3. EUROPEAN HALAL CONGRESS 2025

استشراف مستقبل تطبيق التشريعات الإسلامية (معايير الحلال) في إطار التقنيات المستدامة، مع التركيز على مؤشر مخلفات الحيوانات"

FUTURE FORESIGHT OF HALAL IN THE CONTEXT OF SUSTAINABLE TECHNOLOGIES WITH FOCUS TO ANIMAL WASTE INDEX

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The concept of “you are what you eat”
is supported by Quran

The core definition of Halal is based on the Islamic principle where it says: criticizes wasteful consumption. It highlights the contradiction of people overindulging in food and letting it go to waste, even though there are others who are hungry or in need. It's a call for mindfulness, moderation, and compassion toward those less fortunate.

يَا بَنِي آدَمَ خُذُوا زِينَتَكُمْ عِندَ كُلِّ
مَسْجِدٍ وَكُلُوا وَاشْرَبُوا وَلَا تُسْرِفُوا ۚ
إِنَّهُ لَا يُحِبُّ الْمُسْرِفِينَ

O Children of Adam! Take your adornment, while praying and going round the Ka'bah, and eat and drink but waste not by extravagance, certainly He (Allah) likes not Al-Musrifun (those who waste by extravagance).
[Surah Al-A'raaf: Verse 31]

Introduction

- As the global population grows and environmental challenges intensify, the demand for ethical, sustainable, and health-conscious solutions continues to rise. Within this evolving landscape, the integration of Islamic principles; particularly those related **to Halal (permissible) and Tayyib** (pure and wholesome), into technological and environmental frameworks offers an innovative and culturally rooted approach to sustainability. The Halal industry, traditionally associated with food, is now expanding its influence into diverse sectors such as agriculture, pharmaceuticals, cosmetics, and biotechnology, calling for robust systems that align with both religious compliance and environmental stewardship.
- The growing urgency to manage animal waste sustainably, especially amid agricultural and population growth, is prompting the search for effective, halal-compliant solutions.

Food chain control

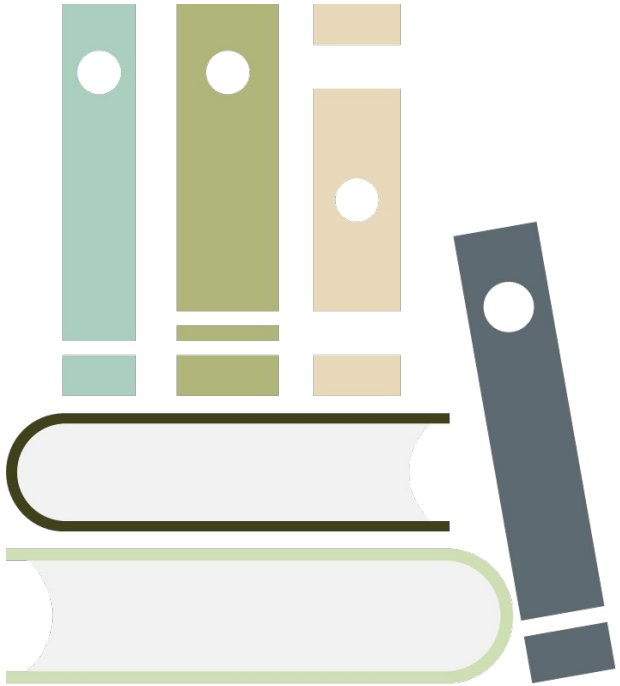
- Halal covers all aspects of food production from raw materials, food processing and food handling services. They must comply with the **halal supply chain** standard, food and requirements of the country or certification by the halal body. Muslim and non-Muslim consumers who buy **halal food products due to health, environmental and quality concerns have diversified the market**. Food chain control efforts need to be focused to develop more effective security halal authentication systems. National situations will influence the design of these systems. However, whatever the architecture of a national food control system, measuring its effectiveness is universally important to verify that resources are being used well and that the health and economic interests of consumers are protected.
- **Regulation and standardization have become part of the global policy in which halal fits in, and the spread of halal to the fields of cosmetics, pharmaceuticals, tourism and finance is present.**

Food Chain Sustainability : “Farm to Fork”

Religion and culture

Religion is ‘the belief in God with a commitment to follow principles believed to be set forth by God’ (McDaniel and Burnett,1990).

Religion is “cultural subsystem” (Arnould,Price and Zinkhan,2004)



Religion is a specific element of culture (Parida and Sahney, 2017) Religion can also provide a holistic understanding of people’s lives (Noori Doabi & Talebnia, 2022).

Therefore, researchers should integrate religious commitment into different **models** of attitudes and behaviour (El Hafiz,2020).

Halal – More Than a Diet

- Halal is not just about food.
- It represents a **complete ethical lifestyle**:
  - Cleanliness
  - Sustainability
  - Social responsibility
- Applies to **agriculture, waste management, environment, and economy**.

Halal Meets Sustainability

- Agricultural expansion = more animal waste.
- Poor waste management = pollution, disease, and lost resources.
- Islamic values demand responsible, ethical solutions

A Growing Problem

- Halal principles align naturally with:
  - **Environmental care**
  - **Waste reduction**
  - **Resource efficiency**
- Opportunity to build systems that are **both halal and green**.

Circular Economy and Waste Reduction

- The principles of Halalan Tayyiban can be further extended to **circular economy** practices. This concept encourages minimizing **waste through recycling**, reusing, and reducing consumption. For instance:
- **Zero Waste Halal Food Chains**: From production to packaging, Halalan Tayyiban products can be part of circular systems where waste is minimized, by-products are reused, and packaging is sustainable.
- **Food Waste Prevention**: Halal food businesses can partner with NGOs and community groups to redistribute surplus food, reducing food waste while fulfilling the duty of charity (Zakat), which aligns with Islamic ethics.
- **Food Waste and Loss Index and Animal Waste Management**: Animal waste must be handled ethically and hygienically in Islamic contexts. Technologies like halal-certified bioreactors: Ensure compliance, Reduce waste, Produce usable, halal-safe by-products. Contributing to global efforts to combat climate change and food industry.

The Food Safety Index (FSI)

- (FSI) is a measure used to assess the overall food safety situation in a given country or region. It typically evaluates how well food safety standards, regulations, and practices are implemented to protect public health from foodborne illnesses. This index is often compiled by organizations like the World Health Organization (WHO), the Food and Agriculture Organization (FAO), or national public health agencies.

The Halal Commitment Index (HCI)

- (HCI) is a tool designed to measure the level of commitment to Halal standards and principles within a company, organization, or sector. While the exact formulation or methodology of the HCI may vary depending on the entity that is using it, it typically aims to evaluate how seriously an organization adheres to Halal practices, especially in areas such as food, pharmaceuticals, cosmetics, and financial services.

Food Waste and Loss Index (FWLI)

- (FWLI) is an international metric developed to measure the amount of food that is lost or wasted throughout the supply chain, from production to consumption. It is used to assess and track progress toward Sustainable Development Goal (SDG) 12.3, which aims to halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses, by 2030.

Animal Waste Index (AWI)

- The Animal Waste Index is a conceptual or analytical tool used to quantify and monitor the volume, type, and environmental impact of waste generated from livestock and animal production activities. This index helps in assessing the sustainability and ecological footprint of animal farming systems.

- **Note:** The term "Animal Waste Index" is not yet standardized globally like the Food Loss and Waste Index under SDG 12.3, but it's increasingly used in **academic,**

Animal Waste Index (AWI): Purpose and Relevance:

- Environmental Monitoring: Tracks the impact of animal waste (e.g., manure, blood, offal) on soil, water, and air quality.
- Resource Management: Supports efforts to recycle or repurpose animal waste, such as in bioenergy, composting, or organic fertilizer production.
- Sustainability Benchmarking: Provides data for evaluating sustainable livestock practices and compliance with environmental regulations.
- Public Health Considerations: Helps identify risks associated with poor waste handling, such as water contamination or disease spread.

Animal Waste Index (AWI): Potential Indicators within the Index:

- Volume of waste per animal unit or per production cycle
- Percentage of waste reused or treated sustainably
- Methane and ammonia emissions from manure
- Compliance rate with waste management standards

The Bioreactor

- A Smart Solution

A modern, halal-compliant technology to treat animal waste.

Features: Sealed, insulated, odor-free, Made from safe, halal-grade materials

Rotates gently to preserve natural com

- Benefits of the Bioreactor: Turns wast
- (compost, soil health)
- Reduces harmful emissions
- Supports halal agriculture and food sa
- Encourages ethical innovation

The Bioreactor- Key Process Parameters:

- Retention Time

Retention time ranges from 3 to 7 days

Compost discharged from the Bioreactor is 75–85% mature based on the selected retention time. Once the desired retention time is set, the system operates automatically.

Post-discharge, an additional 7–10 days may be required to complete the compost

maturation, depending on the retention period used and the intended usage of the compost.

-Moisture Control

Ideal initial moisture content: 50–65%.

Temperature Monitoring

-**Temperatures** are constantly monitored and recorded throughout the composting cycle.

The Bioreactor maintains internal temperatures between 55°C and 65°C for a minimum

of 72 hours, effectively reducing pathogens and viruses to undetectable levels. It also can be programmed to achieve whatever are the local regulations required per country

Halal Compliance in Composting Processes

- The steps in the composting process that ensure **halal** compliance must be beneficial. This would include stages where waste is verified to be free from prohibited materials, and where no harm comes to animals, aligning with Islamic ethical standards.
- Under Halal (Shariah) compliance, the process involving food or waste was conducted with all these criteria:
- Avoid contamination with najis (impurities).
- Use only **halal-certified materials or inputs**.
- Maintain hygiene and separation of **halal** and haram (non-halal) waste

Future Foresight: Aligning Animal Waste Awareness with Sustainability and Ethics

- The future outlook for raising awareness about animal waste highlights a growing alignment between **religious ethics**, particularly Islamic principles, and **global sustainability trends**.
- As consumers become increasingly mindful of their **environmental responsibilities** and **ethical values**, the demand for **sustainable, halal-compliant waste management solutions** is expected to rise.
- This shift reflects a broader movement toward systems that respect both **planetary boundaries** and **faith-based guidelines**, shaping the next generation of environmentally conscious and ethically driven agricultural practices.

Recommendations and Solutions for Managing Animal Waste (Animal Waste Index Focus)

1. Develop a National Animal Waste Monitoring Framework

- **Recommendation:**
  Establish a comprehensive data collection system to track animal waste volumes, types, and treatment methods across farms, slaughterhouses, and processing facilities.
- **Solution:**
- Create a centralized digital **Animal Waste Index (AWI)** platform.
- Mandate periodic reporting by livestock operations.
- Integrate AWI data with environmental and public health databases.

Recommendations and Solutions for Managing Animal Waste (Animal Waste Index Focus)

2. Promote Sustainable Waste Management Technologies

- **Recommendation:**
  Encourage the use of advanced technologies to convert animal waste into valuable by-products.
- **Solution:**
- Support **anaerobic digestion** systems to produce **biogas** and **organic fertilizer**. (**COMPOST**)
- Incentivize **waste-to-energy** or **composting** initiatives at industrial scale.
- Invest in **plasma gasification** or **thermal processing** for high-volume waste treatment.

Recommendations and Solutions for Managing Animal Waste (Animal Waste Index Focus)

3. Integrate AWI into Halal and Sustainability Standards

- **Recommendation:**
  Ensure that halal certification frameworks include environmental sustainability components, including responsible animal waste management.
- **Solution:**
- Develop **Halal + Sustainability** audit criteria with AWI indicators.
- Encourage certification bodies to assess not only animal welfare and slaughter methods but also **post-slaughter waste handling**.

Recommendations and Solutions for Managing Animal Waste (Animal Waste Index Focus)

4. Establish Environmental Regulations and Compliance Standards

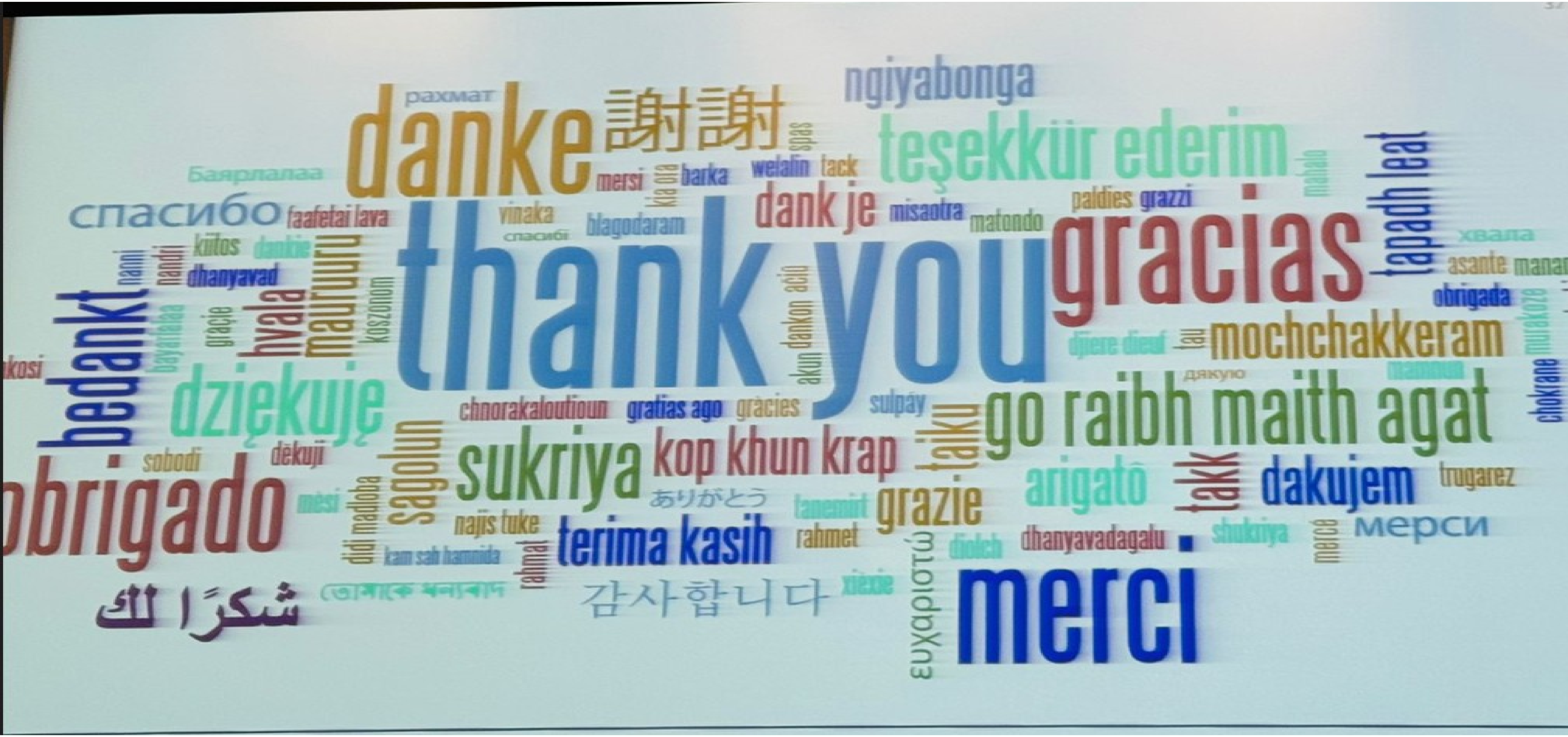
5. Promote Circular Economy Models in Livestock Sector

6. Build Capacity and Raise Awareness

Conclusion

- Implementing an **Animal Waste Index** and aligning it with national and global sustainability goals offers a strategic path to reducing environmental impact, enhancing resource efficiency, and supporting a circular bioeconomic in the livestock sector.
- This study confirms the effectiveness of the Bioreactor in managing animal waste in a way that is both environmentally sustainable and fully compliant with Islamic (halal) principles.
- The system achieved over 80% bioconversion efficiency in under 20 days, outperforming traditional composting methods in both speed and effectiveness. It also eliminated odors and greenhouse gas emissions, making it particularly valuable in livestock-dense or urban areas.
- The high-quality compost produced was nutrient-rich, free from harmful contaminants, and suitable for both organic and conventional farming, supporting the demand for sustainable agricultural inputs.
- The entire process strictly followed Sharia law, using no impure (najis) or prohibited (haram) substances and ensuring ethical animal welfare.
- This technology, bioreactor offers a holistic solution; addressing environmental, economic, and religious needs making it ideal for halal-certified agricultural systems. Future research should explore cost optimization and broader applications across various agro-ecological settings.


التناغم
التعاون
الامتنان
Harmony
Cooperation
Teamwork
Gratitude



thank you
gracias
merci
danke
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