

THE IMPACT OF HALAL CERTIFICATION ON ENVIRONMENTAL STANDARDS IN THE SERBIAN MEAT INDUSTRY

Suzana Knežević¹, Milena Milojević¹, Maja Došenović Marinković¹, Aleksandra Milošević²

¹Academy of Applied Studies Šabac, Unit for Agricultural and Business Studies and Tourism, Vojvode Putnika 56, 15000 Šabac, Serbia, s.knezevic@akademijasabac.edu.rs

²University of Belgrade, Faculty of Law, King Aleksandar Boulevard No 87, 11000 Belgrade, Serbia, alexandramilosevic77@gmail.com,

Corresponding author: Suzana Knežević, Academy of Applied Studies Šabac, Unit for Agricultural and Business Studies and Tourism, Vojvode Putnika 56, 15000 Šabac, Serbia, s.knezevic@akademijasabac.edu.rs

ABSTRACT

This paper explores the impact of Halal certification on environmental standards in the Serbian meat industry, with particular emphasis on sustainable resource use and the reduction of the environmental footprint in meat production. Although Halal certification is primarily a religious regulatory framework, it encompasses specific requirements related to animal welfare, strict hygiene practices, and meat handling procedures - all of which can contribute to enhancing environmental standards in the meat industry. The aim of this research is to analyze the environmental aspects associated with Halal certification and assess its influence on the sustainability of meat production in Serbia. The methodology includes an analysis of relevant literature focusing on the ecological dimensions of Halal production, as well as an examination of the practices employed by domestic meat producers who hold Halal certificates. Special attention is given to the environmental protection measures these producers implement and the challenges they face in adopting sustainable practices. The paper also discusses opportunities for improving existing ecological practices by further aligning Halal standards with sustainable production principles. In this way, Halal certification can contribute not only to meeting the religious requirements of consumers but also to reducing the environmental impact of the meat industry.

Keywords: Halal certification, environmental standards, sustainable production, meat industry, environment.

INTRODUCTION

Halal standard is a set of rules and guidelines for the production and preparation of food in accordance with Islamic religious norms. Its requirements are based on the Quran and Sharia law, which define what is halal, i.e. permitted, and what is haram, i.e. forbidden. The term "permitted" refers to food prepared according to Sharia rules, which is the dietary practice followed by most Muslims around the world.

Halal, among other things, prohibits the use of pork, blood, alcohol, meat from dead animals, carnivores, donkeys, dogs, birds of prey, food prepared with wine, cakes containing any kind of alcohol, as well as products that contain emulsifiers made from pork or other animal fat.

A large number of Halal standard requirements overlap with the requirements of the HACCP system and the ISO 9001 standard, which significantly facilitates the certification preparation process for organizations that have already implemented one of these systems.

Halal can be applied to various products and services – food, cosmetics, medicine, clothing, footwear, furniture, tourism, hospitality, logistics, banking, and stock market operations – but it is most commonly applied in the food and pharmaceutical industries, as well as in the production of cosmetics.

HALAL STANDARDS AND CERTIFICATION IN THE MEAT INDUSTRY

The strictest requirements of the Halal standard apply to the meat industry. For meat to be considered Halal, animals must be raised in accordance with their welfare, must be healthy and alive at the time of slaughter, and the act of slaughter must be performed by a person who is mentally stable and professionally trained. It is not permitted for the act to be carried out by someone under the influence of alcohol, nor by anyone who is not a Muslim, Christian, or Jew, as only they understand the importance of invoking the name of God during slaughter. Additionally, specific methods for restraining animals before slaughter are prescribed (Portal Kvalitet, n.d). Figure 1 shows the fundamental moral principles that form the basis of the halal meat industry, highlighting the interconnection between religious foundation, ethical slaughter procedures, transparency, and sustainability as key factors in ensuring ethically acceptable halal meat production (Rahman et al., 2024).



Figure 1 The Moral Foundations of Halal Meat Production (Rahman et al., 2024).

The list of approved Halal standards, schemes, and guidelines, including those related to meat, followed by Islamic countries is shown in Table 1.

A detailed understanding of the different forms of Halal certification – including certification of red meat and poultry, dried meat products, pharmaceutical and cosmetic preparations, as well as professional training in the field of Halal hospitality and the food industry – represents a key prerequisite for compliance with the standards of the growing global Halal market, both for consumers and business entities (Halal Food Council USA, 2024).

Halal certification is increasingly perceived as an indicator of food quality and safety, thereby enhancing its acceptance among various consumer groups. The principles of Halal diet promote the consumption of pure, nutritionally valuable food, moderation in eating, and a balanced dietary approach. Such practices not only contribute to the improvement of individual health but also influence global market trends, confirming the growing recognition of Halal certification as a standard of food quality and safety (Aung et al., 2025).

Modern consumers most often buy food that is prepackaged in stores, which makes proper product labeling crucial. Food labeling influences consumers' willingness to pay for certain product characteristics. Halal is an attribute that an individual cannot easily verify or confirm on their own. Therefore, consumers rely on competent authorities that check the Halal status and confirm it with appropriate certificates or labels. The most common way to verify the Halal status of food is a thorough check of the Halal certificate or label. In the case of meat, labels should include information about the place of birth, type of breeding and slaughter of the animal, as well as information on whether the slaughter was performed without anesthesia. When this information

Knežević, S., et al. (2025). The impact of halal certification on environmental standards in the Serbian meat industry. *STED Conference 14*(2), 13-19.

is not available, Muslim consumers often seek additional details, such as the origin of the seller, to confirm the Halal status of the product. Meat sold by a Muslim vendor is considered reliable even without an explicit Halal label (Meixner et al., 2018).

One of the methods for labeling Halal meat is shown in Figure 2.

Table 1. Halal standards schemes and guidelines (Halal Quality Control, 2024).

Halal Standards and Guidelines	HQC Schemes	Normative References
Organisation of Islamic Countries [OIC] OIC/SMIIC 1: 2019: General Requirements for Halal Foods OIC/SMIIC 4: 2018: General Requirements for Halal Cosmetics OIC/SMIIC 50-1:2022 Halal Pharmaceuticals - Part 1 - General Requirements OIC/SMIIC 23:2022 Feeding Stuffs for Halal Animals – General Requirements OIC/SMIIC 24: 2020: General Requirements for Food Additives OIC/SMIIC 17-1:2020: Halal Supply Chain Management Systems Part 1: Transportation OIC/SMIIC 17-2:2020: Halal Supply Chain Management Systems Part 2: Warehousing	HQC Halal Certification Scheme (HQC.S:2023) HQC Halal Assurance Program Scheme (HQC.S1:2023) HQC Animal Slaughtering and Awareness Scheme (HQC.S2:2023) HQC Service Providers Scheme (HQC.S3:2023) HQC Supervision Scheme (HQC.S4:2023) HQC Beauty and Personal Care Scheme (HQC.S5:2024)	International Standardization Organisation: ISO/IEC 17000: Vocabulary and general principles ISO/IEC 17065: Requirements for bodies certifying products, processes and services ISO/IEC 19011: Guidelines for auditing management systems ISO/IEC 17021: Requirements for bodies providing audit and certification of management systems Halal Authorities and Regulators: OIC/SMIIC 2:2019: Requirements for Bodies Providing Halal Certification OIC/SMIIC 57:2022: General Requirements for Operations of Bodies in Halal Inspections UAE.S 2055-2:2016: General Requirements for Halal Certification Bodies GSO 2055-2:2021: General Requirements for Halal Certification Bodies BPJPH Decree Number 78 of 2023: Halal Food and Beverage Certification Guidelines BCG Halal 1:2007: Brunei Darussalam Guidelines for Halal Certification



Figure 2. Halal label for meat (Nugraha et al., 2022).

CHALLENGES IN THE HALAL MEAT INDUSTRY

Industrial production of Halal red meat is carried out on a large scale and represents a globally widespread activity. The spiritual dimension of this meat is of key importance to consumers who adhere to Halal principles, with all aspects, including animal welfare during production, being crucial. However, numerous violations of animal welfare standards have been documented in both industrial and artisan Halal meat production. There is evidence of cruel treatment of animals during transport and preparation for slaughter, including long walks, physical abuse, deprivation of food and water, and transportation under unfavorable conditions. Additionally, animals are often treated inhumanely within slaughterhouses—without access to shade, in inadequate facilities, and with the use of force when being moved into slaughter areas. Despite clear Islamic and secular guidelines promoting zero tolerance for abuse, such unacceptable practices continue throughout the entire supply chain (Farouk, Pufpaff & Amir, 2016).

Research such as that conducted by Bux et al. (2022), although primarily focused on the broader context of Halal production, can be relevantly applied to the meat industry as well. Improving infrastructure to avoid contamination with non-Halal materials, along with an integrated role of management, are key aspects in the meat industry, especially given the strict requirements of Sharia law. Additionally, the application of information technologies and block-chain as tools to ensure traceability and authenticate products shows promise in the meat industry, where control over origin and slaughter conditions is central. Although the environmental impacts of block-chain technology have not yet been fully explored, its potential to improve sustainability, reduce chemical use, and enhance resource management—particularly in livestock production—opens opportunities for further research in the meat sector. Moreover, observed trends in waste reduction and creating value-added products from by-products can be successfully implemented in the meat industry through valorization of slaughter or processing residues. By utilizing digital supply chains, the meat industry can enhance transparency, extend product shelf life, and effectively respond to market challenges, thereby contributing to more sustainable and responsible Halal business practices.

One of the key applications of block-chain technology is smart contracts, which enable the automatic implementation and execution of conditions defined within the supply chain through programmed rules. These contracts operate as autonomous pieces of code that automatically confirm the fulfillment of previously agreed conditions between participants in the chain. In the context of the Halal supply chain, block-chain technology allows the digital representation of physical assets through unique digital identities, whose ownership and status can be managed and monitored via smart contracts that serve as the system's operational rules. For example, the process of issuing a digital Halal certificate can be automated so that the certificate is generated and issued immediately upon confirmation of payment for the certification process, thereby increasing efficiency, transparency, and security in managing Halal standards (Hidayati et al., 2023).

The Halal meat industry faces a range of challenges that affect system efficiency and consumer trust. One of the key issues is fragmented regulatory authority, as multiple government institutions apply different regulations, leading to overlap and inefficient oversight. This fragmentation complicates the resolution of disputes and slows institutional responses to sector incidents, such as scandals related to imported Halal meat. Inadequate border control further enables smuggling and the entry of unverified products into the market, jeopardizing the safety and authenticity of the Halal supply. At the same time, producers face rising costs for animal feed and meat processing, which are subject to market and currency fluctuations, increasing financial pressure on the sector. Managing the supply chain for Halal products is a particular challenge due to the length and complexity of international goods flows. Discrepancies between domestic and foreign regulations create risks of contamination and violation of Sharia principles. Additionally, counterfeit products and insufficient ingredient labeling remain significant problems, as limited inspection capacities hinder the detection of inauthentic or contaminated products. These challenges call for stronger regulatory mechanisms, improved inter-institutional cooperation, and modernization of quality control to preserve the credibility of the Halal system (Shahidan & Amid, 2023).

PRODUCTION OF HALAL MEAT IN SERBBIA

According to the latest population census from 2022, there are 13,011 Muslims and 153,801 Bosniaks living in the Republic of Serbia (Statistical Office of the Republic of Serbia, 2023). In recent years, there has been an increased influx of workers from Islamic countries, as well as growth in the number of tourists from those regions. These demographic trends point to the need for meat producers to align their production with Halal standards. The growing global demand for Halal meat offers domestic producers the opportunity to access new markets, which can contribute to the strengthening and expansion of the meat industry in Serbia.

The importance of implementing Halal standards in Serbia's meat industry is becoming increasingly pronounced, especially in the context of marketing products to markets with predominantly Muslim consumer populations. Halal certification requires meeting specific criteria related to animal welfare, hygiene conditions, supervision of the entire production process, as well as the exclusion of ingredients that are not compliant with Islamic regulations.

The application of these standards not only contributes to raising the level of quality, safety, and transparency in production but also enables compliance with modern sustainability and environmental protection requirements. Thus, in the domestic context, Halal certification is not limited solely to fulfilling religious conditions but is also established as a tool for enhancing competitiveness and responsibility in the meat processing sector. According to data from the Halal Agency of the Islamic Community of Serbia, during 2025, eight producers in the meat production and processing sector held valid Halal certificates (Table 2).

Table 2. List of meat producers and processors with valid Halal certification (Meshihat of the Islamic Community of Serbia, 2025).

Region	Producer (Place)
North Serbia (Vojvodina)	Industrija mesa Carnex (Vrbas)
	Perutnina Ptuj - Topiko d.o.o (Bačka Topola)
	Superior Foods d.o.o (Bačinci)
	Vukenović DOO (Boljevci)
Central Serbia	Yuhor (Jagodina)
	Laki Komerc d.o.o (Jagodina)
Western Serbia	Klanica Divci DOO (Divci)
	ŠEJN DOO (Šabac)

Meat and meat products produced in Serbia according to Halal standards are marked with the national Halal label (Figure 3).



Figure 3. The Moral Foundations of Halal Meat Production (Rahman et al., 2024).

Knežević, S., et al. (2025). The impact of halal certification on environmental standards in the Serbian meat industry. *STED Conference 14(2)*, 13-19.

By adopting these practices, producers can strengthen their competitive advantage through the development of sustainable strategies and environmental preservation. At the same time, consumers gain increased trust, the opportunity to express cultural diversity, and pathways open for intercultural cooperation between countries, religions, and traditions.

Limitations of Halal standard implementation in Serbia

Despite the growing interest in Halal certification, the implementation of these standards in Serbia's meat industry faces a number of limitations.

Key challenges include:

- Insufficient awareness among producers about the procedures and importance of Halal certification, which leads to lower motivation for implementing these standards. A limited number of accredited certification bodies, which affects the availability and speed of the certification process.
- Technical and organizational obstacles, especially in small and medium-sized facilities that lack adequate conditions for the physical and procedural separation of Halal and non-Halal production.
- Lack of specialized training and qualified personnel, which hinders the practical implementation of strict hygiene and Sharia standards.
- Incomplete legal regulation, given that Halal standards function as additional, non-mandatory standards outside the general food safety regulations.
- Weak promotion and visibility of Halal products in the domestic market, which may reduce their commercial viability for producers.

These limitations point to the need for systemic support to the meat industry, which should include producer education, institutional strengthening of certification bodies, as well as improvements in infrastructure and the legal framework, with the aim of enabling broader and more efficient implementation of Halal standards in this sector. In addition, it is essential to establish adequate mechanisms for institutional and financial support, including subsidies and technical assistance, in order to encourage the modernization of capacities in the meat industry and facilitate the integration of Halal standards into existing production processes.

Ecological aspects of Halal meat certification in Serbia

Halal meat certification in Serbia can significantly contribute to improving environmental standards in the meat production sector. The production methodologies applied within Halal standards are often aligned with principles of sustainability, resulting in a positive impact on the environment. Halal production processes are characterized by more efficient use of resources, particularly water and energy, which reduces the overall environmental footprint. The implementation of standardized procedures in Halal slaughterhouses and meat processing facilities in Serbia can contribute to optimizing the consumption of these key resources.

In addition, Halal certification involves the limitation or elimination of the use of synthetic chemicals such as pesticides, preservatives, and artificial colorants, thereby reducing pollution and enabling the production of more environmentally friendly products. Moreover, the growing use of eco-friendly packaging — including biodegradable and recyclable materials — contributes to reducing the negative impact on the environment, especially in the area of waste management.

The integration of these environmental principles into Serbia's meat industry enables the alignment of religious requirements with the demands of sustainable development, contributing to a responsible approach to environmental protection.

CONCLUSIONS

Although primarily defined through religious regulations, Halal certification in the context of modern food systems in Serbia has the potential to contribute to the improvement of environmental and production standards in the meat industry. Through strict requirements regarding hygiene, animal welfare, and process control, Halal practices can also be viewed as a framework for

Knežević, S., et al. (2025). The impact of halal certification on environmental standards in the Serbian meat industry. *STED Conference 14*(2), 13-19.

introducing more sustainable production methods. However, the implementation of Halal standards in Serbia faces a range of institutional, technical, and economic limitations that slow broader adoption and commercial viability of this approach. Insufficient producer awareness, a lack of accredited bodies, and the need for stronger legislative frameworks represent key challenges. Despite this, it is clear that Halal certification in Serbia not only opens opportunities for export and market diversification but also offers added value by contributing to principles of safe, ethical, and environmentally responsible food production. Further research and multi-sector cooperation can support better integration of Halal standards into the domestic meat production and control system, with potentially positive effects on industry sustainability and environmental protection.

DECLARATIONS OF INTEREST STATEMENT

The authors affirm that there are no conflicts of interest to declare in relation to the research presented in this paper.

LITERATURE

- Aung, T. S., Jasman, W., Alesandra, J., Johar, H. N., Hidayati, N., & Ruslan, M. F. (2025). *Halal practices for responsible production and consumption towards sustainable future*. *Halal Studies and Society*, 2(1), 1–3. <https://doi.org/10.29244/hass.2.1.1-3>
- Bux, C., Varese, E., Amicarelli, V., & Lombardi, M. (2022). Halal Food Sustainability between Certification and Blockchain: A Review. *Sustainability*, 14(4), 2152. <https://doi.org/10.3390/su14042152>
- Farouk, M. M., Pufpaff, K. M., & Amir, M. (2016). Industrial halal meat production and animal welfare: A review. *Meat Science*, 120, 60–70. <https://doi.org/10.1016/j.meatsci.2016.04.036>
- Halal Food Council USA. (2024). *Understanding the Different Types of Halal Certifications*. Retrieved July 4, 2025, from <https://halalfoodcouncilusa.com/understanding-the-different-types-of-halal-certifications/>
- Halal Quality Control. (2024). *List of approved Halal standards, schemes, and guidelines (Rev. 7)*. <https://www.halalqualitycontrol.com/wp-content/uploads/2024/09/W0456-List-of-approved-Halal-Standards-Schemes-and-Guidelines-Rev7.pdf>
- Hidayati, J., Vamelia, R., Hammami, J., & Endri, E. (2023). Transparent distribution system design of halal beef supply chain. *Uncertain Supply Chain Management*, 11(1), 31–40. <https://doi.org/10.5267/j.uscm.2022.12.003>
- Meixner, O., Friedl, R., & Hartl, B. (2018). Preferences for attributes of halal meat: Empirical evidence from the Muslim community in Vienna, Austria. *International Journal on Food System Dynamics*, 9(3), 265–278. <https://doi.org/10.18461/ijfsd.v9i3.935>
- Mešihat Islamske zajednice Srbije. (2025). *Halal*. Retrieved July 3, 2025, from <https://mesihat.org/halal/>
- Nugraha, W.S., Chen, D., & Yang, S.-H. (2022). The effect of a Halal label and label size on purchasing intent for non-Muslim consumers. *Journal of Retailing and Consumer Services*, 65, Article 102873. <https://doi.org/10.1016/j.jretconser.2021.102873>
- Rahman, M. M., Razimi, M. S. A., Ariffin, A. S., & Hashim, N. (2024). Navigating moral landscape: Islamic ethical choices and sustainability in Halal meat production and consumption. *Discover Sustainability*, 5(1), 225.
- Republički zavod za statistiku Srbije. (2023). *Konačni rezultati Popisa stanovništva, domaćinstava i stanova 2022*. Retrieved July 3, 2025, from <https://www.stat.gov.rs/sr-latn/vesti/20230428-konacnirezpopisa>
- Shahidan, N., & Amid, A. (2023). Challenges Faced by Halal Meat Industry: A Review. *Halalsphere*, 3(1), 55–63. <https://doi.org/10.31436/hs.v3i1.61>