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SAGRI: a multidimensional sustainability assessment model for the meat value chain based on the updated GRI standards

SAGRI: um modelo multidimensional de avaliação da sustentabilidade para a cadeia de valor da carne com base nos standards GRI atualizados

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ABSTRACT

The meat value chain is facing increasing pressure to demonstrate credible sustainability performance, driven by regulatory requirements, societal expectations, and due diligence obligations within the EU. Although sustainability reporting frameworks such as the GRI and the CSRD have enhanced transparency, they remain predominantly declarative and lack effective mechanisms for operational verification, particularly in the context of small and medium-sized enterprises (SMEs). This study develops SAGRI, a Multidimensional Sustainability Assessment Model for the meat value chain, aligned with the updated GRI Standards. The model was designed not as a reporting instrument, but as a technical tool for on-site verification, auditing, and certification. It integrates economic, environmental, and social dimensions through a weighted, evidence-based evaluation system, ensuring proportionality across different organizational scales. Unlike existing models, SAGRI operationalizes the link between sustainability reporting and verification, incorporating the due diligence principles of the CSDDD. The model was developed based on a systematic literature review, normative analysis of international standards, and mathematical validation through simulated applications across enterprises of different sizes. The results indicate that SAGRI constitutes a robust, adaptable, and verifiable framework, with potential to support technical audits, sustainability certification, and policy implementation. Although targeted at the meat sector, the model is transferable to other primary sectors.

Keywords: GRI Standards, Sustainability Certification, Meat Value Chain, ESG Auditing, Due Diligence Directive.

RESUMO

A cadeia de valor da carne enfrenta uma pressão crescente para demonstrar um desempenho de sustentabilidade credível, impulsionada por exigências regulatórias, expectativas sociais e requisitos de diligência devida na UE. Embora estruturas de relato como o GRI e a CSRD tenham reforçado a transparência, permanecem predominantemente declaratórias e carecem de mecanismos eficazes de verificação operacional, sobretudo no contexto das PMEs. Este estudo desenvolve o SAGRI, um Modelo Multidimensional de Avaliação da Sustentabilidade para a cadeia de valor da carne e alinhado com os Standards GRI atualizados. O modelo foi concebido não como instrumento de reporte, mas como uma ferramenta técnica para verificação in loco, auditoria e certificação. Integra dimensões económicas, ambientais e sociais através de um sistema de avaliação ponderado e baseado em evidências, assegurando proporcionalidade entre diferentes escalas organizacionais. Diferentemente dos modelos existentes, operacionaliza a ligação entre relato e verificação, incorporando os princípios de diligência devida da CSDDD. O modelo foi desenvolvido com base numa revisão sistemática da literatura, análise normativa de padrões internacionais e validação matemática por meio de aplicações simuladas em empresas de diferentes dimensões. Os resultados indicam que o SAGRI constitui um enquadramento robusto, adaptável e verificável, com potencial para apoiar auditorias técnicas, certificação em sustentabilidade e implementação de políticas. Embora direcionado ao setor da carne, o modelo é transferível para outros setores primários.

Palavras-chave: Normas GRI, Certificação em Sustentabilidade, Cadeia de Valor da Carne, Auditoria ESG, Diretiva de Diligência Devida.

INTRODUCTION

The meat value chain plays a central role in the global economy while simultaneously generating significant environmental, social, and economic impacts. In recent years, this sector has been subject to increasing scrutiny regarding its sustainability performance, driven by climate change mitigation goals, natural resource constraints, labour conditions, and societal concerns related to animal welfare (Charlebois & Summan, 2014; Schneider, 2017; Najafi & Zolfagharinia, 2024; Talwar *et al*., 2024; Zhang *et al*., 2024). These pressures have intensified regulatory demands, particularly within the European Union, where due diligence obligations and sustainability disclosure requirements are becoming progressively more stringent (European Union, 2022).

In this context, sustainability reporting has emerged as a key governance mechanism, enabling organisations to identify risks and impacts, integrate sustainability considerations into strategic decision-making, and enhance transparency towards stakeholders (Jones *et al*., 2014; Sebrina *et al*., 2023). Beyond their communicative function, sustainability reports increasingly serve as management tools that support credibility, accountability, and continuous improvement across value chains (Sebrina *et al*., 2023).

However, the practical implementation of sustainability assessment within the meat sector remains limited. Most actors in the meat value chain are small and medium-sized enterprises (SMEs), which are often excluded from mandatory reporting frameworks and are not required to apply the European Sustainability Reporting Standards (ESRS) (European Union, 2022). Moreover, the proliferation of generic or weakly contextualised certification schemes has undermined the effectiveness and credibility of sustainability governance in the sector (Sebrina *et al*., 2023).

Although sustainability in agri-food systems has been widely addressed, robust, verifiable, and sector-specific assessment and certification models for the meat value chain remain underdeveloped. Existing approaches, including GRI-based reporting tools, composite indices, and sectoral frameworks, tend to prioritize ex post disclosure and self-reported compliance, provide limited mechanisms for systematic verification or on-site auditing, and often fail to integrate environmental, social, and economic dimensions effectively. (Carlsson *et al*., 2007; Krishnan *et al*., 2020; Konefal *et al*., 2023). These limitations are particularly problematic given the structural complexity of the meat value chain and the dominance of SMEs.

Against this backdrop, the present study proposes a sustainability certification system designed specifically for the meat value chain, grounded in the principles of the GRI standards and aligned with ESRS requirements, while remaining operationally applicable to SMEs. The proposed model integrates multidimensional indicators, verification-oriented criteria, and proportionality mechanisms, thereby addressing the gap between sustainability reporting and effective due diligence enforcement. While developed for the meat sector, the framework has a transversal character and may be adapted to other resource-intensive sectors, including agriculture, forestry, fisheries, and food production. By providing a structured and verifiable assessment tool, this research aims to support more responsible practices, enable informed consumer choices, and contribute to a more sustainable, ethical, and resilient agri-food system.

This study contributes to the literature by (i) operationalising GRI-based sustainability principles into a verifiable audit framework, (ii) addressing the systematic exclusion of SMEs from sustainability governance, and (iii) bridging the regulatory divide between sustainability reporting and due diligence implementation. This article is structured as follows: literature review; methodology adopted for model development; main results; validation process and model application scenario; theoretical and practical implications; policy and operational implications; conclusions and final recommendations.

LITERATURE REVIEW

Sustainability Assessment Models in the Meat and Agri-food Sector

Sustainability in the agri-food sector, and particularly in the meat industry, is grounded in the

balanced integration of environmental, social, and economic dimensions, aiming to ensure resilient, responsible, and competitive production systems (Pashaei *et al*., 2017; Krishnan *et al*., 2020; Konefal *et al*., 2023). Since the Brundtland Report (World Commission on Environment and Development, 1987), sustainability has gained increasing relevance in sectors characterised by high environmental impacts, strong dependence on natural resources, and structurally complex value chains, such as meat production (Castillo-Díaz *et al*., 2023).

In the meat value chain, sustainability requires an integrated assessment of all stages, production, transport, slaughter, processing, and distribution, as interdependent components that jointly determine system performance (Fritz & Matopoulos, 2008; Mangla *et al*., 2018; Castillo-Díaz *et al*., 2023). To operationalise this assessment, several methodologies have been proposed. Life Cycle Assessment (LCA) is widely used to quantify environmental impacts across production stages (Stillitano *et al*., 2021; McClelland *et al*., 2023), while ESG-based indicators emphasise corporate governance, transparency, and risk management (United Nations Global Compact, 2004). However, these approaches often remain partial, either focusing predominantly on environmental aspects or privileging corporate disclosure over operational performance.

Sector-specific models applied to food systems, such as BIA-Sustainability, have contributed to raising awareness of sustainability challenges but remain insufficiently adapted to the specificities of the meat industry. In particular, some models are limited to environmental indicators and fail to address critical social and economic dimensions (Serrentino Ferraro, 2023). Similarly, comprehensive frameworks such as the FAO SAFA Guidelines (FAO, 2014) and the GRI Standards (GRI, 2021) provide holistic sustainability structures but are frequently criticised for their limited operationalisation and weak adaptation to sector-specific issues, including animal welfare, antimicrobial use, effluent management, plastic consumption, and labour conditions in the meat value chain (Caccialanza *et al*., 2023a; Falkenberg *et al*., 2023; Traça *et al*., 2025).

The literature consistently highlights the absence of robust, multidimensional assessment models capable of integrating environmental, social, and economic dimensions across the entire meat value chain (Jones *et al*., 2014; Falkenberg *et al*., 2023). This gap is further exacerbated by the limited consideration of innovative practices, such as proximity slaughtering and mobile slaughter units, which have demonstrated potential benefits in terms of animal welfare, emissions reduction, and local economic development (Astruc & Terlouw, 2023; Traça *et al*., 2025). Overall, existing research highlights the need for more integrated, verifiable, and context-sensitive sustainability assessment frameworks capable of supporting effective decision-making and continuous improvement in the meat sector.

Sustainability Reports: Normative Framework and Gaps between Reporting and Verification

Sustainability reports have become central instruments for promoting transparency, accountability, and corporate social responsibility, enabling organisations to disclose their environmental, social, and economic impacts in a structured manner. Increasing pressure from regulators, investors, and civil society has intensified reporting requirements, particularly within the European Union (Jones *et al*., 2014; Reilly & Larya, 2018).

Key regulatory developments, including the Corporate Sustainability Reporting Directive (CSRD) (European Union, 2022) and the EU Taxonomy Regulation (European Union, 2020), have strengthened mandatory disclosure obligations and aimed to reduce greenwashing by harmonising sustainability information. In the agri-food sector, transparency is particularly critical, as sustainability communication directly influences consumer behaviour, market positioning, and investment decisions (Rimmington *et al*., 2006; Falkenberg *et al*., 2023).

In the meat industry, sustainability reporting is especially complex due to the multiplicity of actors involved—producers, transport operators, slaughterhouses, processors, and distributors—and the associated risks related to environmental impacts, animal welfare, and labour conditions (Astruc & Terlouw, 2023). Sustainability reports serve not only as communication tools but also as performance assessment instruments, allowing companies to

identify risks, monitor progress, and demonstrate compliance with regulatory and voluntary standards (Sebrina *et al*., 2023).

The regulatory framework was further expanded with the adoption of the Corporate Sustainability Due Diligence Directive (CSDDD) (European Union, 2024), which requires companies to implement processes to identify, prevent, and mitigate adverse impacts throughout the value chain. While the CSRD focuses primarily on disclosure, the CSDDD introduces an action-oriented logic centred on accountability and risk management. Nevertheless, the effectiveness of these instruments depends largely on the existence of assessment models capable of translating reporting obligations into verifiable and operational practices.

Despite regulatory advances, the literature highlights persistent challenges related to the lack of standardised and comparable sustainability indicators. Economic indicators remain the most consistently reported, whereas environmental and social dimensions—particularly greenhouse gas emissions, antimicrobial use, waste management, and labour conditions—are often addressed inconsistently (Busch *et al*., 2018; Sebrina *et al*., 2023; Traça *et al*., 2025). This imbalance reinforces the gap between sustainability reporting and effective verification, limiting the capacity of regulators and stakeholders to assess real performance and impacts.

Gaps in Existing Assessment Models: The need for a New Approach

Although sustainability reporting and assessment tools have evolved significantly, structural limitations persist in their ability to provide holistic, comparable, and verifiable evaluations of organisational performance, particularly in complex sectors such as agri-food (Falkenberg *et al*., 2023; Serrentino Ferraro, 2023). Many existing models prioritise environmental performance while marginalising social and economic dimensions, resulting in fragmented assessments that fail to capture interdependencies within the meat value chain (Caccialanza *et al*., 2023b).

Additionally, most assessment frameworks are designed for large corporations with substantial technical and financial resources, rendering them poorly suited to the operational realities of small and medium-sized enterprises (SMEs), which dominate the meat sector (Sebrina *et al*., 2023; Silva *et al*., 2023). This mismatch contributes to the practical exclusion of SMEs from sustainability governance and limits the use of sustainability as a strategic management tool (Waite *et al*., 2024).

A further limitation concerns the overreliance on self-reported data and the absence of systematic verification mechanisms, which undermine the credibility and comparability of reported information (Reilly & Larya, 2018). As a result, sustainability remains, in many cases, a declarative exercise rather than an operational and measurable practice. Bridging the gap between reporting and verification therefore requires assessment models that integrate multidimensional indicators, traceability, and verification logics aligned with due diligence requirements (European Union, 2024).

In response to these gaps, this study proposes the SAGRI model, a multidimensional sustainability assessment framework designed specifically for the meat value chain. By combining the methodological principles of the GRI standards with a verification-oriented and SME-adapted structure, the model aims to transform sustainability assessment into an effective tool for management, compliance, and continuous improvement. Through the integration of environmental, social, economic, and ethical dimensions, SAGRI addresses both conceptual and operational deficiencies in existing frameworks, contributing to a more credible and inclusive sustainability transition in the agri-food sector.

METHODOLOGY

This study adopts a Design Science Research (DSR) methodology, which combines scientific rigour with practical relevance and focuses on the development and validation of artefacts designed to solve real-world problems (Peffers *et al*., 2008). This approach is particularly suitable for the present research, as the objective was not to test theoretical hypotheses but to design an operational, verifiable, and scalable sustainability assessment system applicable to the meat value chain. The methodological process comprised four main stages: (i)

documentary review and indicator mappin, (ii) design and technical structuring of the sustainability assessment model, and (iii) simulated validation of the developed tool.

Documentary Review and Indicator Mapping

The first methodological stage consisted of a structured documentary review of scientific literature, international guidelines, and regulatory instruments relevant to sustainability assessment in the meat value chain. Scientific databases including Elsevier, SCOPUS, and Web of Science were consulted using keywords related to sustainability indicators, meat value chain sustainability, corporate social responsibility, GRI standards, and European regulatory frameworks, notably the Corporate Sustainability Reporting Directive (CSRD) and the Corporate Sustainability Due Diligence Directive (CSDDD). This review also included a normative analysis of key EU policy and regulatory documents related to corporate social responsibility, sustainability reporting, financial disclosures, and due diligence obligations, which were used as contextual and conceptual references to ensure alignment between the SAGRI model and the broader EU sustainability governance architecture (European Commission, 2011, 2021; European Union, 2014, 2019).

The objectives of this stage were to: (i) characterise sustainability challenges across the meat value chain; (ii) identify existing sustainability assessment and certification models; (iii) analyse reporting practices in the meat sector; and (iv) establish a regulatory and normative basis for indicator selection. This process ensured alignment between the proposed model and internationally recognised sustainability standards.

Indicator mapping constituted a core component of this stage. A comparative analysis of the European Sustainability Reporting Standards (ESRS) and the Global Reporting Initiative (GRI) Standards was conducted to identify indicators most relevant to the operational realities of the meat sector. The GRI Standards were selected as the primary reference framework due to their comprehensive coverage of economic, environmental, and social dimensions, intuitive structure, and widespread international adoption (GRI, 2025).

An exhaustive review of the updated GRI Standards, including revisions planned for the 2024–2027 period, was undertaken. Indicator selection followed the materiality principle defined in GRI 3 – Material Topics and was complemented by thematic standards relevant to each sustainability dimension. Priority was given to indicators directly applicable to agricultural, livestock, and fisheries activities, as well as to standards addressing sector-specific challenges in the meat industry.

Several GRI Standards not originally assigned to the agricultural sector (GRI 13) were incorporated to reflect the specific characteristics of the meat value chain. These included standards related to materials use (GRI 301), supplier environmental and social assessment (GRI 308 and 414), employment and training (GRI 401 and 404), diversity and non-discrimination (GRI 405 and 406), customer health and safety (GRI 416), and marketing and labelling (GRI 417). Their inclusion was justified by the intensive use of plastics, the relevance of supplier performance, the prevalence of low-skilled labour, and the importance of transparency across all stages of the value chain.

Indicator selection was informed by the researcher's professional experience in sanitary inspection and evaluation of meat sector establishments, enabling the identification of critical operational practices and control points. To mitigate potential subjectivity, this expert-informed selection was systematically validated against GRI materiality criteria and international sustainability standards.

Additionally, two GRI Standards, 308 and 414, related to the environmental and social assessment of suppliers, respectively, were further refined. Indicators assessing the environmental and social performance of clients were incorporated, aiming to evaluate the sustainability of corporate customers such as slaughterhouses, retailers, and supermarkets. This approach ensures that sustainability considerations extend across the entire value chain and are not interrupted after the production stage. Although such indicators are not explicitly included in the GRI Standards, they were considered essential to capture dimensions not fully addressed by existing international frameworks.

SAGRI Model Design

Based on the documentary review and indicator mapping, the SAGRI (Sustainability Assessment System for Agriculture, Livestock, and Fisheries) model was developed as a technical sustainability assessment and verification tool aligned with the GRI Standards. The model is designed to support both documentary analysis and on-site inspections, enabling verification of consistency between reported information and observed operational practices. SAGRI is not intended to evaluate sustainability reports themselves, but rather to assess the accuracy, coherence, and completeness of the information disclosed therein.

The model was structured using checklists, weighted assessment criteria, and compliance levels, allowing for: (i) evaluation of economic, environmental, and social sustainability dimensions; (ii) automatic calculation of final scores and compliance percentages; and (iii) proportional application according to organisational size. To ensure accessibility and replicability, the model was developed using Microsoft Excel®, enabling systematic data organisation, calculation, and aggregation.

Each assessment unit includes information on the applicable GRI standard, sustainability dimension, evaluation question, verification criteria with assigned weights, and an observation field to justify scoring decisions. Multiple assessment levels were defined to reflect differences between Core and Comprehensive GRI reporting approaches, ensuring that the depth of evaluation corresponds to the scope of reporting. Certain standards require verification through both documentary evidence and on-site inspection, strengthening the robustness and credibility of the assessment.

The standards incorporated into SAGRI were organised by sustainability dimension and include general disclosures, economic indicators (GRI 201–206 and sector-specific indicators from GRI 13), environmental indicators (GRI 301, 302, 303, 305, 306, 308, and relevant sectoral indicators from GRI 13), and social indicators (GRI 401–417 and sector-specific social indicators from GRI 13).

Simulated Validation of the Model

The final methodological stage consisted of a simulated validation aimed at testing the logical consistency, proportionality, and scalability of the SAGRI model. No real companies were assessed at this stage. Instead, scenarios were simulated for large, medium-sized, and small enterprises, each characterised by different levels of indicator applicability.

Scenarios included cases in which all indicators were applicable, as well as cases in which only 40% or 70% of indicators could be assessed due to organisational scale or operational scope. This approach allowed verification that the weighted scoring system produces fair and comparable results regardless of company size. Validation focused on the mathematical coherence of the calculation method, ensuring that final scores are derived from weighted averages adjusted to the total applicable indicators. This procedure confirmed that SAGRI is flexible, proportional, and adaptable to diverse organisational contexts, enabling its application across the meat value chain without penalising smaller enterprises or compromising assessment integrity.

RESULTS

Contextual Findings Supporting Model Development

The documentary review and indicator mapping confirmed a structural deficit in sustainability assessment and reporting within the meat value chain, particularly in the domestic ungulate sector. The Portuguese meat industry is predominantly composed of small and medium-sized enterprises (SMEs), which are generally not subject to mandatory sustainability reporting and rarely adopt structured sustainability management practices. Where sustainability-related actions exist, they are typically isolated, compliance-driven, and weakly integrated into organisational strategy.

The analysis further revealed an almost complete absence of sustainability reports specifically addressing domestic ungulate production, both in Portugal and, to a large extent, at the European

level. Existing reports are limited in number, scope, and analytical depth, with an imbalance favouring environmental and economic indicators and a systematic underrepresentation of social dimensions. Moreover, no sustainability assessment or certification model specifically designed for the meat value chain was identified. Existing tools are either generic, questionnaire-based, or excessively focused on environmental indicators, lacking verification-oriented audit mechanisms and multidimensional integration.

These contextual findings empirically support the need for a sector-specific, verification-based, and proportionate sustainability assessment model aligned with international standards while remaining applicable to SMEs, thereby justifying the development of the SAGRI model presented in next Section.

Proposal for a GRI-Based Inspection and Audit Model (SAGRI)

Model Structure and Certification Logic

Based on the gaps identified, the SAGRI (Sustainability Assessment System) model was developed as a multidimensional sustainability inspection and audit framework specifically adapted to the meat value chain, with transversal applicability to agriculture, forestry, and fisheries. SAGRI was deliberately named to preserve its original Portuguese acronym (*Sistema de Avaliação da Sustentabilidade*), while simultaneously maintaining a direct conceptual association with the Global Reporting Initiative (GRI), reinforcing its normative alignment (Figure 1).

Figure 1 - Logo and proposed visual identity for the SAGRI Model.

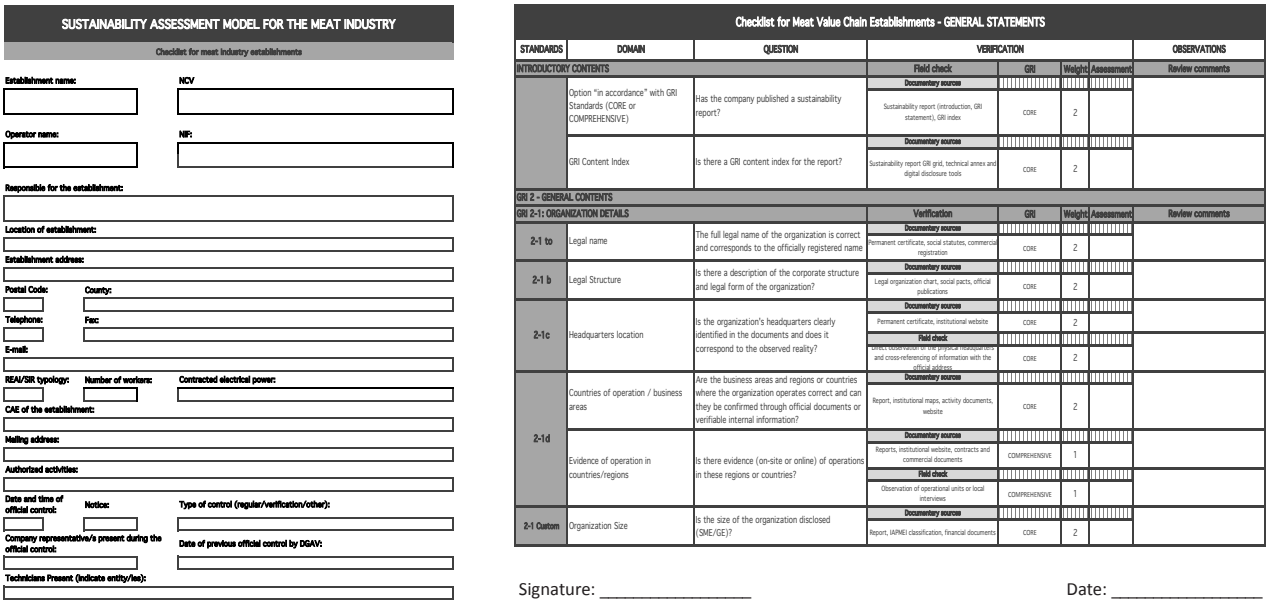
To enhance transparency, recognition, and operational usability, the model incorporates a dedicated visual identity and a certification system comprising two compliance levels—Core and Comprehensive—allowing differentiation of sustainability performance while maintaining consistency with GRI reporting logic (Figure 2).

Figure 2 - Proposed certification seals for the SAGRI Model - CORE and COMPREHENSIVE.

The model emphasises rigorous diagnostic procedures aimed at promoting sustainable, transparent, and comparable practices, with the primary objective of verifying the consistency between reported information and actual practices observed on-site. SAGRI is explicitly conceived as a verification and auditing tool, rather than a reporting instrument. Its primary objective is to verify the coherence between sustainability information disclosed by organisations and actual operational practices observed on-site. The model requires extensive documentary evidence across financial, human resources, legal compliance, and sustainability domains, complemented by direct observation during inspections.

The system was developed in Excel® to ensure accessibility, replicability, and ease of updating in response to revisions of the GRI standards. Its structure comprises seven worksheets, including an inspection guide, document request list, company identification cover, GRI-aligned verification checklists, and automated scoring and certification outputs. The core verification structure, including the checklist layout and assessment logic, is illustrated in Figure 3.

The indicators and standards used are detailed in the Methodology. The seventh worksheet, *"Assessment"*, explains how scores are assigned and compliance percentages calculated, and presents the consolidation of final results, including overall,



SUSTAINABILITY ASSESSMENT MODEL FOR THE MEAT INDUSTRY

Checklist for meat industry establishments

Establishment name: NCV

Operator name: NIF:

Responsible for the establishment:

Location of establishment:

Establishment address:

Postal Code: County:

Telephone: Fax:

E-mail:

REAI/SIR typology: Number of workers: Contracted electrical power:

CAE of the establishment:

Mailing address:

Authorized activities:

Date and time of official control: Notice: Type of control (regular/verification/other):

Company representative/s present during the official control: Date of previous official control by DGAV:

Technicians Present (indicate entity/ies):

Checklist for Meat Value Chain Establishments - GENERAL STATEMENTS

STANDARDS	DOMAIN	QUESTION	VERIFICATION				OBSERVATIONS
INTRODUCTORY CONTENTS			Field check	GRI	Weight	Assessment	Review comments
	Option "in accordance" with GRI Standards (CORE or COMPREHENSIVE)	Has the company published a sustainability report?	Documentary sources: Sustainability report (introduction, GRI statement), GRI index	CORE	2		
	GRI Content Index	Is there a GRI content index for the report?	Documentary sources: Sustainability report GRI grid, technical annex and digital disclosure tools	CORE	2		
GRI 2 - GENERAL CONTENTS							
GRI 2-1: ORGANIZATION DETAILS			Verification	GRI	Weight	Assessment	Review comments
2-1 to	Legal name	The full legal name of the organization is correct and corresponds to the officially registered name	Documentary sources: Permanent certificate, social statutes, commercial registration	CORE	2		
2-1 b	Legal Structure	Is there a description of the corporate structure and legal form of the organization?	Documentary sources: Legal organization chart, social pacts, official publications	CORE	2		
2-1c	Headquarters location	Is the organization's headquarters clearly identified in the documents and does it correspond to the observed reality?	Documentary sources: Permanent certificate, institutional website	CORE	2		
			Field check: direct observation of the physical headquarters and cross-referencing of information with the official address	CORE	2		
2-1d	Countries of operation / business areas	Are the business areas and regions or countries where the organization operates correct and can they be confirmed through official documents or verifiable internal information?	Documentary sources: Report, institutional maps, activity documents, website	CORE	2		
	Evidence of operation in countries/regions	Is there evidence (on-site or online) of operations in these regions or countries?	Documentary sources: Reports, institutional website, contracts and commercial documents	COMPREHENSIVE	1		
			Field check: Observation of operational units or local interviews	COMPREHENSIVE	1		
2-1 Custom	Organization Size	Is the size of the organization disclosed (SME/GE)?	Documentary sources: Report, IAPMEI classification, financial documents	CORE	2		

Signature: _____ Date: _____

Figure 3 - SAGRI verification and assessment structure: cover and first page of the checklists, from a total of 83 pages.

environmental, social, and economic percentages, as well as the criteria for awarding certification (Core, Comprehensive, or Not Certified).

The full PDF version of the model comprises 100 pages, reflecting the inclusion of operational guidance, verification grids, scoring logic, and certification criteria. In total, the model allocates 2,062 points across weighted indicators, with emphasis on environmental (45.9%) and social (32.6%) dimensions, compared to economic indicators (6.8%), reflecting sustainability priorities within the meat value chain.

Assessment, Scoring, and Audit Mechanisms

The SAGRI assessment methodology is structured around three complementary pillars: (i) structured self-assessment combined with independent external audit; (ii) integration of sustainability reports aligned with the GRI Universal Standards; and (iii) evidence-based on-site verification.

Assessment is conducted through documentary analysis and direct observation, supported by mandatory evidence submission as defined in the "Document List" worksheet. Indicators are classified into three hierarchical levels reflecting their relevance to sustainability performance and due diligence requirements:

- Critical indicators (3 points): non-negotiable sustainability requirements. Full compliance (100%) is mandatory; failure to comply with any critical indicator automatically precludes certification.
- Core indicators (2 points): essential GRI-based requirements. A minimum compliance threshold of 90%, in addition to full compliance with all critical indicators, is required for Core Certification.
- Comprehensive indicators (1 point): voluntary best-practice indicators enabling recognition of excellence, provided all critical and core requirements are met.

Table 1 - Summary of the Scoring System

Level	Points	Mandatory Status	Impact on Certification
Critical	3	Essential, cannot be disregarded	100% compliance required; blocks certification if incomplete
Core	2	Mandatory	Enables **Core Certification** if Core > 90% and Critical = 100%
Comprehensive	1	Optional, value-added	Enables **Comprehensive Certification** if Critical = 100%, Core > 90% and Comprehensive > 50%

Sustainability Assessment of GRI (1)

EVALUATION OF RESULTS

1. Assessment Weights

Type of Indicator	Weight	Interpretive Meaning
Critical (priority)*	3	Vital for robust assessment
Essential	2	Mandatory for all GRI reports, even at the basic level
Comprehensive	1	Only required for more complete reports

*Critical indicators that, despite differentiation, will not be applied by the GRI, are defined by risk or regulatory requirements (e.g. emissions, hazardous waste, legal compliance, suppliers).

Assessment Level	Description	Points awarded
Fully fulfilled	The information is present and detailed according to the type of indicator	Receives the total weight of the type (1, 2 or 3)
Partial compliance	Information is present but incomplete or unclear	Receives 50% of the weight of the type (1, 2 or 3)
Omission	Missing, unjustified, or contradictory information	Receive 0 points

2. How the percentage calculation (%) works:

1. Total check weights: Sum of all model indicator weights (fixed value)

2. Validated Weights: Adds only the weights of the indicators that apply to the company (assessed indicators)*.

3. Percentage of the report: corresponds to the percentage of the indicators evaluated.

4. Total count: Sum of all assessments carried out by the inspector.

5. Percentage of Compliance: corresponds to the result of the evaluation in proportion to the indicators evaluated*.

3. Selection list percentage (%) results

Total check weights:	2062		
Total validated weights*	2062	TOTAL count:	0
Total percentage of the report that applies (%):	100,0%	TOTAL compliance percentage (%)**:	0,0%

PREREQUISITES	Critical				Core				Comprehensive				TOTAL		
	Total weight	Weight	Assessment	%	Total weight	Weight	Assessment	%	Total weight	Weight	Assessment	%	Weight	Assessment	%
#General	63	63	0	0%	208	208	0	0%	33	33	0	0%	304	0	0,00%
#Economic	45	45	0	0%	66	66	0	0%	29	29	0	0%	140	0	0,00%
#Environmental	372	372	0	0%	464	464	0	0%	109	109	0	0%	945	0	0,00%
#Social	333	333	0	0%	266	266	0	0%	74	74	0	0%	673	0	0,00%
TOTAL	813	813	0	0%	1004	1004	0	0%	245	245	0	0%	2062	0	
% OF THE TOTAL	0,0%				0,0%				0,0%				0,0%		

** = to the total compliance percentage

4. Final analysis (interpretation)

NOT CERTIFIED	CERTIFICATION CORE	COMPREHENSIVE CERTIFICATION
Insufficient (unreliable) results	Partial compliance	High compliance
Total review % below 100% (red)	Total critical % at 100% (green)	Total critical % at 100% (green)
	Total core % above 90% (green)	Total core % above 90% (green)
	Total % of comprehensive below 50% (red)	Total % of comprehensive above 50% (green)

Assessment weight	% critical	% to achieve	% essential	% critical + core	Minimum % to reach core	Minimum % to hit critical + core	% comprehensive	% critical + essential + comprehensive	Minimum % of comprehensive to be achieved	Minimum % to reach the total
	39,40%	39.4% (100%)	48,70%	88,10%	43.8% (90%)	83,20%	11,90%	100,00%	5.95% (50%)	89,15

**** Note: even if the total % is greater than 83.2% or 89.15%, the minimum criteria for each level (Critical, Basic, Comprehensive) must be met.**

5. Observations

Signature: _____ Date: _____

Figure 4 - Summary of the Final Assessment and Certification Criteria of the SAGRI Model (Pages 99 and 100).

This hierarchical structure, summarised in Table 1, ensures that high overall compliance percentages cannot compensate for the absence of essential sustainability practices, while still rewarding organisations that exceed minimum requirements.

Analysis of the Assessment and Reporting Results

Final compliance percentages are calculated using a weighted proportionality formula that adjusts for non-applicable criteria, ensuring equitable assessment across organisations of different sizes:

Compliance (%) = (Sum of Validated Weights / Sum of Applicable Weights) × 100

For SMEs, indicators deemed not applicable may be assigned a weight of zero, without penalising the organisation or compromising comparability. Mandatory observation fields ensure traceability and transparency, particularly where criteria are classified as incomplete or non-applicable. The model defines three certification outcomes—Non-certified, Core Certified, and Comprehensive Certified—each aligned with GRI standards and operationalising key due diligence obligations under Directive (EU) 2024/1760. The final assessment output, including certification thresholds and dimension-specific results, is illustrated in Figure 4.

VALIDATION AND APPLICATION SCENARIO

This section presents the validation and application scenario of the SAGRI model, with the objective of demonstrating its practical applicability, methodological robustness, and operational coherence across different organisational contexts within the meat sector. Validation focused on assessing the consistency of the weighting system, the adequacy of minimum performance thresholds, and the reliability of the certification criteria, ensuring that the model is appropriately calibrated to the structural and operational diversity of the sector.

The final stage of model application consisted of a series of controlled simulations conducted on fictitious companies of different sizes: large, medium-sized, and small enterprises. This approach enabled the verification of calculation logic, proportionality mechanisms, and classification outcomes, while avoiding the use of real company data at this stage of model development. Such a simulation-based validation approach is consistent with Design Science Research principles and is commonly adopted in the early validation of regulatory and assessment frameworks.

Simulation Results: Company A (100% applicability) versus Company B (≈69%)

To test the model's behaviour under different organisational conditions, two representative business profiles were defined: Profile A, corresponding to a large enterprise with full applicability of all indicators (100%), and Profile B, representing a smaller enterprise for which only approximately 69% of the indicators were applicable. This differentiation reflects differences in scale and operational scope rather than deficiencies in management performance and allows assessment of the proportionality principle embedded in the model.

In the first simulation, SAGRI was applied to a fictitious large enterprise in which the full set of 2,062 points was assessed. The results confirmed the correct functioning of the calculation procedures, the internal coherence of the assigned weights, and the absence of computational inconsistencies (Figure 5).

Subsequently, different certification scenarios were simulated. When Critical indicators were met at 100% and Core indicators exceeded the minimum compliance threshold of 90%, but Comprehensive indicators failed to reach 50%, the model correctly assigned Core Certification (Figure 6). When all minimum thresholds were met across the three indicator categories, Comprehensive Certification was awarded (Figure 7).

The simulations further confirmed the filtering function of the model. Scenarios involving non-compliance with Critical indicators resulted automatically in non-certification, regardless of high overall compliance levels (Figure 8). Similarly, failure to achieve the minimum threshold for Core indicators precluded certification, even where Comprehensive indicators showed high compliance (Figure 9). These results validate the hierarchical structure of the indicator system and its correct operationalisation.

EVALUATION OF RESULTS

1. Assessment Weights

Type of Indicator	Weight	Interpretive Meaning
Critical (priority)*	3	Vital for robust assessment
Essential	2	Mandatory for all GRI reports, even at the basic level
Comprehensive	1	Only required for more complete reports

*Critical indicators that, despite differentiation, will not be applied by the GRI, are defined by risk or regulatory requirements (e.g. emissions, hazardous waste, legal compliance, suppliers).

Assessment Level	Description	Points awarded
Fully fulfilled	The information is present and detailed according to the type of indicator	Receives the total weight of the type (1, 2 or 3)
Partial compliance	Information is present but incomplete or unclear	Receives 50% of the weight of the type (1, 2 or 3)
Omission	Missing, unjustified, or contradictory information	Receive 0 points

2. How the percentage calculation (%) works:

1. Total check weights: Sum of all model indicator weights (fixed value)

2. Validated Weights: Adds only the weights of the indicators that apply to the company (assessed indicators)*.

3. Percentage of the report: corresponds to the percentage of the indicators evaluated.

4. Total count: Sum of all assessments carried out by the inspector.

5. Percentage of Compliance: corresponds to the result of the evaluation in proportion to the indicators evaluated*.

3. Selection list percentage (%) results

Total check weights:	2062		
Total validated weights*	2062	TOTAL count:	1296
Total percentage of the report that applies (%):	100,0%	TOTAL compliance percentage (%)**:	100,0%

PREREQUISITES	Critical				Core				Comprehensive				TOTAL		
	Total weight	Weight	Assessment	%	Total weight	Weight	Assessment	%	Total weight	Weight	Assessment	%	Weight	Assessment	%
#General	63	63	63	100%	208	208	208	100%	33	33	33	100%	208	208	100%
#Economic	45	45	45	100%	66	66	66	100%	29	29	29	100%	86	86	100%
#Environmental	372	372	372	100%	464	464	464	100%	109	109	109	100%	623	623	100%
#Social	333	333	333	100%	266	266	266	100%	74	74	74	100%	520	520	100%
TOTAL	813	813	813	100%	1004	1004	1004	100%	245	245	245	100%	2062	2062	
% OF THE TOTAL	39,40%				43,80%				11,90%				100,0%		

** = to the total compliance percentage

4. Final analysis (interpretation)

NOT CERTIFIED	CERTIFICATION CORE	COMPREHENSIVE CERTIFICATION
Insufficient (unreliable) results	Partial compliance	High compliance
Total review % below 100% (red)	Total critical % at 100% (green)	Total critical % at 100% (green)
	Total core % above 90% (green)	Total core % above 90% (green)
	Total % of comprehensive below 50% (red)	Total % of comprehensive above 50% (green)

Assessment weight	% critical	% to achieve	% essential	% critical + core	Minimum % to reach core	Minimum % to hit critical + core	% comprehensive	% critical + essential + comprehensive	Minimum % of comprehensive to be achieved	Minimum % to reach the total
	39,40%	39.4% (100%)	48,70%	88,10%	43.8% (90%)	83,20%	11,90%	100,00%	5.95% (50%)	89,15

** Note: even if the total % is greater than 83.2% or 89.15%, the minimum criteria for each level (Critical, Basic, Comprehensive) must be met.

5. Observations

ALL ASSESSMENTS VALIDATED

Signature: _____ Date: _____

Figure 5 - Applicability of indicators to large companies (full score coverage)

3. Selection list percentage (%) results

Total check weights:	2062		
Total validated weights*	2062	TOTAL count:	1866
Total percentage of the report that applies (%):	100,0%	TOTAL compliance percentage (%)**:	90,5%

PREREQUISITES	Critical				Core				Comprehensive				TOTAL		
	Total weight	Weight	Assessment	%	Total weight	Weight	Assessment	%	Total weight	Weight	Assessment	%	Weight	Assessment	%
#General	63	63	63	100%	208	208	196	94%	33	33	15	45%	304	274	90,13%
#Economic	45	45	45	100%	66	66	62	94%	29	29	15	52%	140	122	87,14%
#Environmental	372	372	372	100%	464	464	430	93%	109	109	50	46%	945	852	90,16%
#Social	333	333	333	100%	266	266	250	94%	74	74	35	47%	673	618	91,83%
TOTAL	813	813	813	100%	1004	1004	938	93%	245	245	115	47%	2062	1866	
% OF THE TOTAL	39,40%				45,50%				5,60%				90,5%		

** = to the total compliance percentage

Figure 6 - Simulation results where "comprehensive" indicators are not met (large company): CORE Certification.

3. Selection list percentage (%) results

Total check weights:	2062		
Total validated weights*	2062	TOTAL count:	1875
Total percentage of the report that applies (%):	100,0%	TOTAL compliance percentage (%)**:	90,9%

PREREQUISITES	Critical				Core				Comprehensive				TOTAL		
	Total weight	Weight	Assessment	%	Total weight	Weight	Assessment	%	Total weight	Weight	Assessment	%	Weight	Assessment	%
#General	63	63	63	100%	208	208	196	94%	33	33	24	73%	304	283	93,09%
#Economic	45	45	45	100%	66	66	62	94%	29	29	15	52%	140	122	87,14%
#Environmental	372	372	372	100%	464	464	430	93%	109	109	50	46%	945	852	90,16%
#Social	333	333	333	100%	266	266	250	94%	74	74	35	47%	673	618	91,83%
TOTAL	813	813	813	100%	1004	1004	938	93%	245	245	124	51%	2062	1875	
% OF THE TOTAL	39,40%				45,50%				6,00%				90,9%		

** = to the total compliance percentage

Figure 7 - Simulation results where minimum requirements for all indicators are met (large company): COMPREHENSIVE Certification.

3. Selection list percentage (%) results

Total check weights:	2062		
Total validated weights*	2062	TOTAL count:	1869
Total percentage of the report that applies (%):	100,0%	TOTAL compliance percentage (%)**:	90,6%

PREREQUISITES	Critical				Core				Comprehensive				TOTAL		
	Total weight	Weight	Assessment	%	Total weight	Weight	Assessment	%	Total weight	Weight	Assessment	%	Weight	Assessment	%
#General	63	63	63	100%	208	208	196	94%	33	33	24	73%	304	283	93,09%
#Economic	45	45	45	100%	66	66	62	94%	29	29	15	52%	140	122	87,14%
#Environmental	372	372	366	98%	464	464	430	93%	109	109	50	46%	945	846	89,52%
#Social	333	333	333	100%	266	266	250	94%	74	74	35	47%	673	618	91,83%
TOTAL	813	813	807	99%	1004	1004	938	93%	245	245	124	51%	2062	1869	
% OF THE TOTAL	39,10%				45,50%				6,00%				90,6%		

** = to the total compliance percentage

Figure 8 - Simulation results where "critical" indicators are not met (large company): NON-CERTIFIED company.

3. Selection list percentage (%) results

Total check weights:	2062		
Total validated weights*	2062	TOTAL count:	1869
Total percentage of the report that applies (%):	100,0%	TOTAL compliance percentage (%)**:	90,6%

PREREQUISITES	Critical				Core				Comprehensive				TOTAL		
	Total weight	Weight	Assessment	%	Total weight	Weight	Assessment	%	Total weight	Weight	Assessment	%	Weight	Assessment	%
#General	63	63	63	100%	208	208	196	94%	33	33	24	73%	304	283	93,09%
#Economic	45	45	45	100%	66	66	62	94%	29	29	15	52%	140	122	87,14%
#Environmental	372	372	372	100%	464	464	398	86%	109	109	50	46%	945	820	89,52%
#Social	333	333	333	100%	266	266	230	86%	74	74	35	47%	673	598	91,83%
TOTAL	813	813	807	100%	1004	1004	886	88%	245	245	124	51%	2062	1823	
% OF THE TOTAL	39,40%				43,00%				6,00%				88,4%		

** = to the total compliance percentage

Figure 9 - Simulation results where "core" indicators are not met, regardless of minimum compliance with "comprehensive" indicators (large company): NON-CERTIFIED company.

The same simulation logic was subsequently applied to a fictitious medium-sized enterprise (Profile B), for which only 69.7% of the indicators were applicable, resulting in a reduced assessment total of 1,437 points (Figure 10). In these cases, minimum thresholds were automatically recalculated on a proportional basis, considering only the applicable indicators, thereby ensuring equitable assessment and comparability across organisations of different sizes.

For small and medium-sized enterprises, additional scenarios were simulated, including Core Certification, Comprehensive Certification, and non-certification, resulting either from non-compliance with Critical indicators or from failure to meet Core indicator thresholds (Figures 11 to 14). In all cases, the model produced consistent and predictable outcomes, confirming its robustness and scalability.

3. Selection list percentage (%) results

Total check weights:	2062		
Total validated weights*	1437	TOTAL count:	1437
Total percentage of the report that applies (%):	69,7%	TOTAL compliance percentage (%)**:	100,0%

PREREQUISITES	Critical				Core				Comprehensive				TOTAL		
	Total weight	Weight	Assessment	%	Total weight	Weight	Assessment	%	Total weight	Weight	Assessment	%	Weight	Assessment	%
#General	63	48	48	100%	208	150	150	100%	33	10	10	100%	208	208	100,00%
#Economic	45	39	39	100%	66	40	40	100%	29	7	7	100%	86	86	100,00%
#Environmental	372	297	297	100%	464	298	298	100%	109	28	28	100%	623	623	100,00%
#Social	333	303	303	100%	266	212	212	100%	74	5	5	100%	520	520	100,00%
TOTAL	813	687	687	100%	1004	700	700	100%	245	50	50	100%	1437	1437	
% OF THE TOTAL	39,40%				48,70%				11,95%				100,0%		

** = to the total compliance percentage

Figure 10 - Indicator applicability to SMEs: full compliance despite not covering the entire indicator set (only 69.7% assessed).

3. Selection list percentage (%) results

Total check weights:	2062		
Total validated weights*	1437	TOTAL count:	1370
Total percentage of the report that applies (%):	69,7%	TOTAL compliance percentage (%)**:	95,3%

PREREQUISITES	Critical				Core				Comprehensive				TOTAL		
	Total weight	Weight	Assessment	%	Total weight	Weight	Assessment	%	Total weight	Weight	Assessment	%	Weight	Assessment	%
#General	63	48	48	100%	208	150	150	100%	33	10	3	30%	208	201	96,63%
#Economic	45	39	39	100%	66	40	40	100%	29	7	1	14%	86	80	93,02%
#Environmental	372	297	297	100%	464	298	278	93%	109	28	12	43%	623	587	94,22%
#Social	333	303	303	100%	266	212	198	93%	74	5	1	20%	520	502	96,54%
TOTAL	813	687	687	100%	1004	700	666	95%	245	50	17	34%	1437	1370	
% OF THE TOTAL	39,40%				46,30%				4,00%				95,3%		

** = to the total compliance percentage

Figure 11 - Simulation results where "comprehensive" indicators are not met (SMEs): CORE Certification.

3. Selection list percentage (%) results

Total check weights:	2062		
Total validated weights*	1437	TOTAL count:	1384
Total percentage of the report that applies (%):	69,7%	TOTAL compliance percentage (%)**:	96,3%

PREREQUISITES	Critical				Core				Comprehensive				TOTAL		
	Total weight	Weight	Assessment	%	Total weight	Weight	Assessment	%	Total weight	Weight	Assessment	%	Weight	Assessment	%
#General	63	48	48	100%	208	150	150	100%	33	10	5	50%	208	203	97,60%
#Economic	45	39	39	100%	66	40	40	100%	29	7	3	43%	86	82	95,35%
#Environmental	372	297	297	100%	464	298	278	93%	109	28	20	71%	623	595	95,51%
#Social	333	303	303	100%	266	212	198	93%	74	5	3	60%	520	504	96,92%
TOTAL	813	687	687	100%	1004	700	666	95%	245	50	31	62%	1437	1384	
% OF THE TOTAL	39,40%				46,30%				7,40%				96,3%		

** = to the total compliance percentage

Figure 12 - Simulation results where minimum requirements for all indicators are met (SMEs): COMPREHENSIVE Certification.

3. Selection list percentage (%) results

Total check weights:	2062		
Total validated weights*	1437	TOTAL count:	1356
Total percentage of the report that applies (%):	69,7%	TOTAL compliance percentage (%)**:	94,4%

PREREQUISITES	Critical				Core				Comprehensive				TOTAL		
	Total weight	Weight	Assessment	%	Total weight	Weight	Assessment	%	Total weight	Weight	Assessment	%	Weight	Assessment	%
#General	63	48	48	100%	208	150	148	99%	33	10	5	50%	208	201	96,63%
#Economic	45	39	39	100%	66	40	36	90%	29	7	1	14%	86	76	88,37%
#Environmental	372	297	297	100%	464	298	262	88%	109	28	18	64%	623	577	96,62%
#Social	333	303	297	98%	266	212	202	95%	74	5	3	60%	520	502	96,54%
TOTAL	813	687	681	99%	1004	700	648	93%	245	50	31	54%	1437	1356	
% OF THE TOTAL	39,10%				45,10%				6,40%				94,4%		

** = to the total compliance percentage

Figure 13 - Simulation results where "critical" indicators are not met (SMEs): NON-CERTIFIED company.

3. Selection list percentage (%) results

Total check weights:	2062		
Total validated weights*	1437	TOTAL count:	1296
Total percentage of the report that applies (%):	69,7%	TOTAL compliance percentage (%)**:	90,2%

PREREQUISITES	Critical				Core				Comprehensive				TOTAL		
	Total weight	Weight	Assessment	%	Total weight	Weight	Assessment	%	Total weight	Weight	Assessment	%	Weight	Assessment	%
#General	63	48	48	100%	208	150	130	87%	33	10	5	50%	208	183	87,98%
#Economic	45	39	39	100%	66	40	32	80%	29	7	1	14%	86	72	83,72%
#Environmental	372	297	297	100%	464	298	242	81%	109	28	18	64%	623	557	89,41%
#Social	333	303	303	100%	266	212	178	84%	74	5	3	60%	520	484	93,08%
TOTAL	813	687	687	100%	1004	700	582	83%	245	50	31	54%	1437	1296	
% OF THE TOTAL	39,40%				40,50%				6,40%				90,2%		

** = to the total compliance percentage

Figure 14 - Simulation results where "core" indicators are not met, regardless of minimum compliance with "comprehensive" indicators (SMEs): NON-CERTIFIED company.

Overall, the simulation exercise demonstrated the model's capacity to differentiate levels of sustainability performance, automatically identify non-compliance situations, and support technically sound certification decisions.

Summary of Indicator Applicability and Certification Outcomes

Table 2 summarises the results of the simulation tests, presenting the applicability percentages of

Table 2 - Results of model testing in large, medium-sized and small enterprises

Test	Critical (100%)	Core (% minimum)	Comprehensive (% minimum)	Result
1	Fulfilled	> 43,8% (>90%)	> 5,95% (> 50%)	Comprehensive Certification
2	Fulfilled	> 43,8% (>90%)	Not fulfilled	Core Certification
3	Fulfilled	Not fulfilled	> 5,95% (> 50%)	non-certified
4	Not fulfilled	> 43,8% (>90%)	> 5,95% (> 50%)	non-certified

SAGRI indicators across the three sustainability dimensions—economic, environmental, and social—for enterprises of different sizes, in accordance with the minimum thresholds established for Critical, Core, and Comprehensive indicators.

Test 1 represents the optimal scenario, in which Critical indicators were fulfilled at 100%, Core indicators exceeded the minimum compliance threshold, and Comprehensive indicators achieved more than 50% compliance. In this case, the system correctly awarded Comprehensive Certification, confirming the expected functioning of the certification filters.

In Test 2, Critical indicators were fully met and Core indicators exceeded the minimum threshold, but Comprehensive indicators did not reach the required level. The model appropriately classified this scenario as Core Certification, demonstrating its ability to distinguish between levels of sustainability performance.

Test 3 illustrates a scenario in which, despite full compliance with Critical indicators, the minimum threshold for Core indicators was not achieved, even though Comprehensive indicators exceeded 50%. In this case, certification was not awarded, confirming the hierarchical priority of Core indicators in the certification logic.

Finally, Test 4 simulates a situation in which Critical indicators were not fulfilled, despite high compliance levels in the remaining indicator categories. As expected, the model did not award certification, confirming that compliance with Critical indicators constitutes a mandatory precondition for any level of certification.

DISCUSSION

Building on the validation results presented, this section discusses the main theoretical, practical and policy-related contributions of the SAGRI model. The proposed framework addresses critical gaps identified in both the academic literature and current business practices within the meat sector, namely the predominance of declarative sustainability reporting tools and the absence of systematic verification mechanisms.

One of the key differentiating features of SAGRI lies in its alignment with the GRI standards while operationalising them through a structured inspection and audit model. Unlike conventional reporting frameworks—such as GRI and CSRD—that prioritise disclosure and transparency, SAGRI translates sustainability principles into verifiable requirements supported by documentary evidence and on-site validation. This approach significantly reduces the risk of greenwashing and enhances the credibility and traceability of sustainability information.

A further innovation concerns the extension of value-chain accountability. By operationalising GRI 308 and GRI 414 beyond suppliers to include clients, SAGRI ensures continuity of sustainability assessment throughout the entire value chain, from production to distribution. This feature distinguishes the model from existing frameworks, including BIA-Sustainability, which tend to focus primarily on environmental practices and lack sector-specific audit mechanisms.

From a practical perspective, SAGRI was explicitly designed to address the structural asymmetries

between large enterprises and SMEs. Through proportional thresholds, non-applicability mechanisms and phased certification pathways, the model avoids the systematic exclusion of smaller operators, which dominate the meat sector. This proportional design enhances feasibility and fairness while preserving audit robustness.

The discussion also highlights a strategic implementation pathway whereby certification is initially targeted at large companies, which possess greater technical and financial capacity and exert leverage over value chains. Their early adoption of SAGRI may generate a cascading effect, facilitating the progressive integration of SMEs into certified value chains through reduced administrative burden and shared compliance structures.

Finally, the weighting structure of SAGRI assigns greater relative importance to environmental and social indicators than to purely economic ones, reflecting the specific sustainability pressures associated with the meat sector, including emissions, animal welfare, resource use and labour conditions. Overall, SAGRI constitutes a multidimensional, verifiable and sector-specific sustainability framework that bridges the gap between reporting and due diligence, reinforcing transparency, comparability and accountability within the meat industry.

Suggestions for Future Research

Future research should prioritise empirical validation of the SAGRI model through its application to real companies across different segments of the meat value chain. Comparative analyses of sustainability reports published at the European level are also recommended, with a focus on identifying convergences, omissions and dominant indicators across environmental, social and economic dimensions.

Given the limited effectiveness of extensive questionnaires observed during this research, qualitative approaches—such as semi-structured interviews and on-site engagement with sector stakeholders—are considered more suitable for collecting reliable and context-rich data. The use of qualitative and multivariate analysis tools may further support the identification of best practices and structural weaknesses within sectoral sustainability reporting.

POLICY AND PRACTICAL IMPLICATIONS

The adoption of SAGRI by European Union Member States would provide a harmonised and technically robust framework to support sustainability audits within the agri-food sector. The model may function as a complementary enforcement instrument for the CSRD and the Corporate Sustainability Due Diligence Directive, translating disclosure obligations into verifiable compliance processes. By integrating on-site audits and independent verification, SAGRI enhances the operationalisation of EU sustainability policies, including those underpinning the European Green Deal and climate neutrality objectives. Its proportional design supports a just transition for SMEs, allowing audit requirements to be adapted to organisational capacity while preserving regulatory coherence.

From a normative perspective, the model also highlights limitations in the current GRI framework, particularly the absence of mechanisms to assess sustainability impacts on the client side of value chains. Based on the SAGRI structure, future revisions of GRI 308 and GRI 414 could consider extending their scope to include supplier–client relationships, thereby strengthening traceability and value-chain accountability.

CONCLUSIONS

This study proposed and validated SAGRI, a sustainability assessment and certification model specifically designed for the meat value chain and aligned with the GRI standards. By combining documentary verification with on-site audit mechanisms, the model advances beyond declarative reporting and contributes to strengthening the credibility and operational relevance of sustainability governance in the sector.

Although empirical application in real business contexts remains a limitation at this stage, SAGRI

represents a decisive step towards the development of a robust, verifiable and scalable certification system. Its modular structure enables replication across other agri-food sectors, reinforcing its transversal potential.

Future empirical validation will be essential to consolidate the model, refine its indicators and support its broader adoption as a reference framework for promoting a more sustainable, ethical and competitive agri-food system.

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