

PERCEPTION OF SMALL AND MEDIUM-SIZED PORK PRODUCERS IN THE REPUBLIC OF MOLDOVA ON FOOD SAFETY REGULATIONS AND ECONOMIC SUSTAINABILITY

Aurelia LITVIN¹, Larisa CAISIN¹, Ana RAILEANU¹, Aliona IONESCU²

¹Technical University of Moldova, 168, Ștefan cel Mare și Sfint Boulevard, Chisinau, Republic of Moldova, E-mails: aurelia.litvin@gmail.com, larisa.caisin@mpasa.utm.md, ana.raileanu@mpasa.utm.md

²Pork Producers' Association, 17, Mihai Viteazu Street, Chisinau, Republic of Moldova, E-mail: apcpmoldova@gmail.com

Corresponding author: aurelia.litvin@gmail.com

Abstract

The paper analyzes the perceptions of local pork producers and consumers in the Republic of Moldova about the regulations governing food safety and their role in economic development. The study refers to the importance of complying with standards, the impact of implementing standards on production costs, and the analysis of the competitiveness of the Republic of Moldova's market, which is currently in the process of gradual alignment with European Union norms. Through a mixed approach, data were collected through structured questionnaires and semi-structured interviews with the main actors: small and medium-sized producers, traders and consumers. The quantitative data were statistically analyzed, and the qualitative data were thematically coded to highlight major attitudes and challenges. The results show that although most producers recognize the importance of compliance, they consider the implementation of regulations to be costly and insufficiently supported institutionally. Consumers associate compliance with standards with higher product quality, but show limited information. The study concludes that institutional support, targeted training, and consumer education are essential for balancing regulatory enforcement with long-term economic sustainability in the pork sector in the Republic of Moldova.

Key words: food safety, pork producer sector, regulation, sustainability

INTRODUCTION

Pig breeding is a sector of the livestock industry within the national economy. The pig breeding sector has diversified its animal selection and breeding technologies. It has visibly increased the efficiency of feed utilization and animal slaughter. The quality of pork, in terms of albumin content and degree of its assimilation, is close to that of other animal species, and in terms of caloric content it is much higher. New capital investments are being made in the sector to modernize production and labor organization. At the same time, this sector is strictly regulated from the point of view of food safety [3, 15]. The literature points out that the implementation of these regulations can have different effects on farms of different sizes, especially on small and medium-sized producers, who often face financial and

institutional constraints (Baltag, Henson & Humphrey, 2010) [2, 16].

Food safety has become a central concept in modern agri-food policies, being defined as the set of measures aimed at ensuring that food products do not pose risks to the health of consumers. According to the World Health Organization and World Organisation for Animal Health (WHO, 2020, WOA, 2022), food safety is essential for protecting public health and maintaining consumer confidence in the food system. [31, 32] In the European Union, the legislative framework on food safety is mainly governed by Regulation (EC) No. 178/2002, which establishes the general principles of food legislation and the responsibilities of operators in the agri-food chain [11,12].

This regulatory framework supports the principle of traceability, the empowerment of producers and the implementation of food

safety management systems, such as HACCP (Hazard Analysis and Critical Control Points). In the specialized literature in the economic and agricultural fields, the application of food safety standards is frequently examined in relation to agri-food value chains and the level of competitiveness of producers. According to Jaffee, Henson and Rios (2011), these standards can have a significant role in increasing product quality and facilitating access to international markets, but, at the same time, they can create barriers for small producers who do not have the resources to comply with these requirements [18]. Compliance costs can include investments in infrastructure, quality monitoring systems, certification and staff training. In the livestock sector, these costs can be particularly high, as biosecurity and veterinary control standards are complex and require significant investment [27].

In the case of the pig sector, food safety is closely linked to animal health, growing conditions and meat processing. Studies by McGlone (2013) show that modern pork production systems are under increased pressure to comply with strict standards on animal welfare, hygiene and product traceability. These requirements are motivated both by consumer concerns and by the need to prevent zoonotic diseases and food contamination. At the same time, McGlone in his research mentions that the sustainability of pork production systems highlights that economic efficiency, environmental protection and social acceptability are fundamental factors for the sustainable development of the sector in the long term (McGlone et al., 2013) [20].

In the Republic of Moldova, the application of food safety standards is largely determined by the process of harmonizing the national legislative framework with the acquis communautaire of the European Union. According to studies conducted by Litvin et al (2018) and Caisin (2025), the modernization of the Moldovan agri-food sector is closely linked to the adoption of European food quality and safety standards. These standards can contribute to increasing the competitiveness of Moldovan agri-food

products on international markets, but can generate difficulties for small producers, who face limitations in terms of access to capital, technology and information. (Caisin et al., 2025) [4, 19].

The research carried out by Turcan (2020) highlights the role of traceability systems and sanitary-veterinary control in ensuring food safety in the Republic of Moldova. (Turcan et al., 2020) [28]. The National Food Safety Agency (ANSA) is the state control body that ensures and monitors the implementation of the aforementioned systems [1]. At the same time, studies show that the level of compliance with food safety regulations varies significantly depending on the size and economic capacity of farms [13,14]. Large commercial farms are generally better prepared for the implementation of standards, while small farms and individual households have difficulty complying with legal requirements.

Producers' perception of food regulations is an important aspect in the analysis of the effectiveness of public policies. The literature emphasizes that the success of the implementation of standards depends not only on the legislative framework, but also on the level of acceptance and understanding of these regulations by manufacturers (Henson et al., 2006) [17]. If farmers perceive regulations as overly complex or costly, there is a risk that they will only be partially or formally implemented. Conversely, when manufacturers recognize the economic and reputational benefits of compliance, the level of adoption of standards increases significantly.

In the pig sector, farmers' perceptions are influenced by several factors, including the size of the farm, level of education, professional experience and access to markets. Studies conducted in Central and Eastern Europe show that smallholder farmers are often sceptical about the economic benefits of food standards, as the initial costs of implementation can outweigh the short-term benefits (Popescu, 2020, Popescu et al, 2021) [24, 25]. At the same time, research indicates that institutional support, training programs, and government subsidies can help increase

farmers' capacity to implement these standards.

Another important aspect analyzed in the literature is the relationship between food safety and the economic sustainability of farms [5, 23]. Economic sustainability implies the ability of farms to generate stable incomes and maintain competitiveness in the long term. According to the OECD and FAO (2022), the adoption of food quality and safety standards can contribute to increasing the added value of agri-food products and access to premium markets. However, the economic benefits of these standards depend on the ability of farmers to integrate these requirements into their production and marketing strategies [22].

In this context, this study investigates the perception of small and medium-sized pork producers in the Republic of Moldova regarding food safety regulations and their impact on the economic sustainability of their activity.

MATERIALS AND METHODS

The study was designed as an exploratory research with a mixed approach, combining quantitative and qualitative elements, with the aim of highlighting how producers perceive regulatory requirements, the difficulties encountered in the compliance process and the economic implications generated by them.

Small and medium-sized producers in the pig sector served as the basic sample of the research. To ensure balanced results, producers from the North, Center and South regions of the Republic of Moldova were selected. They represent an important segment of the national livestock sector, having a significant role in ensuring domestic pork production and supporting the rural economy. The selection of study participants was carried out through a targeted sampling method, so that the respondents would be actively involved in the pork production activity and have direct experience in applying food safety requirements.

Data collection was carried out through a structured questionnaire, applied to a sample of 50 producers in the field of pork

production. The questionnaire was developed in such a way as to allow the assessment of producers' perceptions, experiences and attitudes towards food safety regulations, as well as the analysis of the economic impact of their implementation on production activities. The research instrument included both closed-ended questions, which allowed the quantification of general opinions and trends, and open-ended questions, which offered the possibility of obtaining additional information on specific problems encountered by producers.

The questionnaire was structured into several thematic sections. The first section aimed to collect general information about the holdings, such as farm size, production capacity, experience in pig farming and the size of the economic activity. The second section aimed at the level of knowledge and understanding of food safety regulations, including the familiarization of producers with national legislative requirements and sanitary standards applicable to the sector. The third section analyzed the degree of compliance and operational difficulties, such as the costs of implementing hygiene measures, veterinary controls, product traceability and other requirements imposed by the regulatory framework. The last section followed the perception of economic sustainability, assessing how compliance with regulations influences production costs, market competitiveness and long-term development prospects of farms.

Before application, the questionnaire was analyzed to ensure the clarity and relevance of the questions formulated. Participation in the study was voluntary, and respondents were guaranteed the confidentiality of the data provided. The distribution of the questionnaires was carried out through direct contact with producers and through professional networks in the livestock sector. Data was collected during November 2025 and were analyzed using descriptive statistical methods, which allowed the identification of the main trends and patterns in the perceptions of producers. Frequencies and percentages were calculated to highlight the distribution of responses within the analyzed sample. At the

same time, the responses to the open questions were interpreted through a thematic analysis, which allowed highlighting the main problems related to compliance with food safety regulations, financial constraints and adaptation strategies adopted by producers. Through this methodological approach, the study provides a comprehensive picture of how food safety regulations are perceived and managed by producers. At the same time, it highlights the relationship between compliance with regulations and the economic sustainability of activities in the livestock sector.

RESULTS AND DISCUSSIONS

In the Republic of Moldova, the pig sector faces a number of structural challenges, including fragmentation of production, low investment levels and volatility of agricultural markets.

The World Bank report (2020, 2021) highlights that modernizing the livestock sector requires significant investments in infrastructure, production technologies, and quality control mechanisms.

From this perspective, food safety regulations can significantly contribute to boosting the modernization process of the sector, but it is essential to maintain a balance between regulatory requirements and the economic capacity of farmers to comply with them. The systematic analysis of the Republic of Moldova's food safety legislation allowed the research team to identify the applicable regulatory acts, their degree of updating and their internal coherence [29, 30].

A significant number of legislative documents were examined, as well as a number of technical norms and orders issued by the National Food Safety Agency (ANSA) [1].

The Legislation on red meat was analyzed in detail, which includes normative acts establishing sanitary and veterinary requirements for the production, processing, marketing and official control of meat from large animals (cattle, pigs, sheep), with an emphasis on hygiene, traceability and public health protection [21, 26].

The result of this activity was the development of a legislative database of relevant documents, organized by thematic areas – sanitary control, traceability, labelling, hygiene, certification and import/export.

The analysis highlighted the fact that a significant part of the national legislative framework is already aligned with European Union regulations, especially in the field of food hygiene and traceability of products of animal origin (Table 1). However, areas were also identified where regulatory framework remains fragmented or outdated, especially regarding internal audit procedures of food operators and sanctions for non-compliance.

Table 1. Comparative analysis of the legislation of the Republic of Moldova and the European legislation in the field of food safety

Legislative aspect	Republic of Moldova	European Union
Basic legislative framework	Law no. 306/2018 on food safety	Regulation (EC) no. 178/2002 – "From farm to fork"
Product traceability	Regulated, But the implementation is being strengthened	Mandatory, with integrated IT systems and rigorous control
Food labelling	Partial transposition of Regulation (EU) no. 1169/2011	Complete, clear labelling with nutritional and origin information
Official controls	Law no. 50/2013 and recent harmonization projects	Regulation (EU) no. 2017/625 on official controls and delegated rules
Use of pesticides /additives	Regulated, but with the need to align with EU doses and methods	Strict regulations on permissible limits and continuous monitoring
Laboratory certification	In the process of accreditation and modernization	Only accredited laboratories can perform official tests
Responsible institutions	National Agency for Food Safety, Ministry of Agriculture, Ministry of Health	EFSA, the national competent authorities of each Member State

Source: developed by the authors based on sources [1, 22, 26].

The next activity aimed at comparing Moldovan regulations with international standards, in particular with those of the European Union and Codex Alimentarius. The process was structured around five key areas: food quality control, traceability, chemical residues, product labelling and requirements for the hygiene of technological processes.

For each area, the project team created a comparative matrix in which national regulations were reported to EU Directives

and Regulations, as well as to FAO/WHO international standards.

The analysis revealed that, on average, approximately 72% of national provisions are aligned with international requirements, but significant differences persist in terms of the terminology used, certification procedures and the level of sanctioning of deviations. A concrete example is the regulations on food additives, where Moldovan legislation uses a limited list, different from the one adopted at EU level. Also, the labelling standards do not require the indication of the origin of all ingredients, which may affect transparency for consumers and the access of domestic products to foreign markets.

Based on the comparison, an in-depth analysis of the significant differences between Moldovan and international regulations was carried out. The process involved a qualitative assessment of the inconsistencies, classifying them into three categories: technical, conceptual and implementation.

- Technical inconsistencies concern the lack of clear standards for maximum permitted limits of chemical residues and for laboratory testing methods.
- Conceptual ones derive from different interpretations regarding the definition of the terms “safe food” and “compliant product”.
- Regarding implementation aspects, differences were found between the authorities responsible for control, the lack of a single platform for reporting non-conformities and difficulties in inter-institutional coordination.

These findings were documented and refer to the updating of control mechanisms and the strengthening of cooperation between regulatory institutions. The need to implement European good practices was also mentioned, such as:

1. The EU Farm to Fork System:

- Integration of all stages of the food chain: production, processing, distribution, consumption.
- Rigorous control of hygiene, traceability and use of chemicals.
- Promotion of sustainability and healthy eating.

2. Transparent and informative labelling:

- Clear labels on origin, composition, allergens, nutritional value.
- Implementation of QR codes for quick access to additional information.

3. Certification of laboratories and personnel:

- Exclusive accreditation of laboratories that comply with ISO standards.
- Continuous training for health inspectors and quality control specialists.

4. Monitoring of residues and contaminants:

- Centralized IT systems for tracking residues in food products.
- Risk assessment by independent institutions such as BfR (Germany) [6, 7, 8, 9,10].

The application of these good practices and reforms will bring the Republic of Moldova closer to European standards and, at the same time, support the protection of public health, contributing to strengthening the competitiveness of the agri-food sector and facilitating the access of Moldovan products to the European single market. Harmonizing national legislation with European Union norms in the field of food safety constitutes a strategic investment in the health of the population, in economic performance and in strengthening institutional trust. Therefore, food safety must be treated not only as a technical aspect of public governance, but as a national strategic priority, with direct effects on the health of the population, economic competitiveness and citizens' trust in state institutions.

The analysis of the data collected through the questionnaire reveals that the majority of respondents work in the primary sector of the agri-food chain, namely in the field of animal husbandry. This reality highlights the specific configuration of the pig sector in the Republic of Moldova, where most pig breeding activities are carried out in small and medium-sized farms, with a relatively low level of vertical integration of the value chain. The results indicate that the main activity of the majority of the enterprises analyzed is pig breeding, while a smaller number of economic operators are involved in activities such as slaughtering, meat processing or marketing of meat products. This distribution suggests the existence of a fragmentation of the production

chain, which may reduce the capacity of producers to generate added value and to amortize the costs associated with the compliance with food safety regulatory requirements. In the context of the integration of the agri-food market and the alignment of national legislation with European standards, the lack of vertical integration may represent a structural limitation for the competitiveness of local producers.

The distribution of enterprises by size highlights the predominance of micro enterprises, with a small number of employees. The majority of respondents fall into the category of enterprises with fewer than 10 employees, while small and medium-sized enterprises are represented to a lesser extent. This economic structure is particularly relevant for the analysis of the impact of food safety regulations. The implementation of modern food safety management systems, such as HACCP or ISO 22000, involves investments in infrastructure, operational procedures, staff training and monitoring of technological processes. For small enterprises, these requirements can generate relatively high costs in relation to their financial capacity.

The results therefore suggest that food safety regulations can have a disproportionate impact on small enterprises, affecting their competitiveness compared to larger economic operators, which have more consistent resources to implement regulatory requirements.

Food safety regulations play a key role in protecting public health and ensuring the quality of food products. However, the implementation of these regulations can generate additional costs for producers, especially for small and medium-sized enterprises.

The data obtained from the questionnaire suggest that compliance with sanitary and veterinary standards involves significant investments in the modernization of infrastructure, adaptation of technological processes and development of internal control systems. In the absence of effective institutional or financial support mechanisms, these requirements may diminish the

competitiveness of domestic producers on the domestic market.

Instead, compliance with food safety standards can generate significant long-term benefits. The implementation of food safety management systems contributes to increasing consumer confidence, improving product quality and facilitating access to foreign markets.

Figure 1 shows the level of implementation of systems such as HACCP or ISO 22000 among the analyzed producers.

The results show that a significant proportion of the respondents (30 person) have not yet implemented a formal food safety management system, but plan to do so in the future. At the same time, a smaller proportion of enterprises (10 person) have fully implemented these systems or are in the process of implementing them.

These finding indicate the existence of structural and financial barriers to the adoption of international food safety standards, especially in the case of small and micro enterprises.

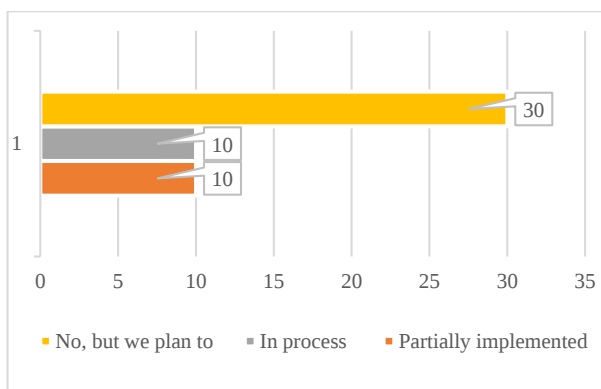


Fig. 1. Food safety management system implementation (Number of respondents)

Source: Developed by the authors based on the survey results.

Figure 2 highlights the main difficulties faced by producers. The most frequently mentioned obstacles are: high compliance costs; complex administrative requirements; lack of qualified personnel; lack of support or information from authorities. These results suggest that the problem is not only financial, but also institutional and administrative, which highlights the need for more effective support programs for the agri-food sector.

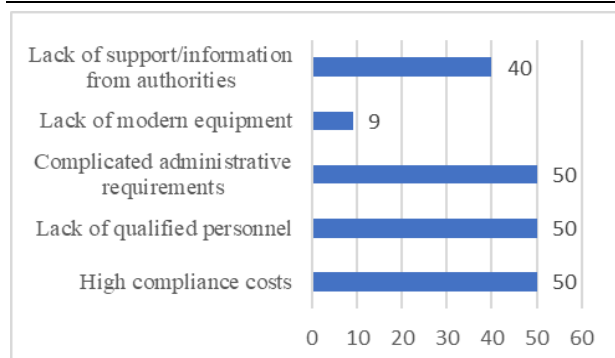


Fig. 2. Main obstacles in compliance with food safety regulations (Number of respondents)

Source: Developed by the authors based on the survey results.

Figure 3 highlights the perception of producers on the costs generated by the implementation of regulations. The results show that the majority of respondents believe that the regulations have significantly increased production costs. This aspect is particularly important for the competitiveness of local producers, especially in relation to imported products.

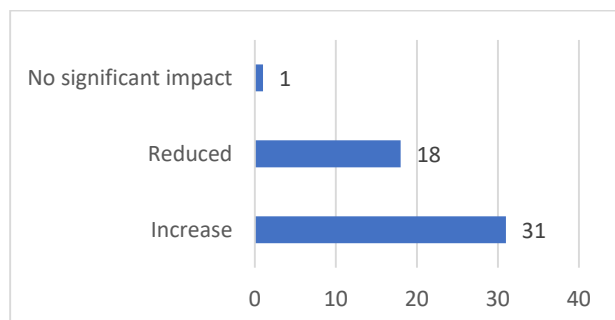


Fig. 3. Impact of food safety regulations on production costs (Number of respondents)

Source: Developed by the authors based on the survey results.

The analysis of the diagram regarding the question “Do you think that full alignment with EU standards is realistic for small meat producers in the Republic of Moldova by 2030?” reveal a predominantly reserved attitude among producers. A majority of responses, namely 36 farmers, consider that full harmonisation with European Union standards by 2030 is not an achievable objective for small producers in the meat sector. At the same time, 14 farmers stated that they cannot assess this perspective, which suggests a significant level of uncertainty

regarding the sector’s ability to meet European requirements.

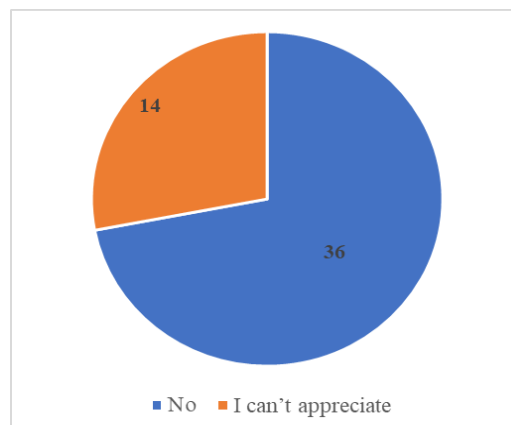


Fig. 4. Perceived feasibility of full alignment with EU standards by 2030 (Number of respondents)

Source: Developed by the authors based on the survey results.

These results suggest the existence of significant challenges, such as limited financial resources, insufficient infrastructure and difficulties in implementing food safety standards.

CONCLUSIONS

The research highlights the significant role of food safety regulations in shaping the competitiveness of local pork producers in the Republic of Moldova. The analysis of data obtained through the questionnaire applied to producers shows that the sector is dominated by small and micro enterprises, which operate predominantly in primary livestock activities and have limited financial and administrative resources to implement complex food safety management systems.

The results of the study indicate that food safety regulations are perceived simultaneously as a necessity to ensure product quality and protect consumer health, but also as an economic and administrative challenge for producers. The main difficulties identified in the compliance process include high implementation costs, the complexity of administrative requirements, the lack of qualified personnel and limited access to information and technical support.

The research also shows that the implementation of food safety standards, such

as HACCP systems, is still at an early stage for a significant part of producers, which reflects the need to strengthen institutional capacities and support mechanisms for the agri-food sector. In parallel, a portion of respondents consider that adherence to these regulations may enhance long-term competitiveness through improvements in product quality, greater consumer trust and easier entry into more demanding markets. Overall, food safety regulations represent a key component of the sustainable development of the agri-food sector in the Republic of Moldova, however their effect on producer's competitiveness is largely determined by the capacity of business to adjust to emerging requirements and by the availability of effective public support policies. Strengthening training programs, facilitating access to financing for infrastructure modernization and improving communication between public institutions and producers can significantly contribute to increasing the level of compliance and strengthening the competitiveness of local producers on the agri-food market.

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