

The Sustainability of Meat and Cured Meat Supply Chain: Where Are we Now?



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1 Introduction

The world's growing population (United Nations, 2021) is forcing a progressive increase in attention to the ability to meet food demand in order to assure food to 9,7 billion of people in 2050 (FAO, 2018). Food production and consumption will also have to face with the responsible use of environmental and economic resources (European Commission, 2020; Hilborn et al., 2018; Sala et al., 2017), as well as socially equitable distribution of impacts on local communities. In addition, diets play a crucial role for the nutritional and health dimension (Green et al., 2020; Mele et al., 2015), while preserving cultural and local traditions (Atkins and Bowler, 2016). Prior analysis described the key role played by agricultural step of food production (ALTIS, 2021a) or for the final stage of distribution and consumption (ALTIS, 2021b; BEUC, 2022). This chapter will focus mainly on the transformation phase of one of the most diffused protein sources.

Protein sources represent a well-known pillar for a balanced diet, even though not fairly distributed in different continent and regions (Macdiarmid et al., 2021). Europe has the leadership in terms of proteins per-capita consumption of protein per year (Henchion et al., 2021). In Western countries, diet composition meat and

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cured meat products represent a significant part of protein sources (WHO, 2020), while the cultural determinants in meat consumption change over different areas (Mathijs, 2015; Nam et al., 2010).

Sustainability of the meat and cured meat supply chain is growing attention of consumers (Cappelli et al., 2020; Tait et al., 2016) (see for more details Chapter “Managing Generational Handover in Family Business: Some Case Studies in the Charcuterie Factories”), companies, research centres and policymakers, especially from an environmental perspective and in the context of growing concerns regarding human and animal welfare (see for more detail Chapter “Animal Welfare in Swine Production”). Numerous scientific studies (Cesari et al., 2017; Clark et al., 2019; Djekic and Tomasevic, 2016; Tukker et al., 2011) and surveys carried out by interest groups (Carni sostenibili, 2016; Greenpeace Italy, 2020; Demetra – Lav, 2021; Nomisma, 2020; WWF, 2021) (see for more details also Chapter “Generation Z and Sustainable Cured Meat Consumption: Educational Challenges and Pedagogical Perspectives”) have examined the environmental, health and welfare impacts (Godfray et al., 2018; Mele et al., 2015).

Recently, the EAT-Lancet Commission (Willett et al., 2019) concluded that the *‘Great Food Transformation will only be achieved through widespread, multisector, multilevel action that includes a substantial global shift towards healthy dietary patterns, large reductions in food loss and waste, and major improvements in food production practices’*.

This awareness calls for a sense of urgency in understanding what changes are taking place in the strategic orientation of companies operating in this sector. A better understanding of the dynamics of increased awareness, monitoring and disclosure areas is the central.

While the previous chapter analysed disclosure propensities in the broader context of the Italian agribusiness, this section of the book will explore individual areas and topics of analysis related to managerial practices.

As anticipated priorly in other contributions, the meat supply chain consists of three macro-levels of analysis that traditionally coincide with the breeding, slaughtering and processing, distribution and consumption phases (Taylor, 2005). This contribution aims to highlight, with an exploratory study, the central phase of this chain, playing the role of link between the livestock farm and the final consumer.

The main goal of this chapter is the investigation on the diffusion of sustainability practices and accountability principles at the transformation tier of meat and cured Italian meat supply chain.

The Italian context is of interest precisely because it belongs to the European area—with high-content protein diets (Henchion et al., 2021; IPCC, 2019)—and has a limited level of direct environmental and social impact compared to other areas, as well as encompassing 49 Protected Designation of Origin (PDO) and Protected Geographical Indication (PGI) meat products (ISMEA – Qualivita, 2022; e-Ambrosia – European Commission, 2022).

Literature shows how the attribution of environmental impacts in the meat supply chain in Italy is a complex issue. Analyses of the positive evolution of feed conversion indices suggest an increasing efficiency of feed (Assalzo, 2021) and a

greater overall sustainability of feed, especially for the protein part (FEFAC, 2021). The concomitant decrease in the use of antibiotics suggests an improvement in animal welfare conditions and standards (European Commission, 2022), while the analysis on the impacts of carbon emissions attributes only 7.1% to the agricultural sector, of which just over 5% to livestock farming (ISPRA, 2021). This ‘over performance’ of the Italian context would suggest a better propensity to communicate results and an overall better accountability.

On the other hand, studies on social impacts of meat farming and processing activities produce outcomes that are not always comparable (Aranda et al., 2021). This prevents the possibility of carrying out comparative studies of the effects on the environment, communities, products, consumers and supply chain tiers other than the one analysed with a holistic perspective (Alemayehu, 2011; Golini et al., 2017). Most of these analyses identify the meat sector as a whole or the value chain as the field of investigation, favouring an industry perspective, but without examining the role of processing companies and the strategies they adopt to integrate sustainability in their activities in order to meet a demand for more sustainable food products.

At the processing level, there has been a development in terms of technological innovation, aimed at increasing both production efficiency and food safety. In addition to the progressive implementation of traceability systems and controls along the supply chain, there has also been an enhancement of the craft techniques that are integrated in this production processes. In particular, with reference to PDO and PGI products, the processed meat segment recognises a higher average price in the protected pork circuits (Ferrer-Perez et al., 2020). The Italian context also stands out for the adoption of high standards on process and quality control throughout the supply chain, as well as the need to promote forms of product protection.

This effort is awarded with a distinctive positioning and competitive advantage in terms of exports, particularly evident in the peak recorded in 2020 (Assica, 2021).

On basis of these assumptions, this research explores Italian meat processors’ sustainability disclosure in order to identify different attitudes towards the management of environmental, social and governance (ESG) factors. To our knowledge, this is one of the few scientific studies on the transformation tier of the meat supply chain and with Italian data showing evidence on distinct patterns towards sustainability communication practices.

This study is articulated in four further sections. The first aims to present the material and methods applied, then the stages of Corporate Social Responsibility (CSR) development in the meat supply chain firms are discussed, thirdly the discussion of results are proposed and, finally, conclusions and further research directions are drawn.

2 Material and Methods

The survey sample was selected from Italian companies operating in the processing and preservation of meat and production of meat products (NACE Code C.10.1).

Of the 7678 companies registered in the Aida database (Bureau van Dijk),¹ 3757 are active and with a published balance sheet in the two-year period 2019–2020. Within this list of companies, the number of companies that exceed at least two of the three reference size thresholds for the obligation to prepare a non-financial statement under the regulations currently in force (Directive 2014/95/EU and Legislative Decree 254/2016) was identified. This cross-analysis showed that in the two consecutive years 46 companies simultaneously exceeded at least two of the three requirements. For companies belonging to a group, the reporting documents published by the holding company were assessed if present.

The methodology for analysing and assessing companies is divided into two sections.

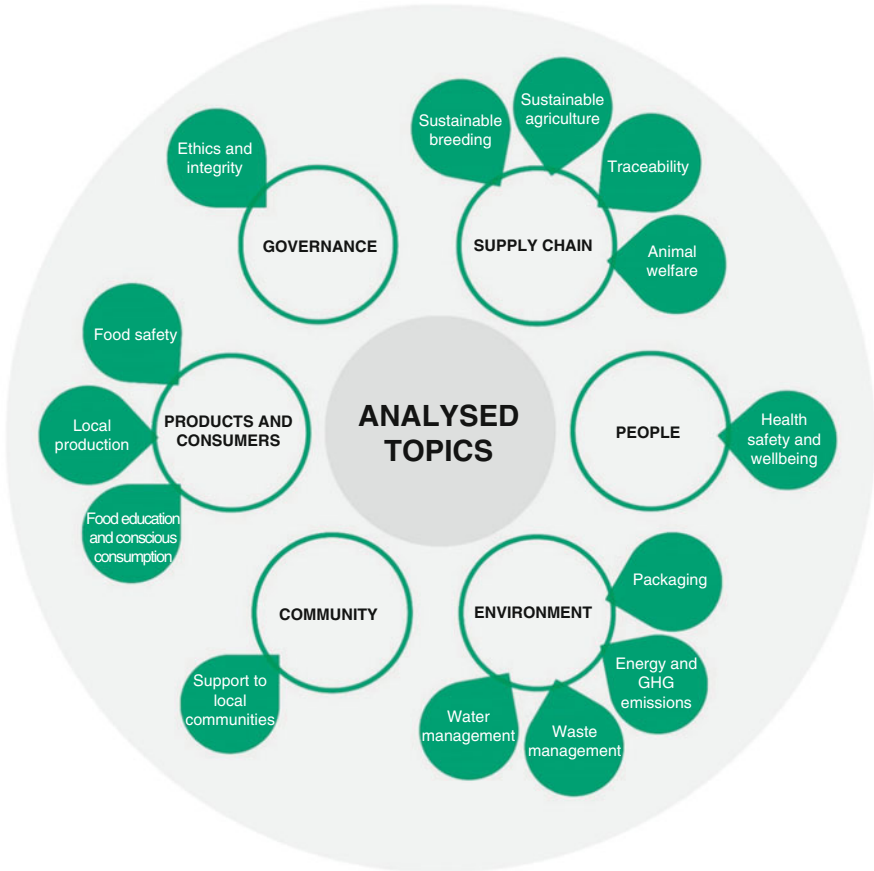
The *general section* assesses the presence of a structured approach to sustainability, through the analysis of the sustainability communication and reporting tools adopted by the companies. The documents analysed include company websites, social media, blogs or magazines and sustainability reports in the most recent edition as of February 2022 if applicable. In this sense, the section also intends to examine the readiness of the companies in light of the planned extension of sustainability reporting obligations under the Corporate Social Reporting Directive (CSRD) approved in November 2022 by the European Parliament.

The *thematic section* analyses and evaluates the sustainability practices adopted and reported by the companies. The analysis is based on a sectoral materiality matrix, which groups the ESG topics that are most relevant for the meat supply chain since they are associated with significant negative or positive impacts on stakeholders or the environment, as identified on the basis of an analysis of the abovementioned scientific literature, of the main international sustainability reporting standards—Global Reporting Initiative (GRI) Standard and Sustainability Accounting Standards Board (SASB) Materiality Map©—and of the sustainability reports published by the companies themselves, as analysed with an inductive approach. The matrix includes 14 material topics that were further grouped into six macro-areas on grounds of thematic consistency.

Each material topic is associated to a variable number from two to five of possible management practices, including the formalisation of company policies, the presence of certified management systems and the activation of specific projects or actions aimed at improving ESG performance.

The practices are associated with a score between 1 and 2 depending on the degree of evolution of the management approach they denote, as established by the researchers' expertise in the field. The overall score for the specific section is calculated as the weighted average of the score obtained for the individual material topics, weighted by a percentage factor of topic materiality. The overall assessment of the companies gives a weight of 30% to the score for the general section and the remaining 70% to the score for the specific section of the topics presented in Fig. 1.

¹Data extracted on 10 January 2022.



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Fig. 1 Analysed topics of the thematic section. Source: Authors’ representation

The score obtained by each company was associated with one of the stages of sustainability evolution identified by the model proposed by Molteni (2007): informal, current, systematic, innovative and dominant.

3 The Stages of CSR Development in Meat Supply Chain Transformation Firms

As anticipated in the previous section, the 46 companies analysed were classified according to the stages of the Molteni (2007) model. Based on the methodology described above, the distribution is presented in the following paragraphs (Fig. 2).

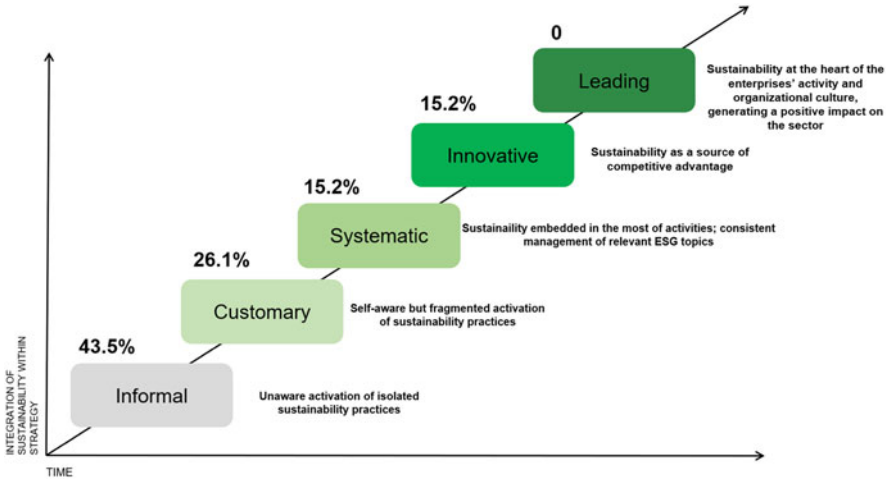


Fig. 2 Firm's positioning (% on the overall sample). Source: Authors

3.1 Informal Approach (0–25 Points)

The 43% of the analysed companies have not formally integrated sustainability into their strategy. Many of these have activated initiatives to manage material issues but in a sporadic and often unconscious manner. Communication of ESG practices is still partial and typically limited to the presence of product quality and safety certifications. In this context, the challenge is to move towards a fully aware sustainability, through a greater commitment on part of the top management, also in response to the emergence of requests or pressure from stakeholders (e.g. consumers, employees, institutions, suppliers, competitors, etc.).

3.2 Current Approach (25–45 Points)

Just over a quarter of the companies (12) in the panel fall into the second stage, distinguished by the implementation of some initial formal social responsibility initiatives, including the adoption of a code of ethics and/or social and environmental policies. Virtuous practices, more or less numerous, are well communicated and valorised, even if focused only on certain sustainability issues, typically related to the supply chain and product quality. The current stage of sustainability should only be seen as a transitory moment: the 'natural' evolution, once the effectiveness of sustainable practices in the company has been ascertained, is to initiate a process of critical analysis of the company's products and activities aimed at defining a strategic plan and sustainability reporting, creating the conditions to move on to the systematic stage.

3.3 *Systematic Approach (45–60 Points)*

This stage includes seven companies that have implemented numerous initiatives relating to all the different aspects of sustainability: supply chain, product quality, environment, employees and community. In addition to the presence of social and environmental policies, there are the first attempts at sustainability performance reporting and the communication of strategic, qualitative or quantitative objectives. At this stage of development, top management has become fully familiar with social and environmental responsibility issues, implementing ongoing stakeholder engagement initiatives in order to monitor the results achieved with respect to the objectives defined during strategic planning.

3.4 *Innovative Approach (More than 60 Points)*

The seven companies in the innovative stage see the sustainable approach as a real opportunity for competitive advantage and a source of innovation. Therefore, the companies are committed to communicating their numerous sustainability initiatives, actively involving stakeholders and publishing reporting documents and strategies with clear and challenging objectives.

In the meat sector, the innovative stage is also characterised by the launch of initiatives that mobilise different stakeholders, changing the cooperation/competition modes to favour value sharing along the entire value chain. Within the sample, the innovative stage appears to be more easily accessible to large companies: four of the seven companies identified, in fact, exceed 500 employees, beside three significant cases of medium-sized companies, one of which belongs to a larger group, which have made sustainability a distinctive element of their strategy.

3.5 *Dominant Approach*

The transition to the final stage of the path, the dominant one, is of a purely cultural nature: top management comes, in fact, to consider sustainability as the cornerstone of the company mission and its strategic vision, thus assuming a driving function for the entire sector and setting itself up as a model to be emulated. In the present survey, it was not possible to identify companies at this stage, since sustainability does not yet seem to represent the primary driver of development for companies in the sector, but rather a lateral and complementary aspect—however relevant—with respect to product quality. By analysing the paths taken by some innovative companies, however, it is possible to grasp the first expressions of a new concept of ‘sustainable quality’, the concrete declination of which may guide the future growth of the entire sector.

4 Discussion

This section aims to identify the communication and reporting strategies widespread in the slaughterhouse and processing phase. This section will be subdivided to present the results of the analysis conducted on both the general section and the thematic session, as anticipated in methodology.

4.1 General Section

In the analysed sample, nine companies presented a publicly available sustainability or environmental report, representing 19.6%.

Of the nine publicly available reports:

- Only one is prepared in accordance with the currently applicable regulatory obligations (Legislative Decree 254/2016).
- All adopt the GRI international standards according to the different compliance options.
- Four were subject to an assurance review by an external auditing firm.
- Three reports were published in their first edition in 2021, demonstrating significant growth in the uptake of these tools.

It should be emphasised that the adoption of GRI Standards entails carrying out a materiality analysis, that is, the identification of the ESG topics that are most relevant to the company and its stakeholders. This process of analysis implies the activation, by the company, of a direct dialogue with its stakeholders, aimed at identifying their requests, expectations and possible concerns about its activities and development strategies, thus avoiding the risk of self-referential communication and favouring a proactive approach to critical perceptions affecting the supply chain.

There are also nine companies that report their contribution to the pursuit of the Sustainable Development Goals (SDGs) promoted by the United Nations, either in their sustainability report (eight companies) or on their institutional website (1). This reporting practice aligns and connects the company's commitment to the goals and orientations of international policy makers, denoting an awareness of the global challenges involving the supply chain—first and foremost that of the sustainability of agrifood production systems expressed by Target 2.17 (see for comparison with others food categories the previous chapter).

Of the sample of 46 companies, almost half (22) have a section of their website dedicated to sustainability. The percentage of 47.8% makes clear a widespread interest in sustainability issues, as well as a propensity to include these principles in corporate communication and positioning strategies. This evidence is confirmed by the fact that, even in the absence of a unified section, all the companies analysed disclose information on their sites on certain ESG issues, albeit with very different levels of breadth and detail.

The propensity to publish ESG objectives was another of the parameters taken into consideration to analyse the strategic orientation of companies towards sustainability.

- A total of 59.6% of the companies in the sample indicate qualitative objectives in their public reports or on the institutional website, expressed in the form of explicit commitments with respect to certain material topics.
- A total of 39.6% of the sample publishes quantitative objectives, with the adoption of numerical indicators and/or objective criteria and the identification of specific targets to be achieved within a defined time frame.

From the point of view of communication, the presence in the sustainability report or on the institutional website of references to the topics covered by this survey is quite varied:

- Twenty consider less than 50% of the topics identified.
- Fourteen present between 50% and 75% of the contents considered.
- Twelve include more than 75% of the topics.

4.2 Thematic Section

This section will open up the discussion around the six different thematic sessions: governance, people, supply chain, products and consumers, environment and community. For each topic, a summary of the criteria involved has been listed in the following tables.

Corporate **governance** is of interest in the analysis of sustainability orientation. This section is, therefore, mainly focused on the relevance of the issue of business ethics and integrity, linked to the publication of two documents: the Code of Ethics (44.7%) and the Organisation and Management Model pursuant to Legislative Decree 231/2001 (40.4%). In Table 1 is proposed a list of the key criteria adopted for the analysis of health (HS), safety (HSE) and welfare of workers.

The topic of sustainability cannot disregard the consideration of the role of **people** who work along the supply chain and the companies within it. The analysis of this pillar has been declined according to the presence of various criteria relating to both the protection of workers’ rights, with specific reference to occupational health and

Table 1 People: Health, safety and well-being

Practice	Percentage of companies
HS or HSE policy	57.4%
ISO 45001 (or equivalent)	19.1%
OHS training hours per employee disclosure	19.1%
OHS incident reporting	17.0%
Employee welfare measures	14.9%

Source: Authors

Table 2 Supply Chain: Sustainable breeding

Practice	Percentage of companies
Policy or statement	70.2%
Certified organic product	38.3%
Breeder selection practices based on environmental criteria	29.8%
Breeder selection practices based on social criteria	19.1%
Training for breeders on sustainability	17.0%

Source: Authors

Table 3 Supply Chain: Sustainable agriculture and feed

Practice	Percentage of companies
Assessment and management of environmental and food risks	34.0%
Traceability of raw materials	29.8%
Circular economy practices	21.3%
Adherence to sustainability standards	21.3%

Source: Authors

safety, and to the active promotion of well-being and skills development. While most companies state that they are explicitly committed to protecting their employees, reporting on the actions and practices undertaken shows significant room for improvement.

Overall, it emerges that worker protection and human capital development policies are reported almost exclusively in the context of sustainability reports, only rarely finding space in web-based communication, suggesting a low perception of relevance of people-related issues by companies in the sector (Table 2).

The **supply chain** issue has been analysed through five dimensions: sustainable breeding, sustainable agriculture, traceability and animal welfare.

The breeding phase is decisive in assessing the overall sustainability of the supply chain, representing its first level. However, the implementation of selection practices that consider environmental and social criteria is still limited, or at least its communication. This also applies to the issue of training farmers on sustainability, which is addressed by eight companies, often in the context of interventions promoted within controlled supply chain paths, with distinctive positioning or because they own shares in processing companies. On the other hand, the diffusion of communication of product lines certified as organic is wider, in response to the growing demand (Table 3).

Italy is dependent on foreign cereal supplies for almost half of the raw materials that form the basis of formulations and according to varying percentage shares: 46.5% for maize, 82.3% for soybean meal and 86.1% for sunflower meal (Assalzo, 2021). This deficit in terms of imports in recent decades has been influenced both by the loss of arable land areas and by the allocation of part of the national production to the feeding of biogas plants, which are also used for the valorisation of livestock manure. This is also the context of the research promoted to study the development

Table 4 Supply Chain: Traceability

Practice	Percentage of companies
Policy or statement	87.2%
Technological systems for the traceability of the supply chain	59.6%
ISO 22005 or equivalent	40.4%

Source: Authors

Table 5 Supply Chain: Animal Welfare

Practice	Percentage of companies
Policy or statement	72.3%
Decent living conditions in transports and at slaughter	46.8%
Use of drugs limitations	38.3%
Measures to ensure adequate living spaces	36.2%
Limitation of mutilations	12.8%

Source: Authors

of feed conversion indices over time, highlighting improved efficiency of livestock production and the environmental impact of different formulations (Assalzo, 2021).

It is a well-established fact that there is, in the breeding phase in particular, a historical propensity to use by-products and co-products, thus valorising volumes of products that represent waste in the context of other food production chains (see for more details Chapter “Sustainability of Swine Breeding: Future Challenges and Opportunities”) (Table 4).

The issue of traceability is important in any manufacturing context, but it finds one of its highest levels of expression precisely in the Italian agri-food sector. In this production context, in fact, it is emphasised that product and consumer quality protection systems are promoted at an operational level in each of the contexts analysed (Sacchetti et al., 2021). The criteria used to observe the communication of this attention, in fact, emphasise this attention at a transversal level.

Almost all companies explicitly emphasise their dedication to promoting the full traceability policy of their product in their corporate documents and media. This statement is often accompanied by specific certifications of international importance, such as ISO 22005 or DTP 035, to assure the quality of the product, as well as the traceability of the raw material processed, also to guarantee PDO and PGI branded products. A small group of companies make an explicit reference to technological systems for traceability (Table 5).

Animal welfare transversally involves all three groups of actors in the supply chain in different ways. In fact, this issue personally involves the breeder who invests in the modernisation of structures and facilities, as well as the downstream stages of the chain (slaughterhouse, processing and distribution) through the implemented control system. As regards the focus of this analysis, most processors belonging to the sample explicitly declare themselves attentive to the respect and protection of animal welfare in their supply chain policies. This broad declaration of sensitivity is followed by the analysis conducted of the practices and criteria that

Table 6 Products and consumer: Local Production

Practice	Percentage of companies
Use of 100% Italian meats	87.2%
At least one PGI or PDO-labelled product	76.6%
Choice of native or rare breeds	6.4%

Source: Authors

Table 7 Products and consumer: Food safety

Practice	Percentage of companies
BRC or IFS certification	80.9%
Policy or statement	78.7%
GMO free products (at least one)	46.8%
Nitrite free products (at least one)	31.9%

Source: Authors

contextualise and operationalise this commitment, especially in relation to the European Farm to Fork strategy and national legislation (EC Regulation 429/2016; EC Regulation 625/2017; Legislative decree. n°27/2021). Decent condition in transport and at slaughter represents a criterion that is closer to the direct operation and control of processors, and it is therefore mentioned in the communication by almost half of the sample. The limitation with respect to the use of drugs is an interesting topic especially with respect to the promotion of references with limited or no use of antibiotics in the life of the animal. The main references on the market are the voluntary standards DT 35 and DT 109 for the pig sector (Table 6).

The topic of **products and consumers** has been articulated in the valorisation of local production, food safety and the education to a conscious consumption. The provenance of raw materials and of the products themselves is one of the main elements of consumer interest, both for meat and cured meat products, and is the focus of recent regulatory interventions on labelling (see for more details Chapter “Protecting Farm Animal Biodiversity through Geographical Indications: A Legal Analysis”). The sample shows a strong preference for the use of meat from Italian farms, at least limited to specific product lines, which finds ample space in environmental communication. Equally pervasive is the presence of PGI- or PDO-labelled articles, especially in the production of cured meat: this element confirms the role of the territory and production traditions as a central asset of the sector, also from a sustainability point of view (see also Chapters “The Quality of Heavy Pork Meat: The Role of PDO Production Specifications” and “Protecting Farm Animal Biodiversity through Geographical Indications: A legal Analysis”).

On the other hand, the proposal of product lines from local or rare breeds appears to be a minority, which finds a structural limitation in the reduced production volumes but meets with strong consumer interest, both for qualitative and sustainability factors, such as the frequent use of extensive farming practices and the contribution to the protection of zootechnical biodiversity (Table 7).

Table 8 Products and consumer: Food education and conscious consumption

Practice	Percentage of companies
Communication of the products' nutritional values via web	44.7%
Sustainability claims on social channels	29.8%
Communication practices for responsible consumption	27.7%
Initiatives to raise awareness and fight against food waste	23.4%
Support for food education campaigns	17.0%
Information on the environmental impact of products	12.8%

Source: Authors

Consistent with market perceptions, companies in the supply chain appear to be particularly active in communicating their food safety practices, regardless of the publication of a sustainability report or the presence of a dedicated section on the website: food safety is, in this sense, a cornerstone of corporate communication.

Focusing on practices beyond compliance with regulations on self-control and risk analysis, the spread of formal policies and affirmations of commitments and objectives undertaken by the company and, above all, the presence of international food safety certifications, such as British Retail Consortium (BRC) and International Food Standard (IFS), stand out. These are not limited to third-party audits of the Hazard Analysis & Critical Control Points (HACCP) system, but also include the adoption of good management requirements and practices in product processing, analysis laboratories and hygiene protection, requiring the structuring of advanced management systems (Table 8).

While companies in the supply chain effectively monitor food safety with a preventive approach, they are not as committed to active consumer communication to address concerns about product sustainability and health impacts.

A predominantly passive approach also emerges when analysing communication practices regarding the environmental sustainability profiles of production. Also emerging is the potential for developing participation in initiatives to combat food waste, which is responsible for a significant part of the industry's environmental impacts.

These results seem to confirm the prevalence of communication strategies still focused mainly on product quality, which also emerges from the analysis of sustainability reporting and communication practices (Table 9).

The **environment** topic in the meat industry has been analysed also with the concern of greenhouse gas emissions that arise mainly from energy consumption and fuel consumption for company fleets. The results of the analysis reflect the growing sensitivity of public opinion towards climate change. The most widespread concrete initiatives concern the purchase or self-production of electricity from renewable sources, implemented by almost half of the panel. In particular, the companies that opted for self-production mainly invested in photovoltaic systems, often taking advantage of the ample availability of space on farms and/or production sites. Initiatives for upgrading or installing modern energy-efficient systems were

Table 9 Environment: Energy and GHG emissions

Practice	Percentage of companies
Use or self-production of energy from renewable sources	46.8%
Environmental policy with reference to energy consumption and emissions	42.6%
ISO 14001 or Eco-Management and Audit Scheme (EMAS)	38.3%
Installation or upgrading of energy systems in the last 2 years	19.1%
ISO 50001 (or equivalent)	10.6%
Logistics optimization initiatives	6.4%

Source: Authors

Table 10 Environment: Water management

Practice	Percentage of companies
Environmental policy with reference to water consumption	38.3%
Water purification plants	29.8%
Installation or requalification in the last 2 years of high efficiency water systems or with water recycling	14.9%

Source: Authors

Table 11 Environment: Waste management

Practice	Percentage of companies
Environmental policy with reference to waste management	36.2%
Food waste reduction and/or recovery actions	27.7%
Cogeneration powered by waste	23.4%

Source: Authors

apparently less widespread and, perhaps, considered less impactful than actions related to the use of energy from renewable sources (Table 10).

Concerning water consumption, as for all environmental aspects, this analysis only considers the impacts of the industrial phases of meat and cured meat production, which represent a marginal component of the water footprint in comparison to the breeding and feed cultivation phase. For beef products, for example, water consumption from processing is estimated to contribute 6% of the total water footprint (Carni Sostenibili, 2016). Within the analysed panel, the topic does not seem to be perceived as particularly relevant: only 38% of companies, in fact, include a reference to water consumption in their environmental policies. Focusing on communication and the development of concrete initiatives, the percentages drop even further (Table 11).

Like almost all agricultural raw material processes, meat processing generates different types of waste and discards, consisting mainly of animal by-products (EC Regulation 1069/2009). Some by-products are therefore compulsorily destined for incineration, while others can be fed into new production processes (for more

Table 12 Environment: Packaging

Practice	Percentage of companies
Recyclable packaging	42.6%
Reduction in packaging weight	29.8%
Environmental policy with reference to packaging	27.7%
Packaging from recycled raw materials	19.1%

Source: Authors

Table 13 Community: Support to local communities

Practice	Percentage of companies
Support to environmental projects	55.3%
Support to social projects	45.7%
Support to cultural projects	17.0%

Source: Authors

details, see Chapter “The Quality of Heavy Pork Meat: The Role of PDO Production Specifications”). Despite the relevance of the topic, a small percentage of the companies analysed address waste management in their communication and through formalised policies, and even fewer affirm that they have promoted actions aimed at reducing or recovering their food waste, which essentially take the form of transferring by-products to companies dedicated to the production of pet food, animal feed or fertilisers (Table 12).

In the agri-food sector, the use of packaging with a lower environmental impact is becoming increasingly widespread. This run-up seems easy to share at a strategic level in the light of some data: according to a Nomisma study, 33% of Italian consumers see packaging characteristics as a fundamental aspect in the definition and perception of the sustainability of a food product, and for one Italian in four, the presence of sustainable packaging is the main purchase driver (Nomisma, 2021). These new trends are reflected in the results of the analysis, from which emerges a particular interest in fully recyclable packaging, usually made of several easily separable materials (paper/plastic laminates) or more rarely in mono-material such as PE and PET. Less consistent, but still interesting, is the group of companies that opted for a reduction in packaging weight, at the same time gaining environmental and economic advantages due to the lower use of resources and reduced transport costs. On the other hand, a still small proportion has introduced the use of recycled raw materials, a result justified by the economic efforts involved, which are generally greater than the other practices mentioned (Table 13).

Business activity does not limit its sphere of influence to the narrow group of stakeholders such as shareholders, employees and suppliers, but also has an impact on the social fabric, the surrounding environment and the **local community** that hosts it.

This relationship between the local community and business activity is evident and tangible in the ability to valorise and promote products that are typical of the territory or fall within the protection circuit of the numerous consortia. This kind of

impact has repercussions on qualitative and quantitative variables (production and sales volumes, prices and territorial diffusion) that have already been effectively monitored for some time by other studies such as the annual ISMEA—Qualivita report (2022). What is complex to map to date is the set of initiatives that individual companies promote that have positive environmental as well as social and cultural impacts. For the selected sample of companies, this type of commitment was also mapped.

The environmental sphere includes all the projects promoted by companies with the aim of having a direct positive impact on the local area, as for instance reforestation, biodiversity conservation or food waste projects. The figure on social projects consists of initiatives promoted in collaboration with non-profit associations, local administrations and initiatives implemented for the fight against Covid-19.

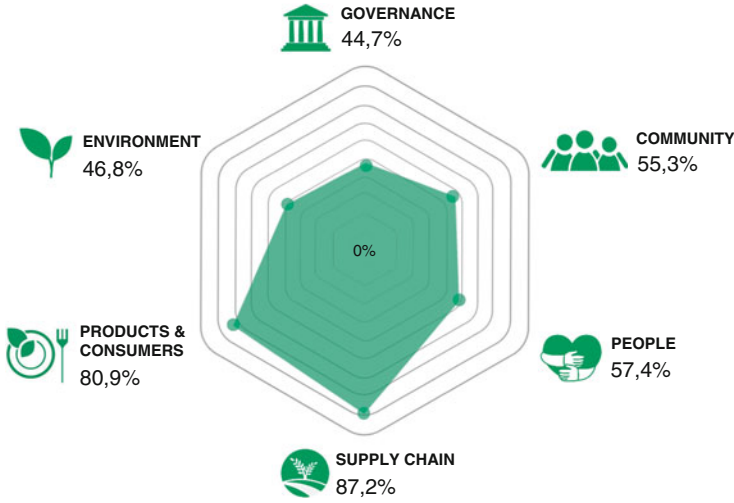
It is also worth mentioning the projects developed in the cultural sphere, such as the creation of educational and training courses in the gastronomic sphere, as well as the promotion of spaces dedicated to the product and tradition' story telling.

5 Conclusions

Analysing the macro-areas on which reporting and communication focus the most, it is possible to identify a significant differentiation within the sample. While a very high proportion of the companies surveyed communicate sustainability-relevant practices in the areas of supply chain and products, fewer companies communicate in the remaining topic areas, reaching percentages of less than 50% for environmental and governance topics. Figure 3 graphically synthesise the areas of communication and reporting covered by the sample of companies.

From the analysis, companies in the sector seem to adopt rather selective sustainability communication and reporting practices, focusing on a relatively narrow range of topics. Considering the macro-areas within which the individual companies report at least one practice, topics relating to the supply chain (87.2%) and to products and consumer relations (80.9%) prevail decisively over the rest, indicating a communication focused primarily on the production dimension and a vision of sustainability strongly anchored to products, processes and to territorial identity.

On the other hand, the environmental area (46.8%) and the governance dimension (44.7%), to which the companies in the sample seem to assign less relevance, are less attended to. As far as the environmental dimension is concerned, although some aspects related to the sustainability of livestock and feed are dealt with under the supply chain area, the companies express a perception of urgency that is misaligned with that of public opinion, the media and NGOs. Similarly, a substantial part of the sample apparently tends to take for granted areas related to people and communities, despite the fact that these include issues that are indispensable for a comprehensive and effective approach to sustainability, such as occupational health and safety and business ethics.



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Fig. 3 Areas of communication and reporting. Source: Authors representation

An effective response by the supply chain as a whole to the challenge of sustainable development cannot disregard, in any case, an acceleration of the path by the small- and medium-sized enterprises (SMEs) that make up the vast majority of the sector: an objective that appears ambitious in the current context of turbulence on the raw materials and energy markets aggravated by the war in Ukraine jeopardises the economic sustainability of livestock farming activities and may lead to postponing significant investments in the environmental and social field. Given the benefits, including economic ones, that sustainability practices such as energy and water saving, the rational use of raw materials and the reuse of waste can bring to businesses, a vicious circle risks being set in motion that could jeopardise the sustainable transition and the very sustainability of the supply chain as a whole. It is therefore necessary to reflect on the incentives that can be activated to encourage SMEs to adopt a more strategic and systematic approach to sustainability.

With regard to regulatory developments, the approval of the CSRD and the consequent lowering of the size thresholds for the reporting obligation will lead to a greater spread of such practices, presumably including the 46 companies analysed. If this extension considered in isolation does not appear sufficient to bring about a qualitative leap in the sector, since it affects only a small portion of the sector, it would however be able to exert a significant ‘push’ to the extent that it is seized as an opportunity for strategic reflection, and not only for narration, triggering emulation by SMEs. Still in the regulatory sphere, we can expect from the introduction of the Corporate Sustainability Due Diligence and the related obligations for large companies to identify and mitigate the environmental and social impacts of the supply chain, a consolidation of the supplier assessment practices based on ESG criteria

already implemented by large industrial groups and many large-scale distribution players, with a contribution to the spread of systems for monitoring socio-environmental performance (see for more detail previous chapter). However, legislative interventions run the risk of legitimising a perception of sustainability as a mere compliance constraint, overshadowing the competitive opportunities it opens up for companies. In this sense, the potential impact of public or public-private policies to support the visibility of sustainable products and companies, through the creation of new labels or the strengthening and rationalisation of labels already on the market, should not be underestimated, but accompanied by a stronger investment in food education programmes and the development of critical consumer analysis skills.

Further research could broaden the category of products involved or propose comparative analyses between different geographical contexts (other EU countries) or groups of companies relevant to other product classifications in the context of agri-food manufacturing.

Given the sector's limited financial resources, however, a decisive driver will be the ability to allocate a sufficient volume of public and private investment to support the sustainable transition of the agri-food sector.

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