advantages	Limitations
Polymerase Chain Reaction (PCR)	Detect animal DNA, especially porcine DNA	Highly sensitive and accurate	Requires specialised laboratory equipment
DNA Barcoding	Species identification	Detects food adulteration and species substitution	Higher analysis cost
ELISA	Detect animal proteins and allergens	Fast and cost-effective	Less effective if proteins are heavily degraded
GC-MS	Detect alcohol and volatile compounds	Highly accurate chemical analysis	Expensive instrumentation
LC-MS/MS	Detect chemical contaminants, additives, and toxins	Extremely sensitive and reliable	Requires skilled laboratory personnel
FTIR Spectroscopy	Detect fats and edible oil adulteration	Rapid screening with minimal sample preparation	Often requires confirmation using other analytical methods

Table 1. Comparison of Common Detection Technologies for Hidden Contaminants

Malaysia has established one of the world's most comprehensive halal governance systems to protect consumers and maintain confidence in halal-certified products. The **Department of Islamic Development Malaysia (JAKIM)** is responsible for halal certification, while the **Ministry of Health (MOH)** enforces food safety laws. Halal-certified manufacturers must comply with **MS1500:2019**, which outlines requirements for food preparation, processing, packaging, storage, and distribution according to Islamic principles (JAKIM, 2024).

In addition, the **Food Act 1983** and the **Food Regulations 1985** regulate food quality and safety in Malaysia. These laws empower authorities to inspect food products, conduct laboratory analyses, and recall contaminated products when necessary. Together, halal certification and food legislation help ensure that food products are safe, hygienic, and free from prohibited substances.

The case of **Syarikat Abdul Ghaffar Trading Sdn Bhd v Societe Agro-Export Sahel-Sages [2022] MLJU 298** demonstrates the importance of regulatory enforcement. Following complaints regarding the quality of imported dates, the Ministry of Health ordered a product recall under the Food Act 1983,

highlighting the legal responsibilities of suppliers and importers to ensure food quality before products reach consumers.

Syarikat Abdul Ghaffar Trading Sdn Bhd v Societe Agro-E.pdf

Overall, Malaysia's integrated halal governance system combines scientific testing, legal enforcement, and regular audits to strengthen halal integrity and consumer confidence.

Challenges and Recommendations

Despite significant improvements in halal food monitoring, several challenges remain. One major issue is the increasing complexity of global food supply chains, where raw materials are sourced from multiple countries with different production standards. Manufacturers may also face difficulties verifying the origin of processed ingredients, increasing the risk of hidden contaminants entering halal-certified products (Rahman et al., 2024).

Another challenge is the high cost of advanced laboratory testing. Technologies such as PCR and LC-MS/MS require specialised equipment and trained personnel, making routine testing expensive for small and medium-sized food manufacturers. In addition, food fraud and deliberate adulteration continue to threaten consumer confidence despite strict regulations (Soon et al., 2023).

To address these issues, several improvements are recommended. First, food manufacturers should strengthen supplier verification and implement comprehensive halal assurance systems throughout the supply chain. Second, regulatory agencies should increase laboratory surveillance and random product testing to detect contamination at an early stage. Third, continuous training should be provided to food handlers and manufacturers regarding halal compliance and food safety practices. Finally, public awareness campaigns should educate consumers on recognising authentic halal-certified products and reporting suspicious food items.

Through stronger collaboration between industry, regulatory agencies, laboratories, and consumers, the risk of hidden contaminants can be significantly reduced while maintaining public trust in Malaysia's halal certification system.

Conclusion

The detection of hidden contaminants in halal food products is essential for protecting both consumer health and the integrity of halal certification. As food production becomes increasingly complex, hidden contaminants such as porcine derivatives, alcohol residues, heavy metals, and microbial contamination present significant challenges to food safety and halal compliance. Modern analytical methods, including PCR, DNA barcoding, ELISA, FTIR, GC-MS, and LC-MS/MS, have greatly improved the ability to identify these contaminants accurately.

Malaysia has developed a strong halal governance framework through JAKIM, the Food Act 1983, the Food Regulations 1985, and MS1500:2019. The analysed court case further illustrates that failure to maintain food quality and safety may result in product recalls, legal disputes, and financial losses.

In conclusion, maintaining halal integrity requires continuous cooperation between government agencies, food manufacturers, researchers, and consumers. Scientific innovation, strict regulatory enforcement, and effective supply chain management remain the key elements in ensuring that halal food products are safe, authentic, and trusted by consumers worldwide.

References

Azam, N., & Abdullah, M. (2023). Food authentication technologies in halal food analysis. *Journal of Food Science and Technology*, *60*(8), 3152–3164. https://doi.org/10.1007/s13197-023-05700-1

Department of Standards Malaysia. (2019). *MS 1500:2019 Halal food – General requirements* (Edisi ke-3).

Hashim, N. H., Rahman, N. A., & Yusof, S. M. (2023). Detection methods for halal authentication in processed food products: A review. *Food Control*, *151*, Artikel 109805. https://doi.org/10.1016/j.foodcont.2023.109805

Ismail, N. F., Omar, N., & Hassan, R. (2024). Emerging analytical approaches for halal food verification. *Foods*, *13*(2), Artikel 295. https://doi.org/10.3390/foods13020295

Jabatan Kemajuan Islam Malaysia. (2024). *Manual procedure for Malaysia halal certification (domestic) 2024*. JAKIM.

Rahman, M. A., Abdullah, A., & Karim, N. (2024). Hidden contaminants in halal food supply chains: Challenges and future perspectives. *Foods*, *13*(4), Artikel 641. https://doi.org/10.3390/foods13040641

Soon, J. M., Chandia, M., & Wallace, C. A. (2023). Food fraud vulnerability in global food supply chains: A review. *Trends in Food Science & Technology*, *132*, 1–12. https://doi.org/10.1016/j.tifs.2022.12.015

Syarikat Abdul Ghaffar Trading Sdn Bhd v Societe Agro-Export Sahel-Sages [2022] MLJU 298.

World Health Organization. (2024). *Food safety*. https://www.who.int/health-topics/food-safety