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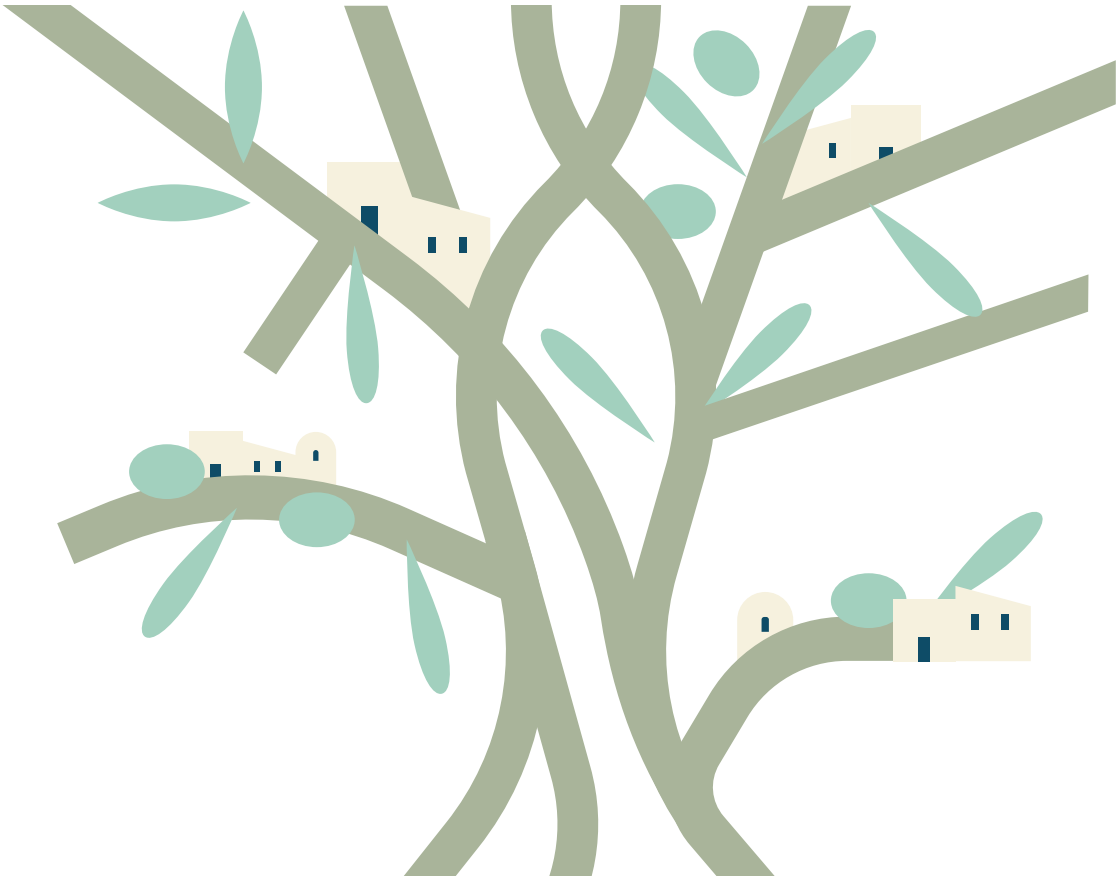

SPECIAL ISSUE:
Governance for sustainability in the agrifood chain


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Editor-in-chief
Teodoro Miano

Managing Editor
Giulio Malorgio

Editorial office
Bologna University Press
Via Saragozza, 10
40123 Bologna (Italy)
tel.: +39 051 232882
fax: +39 051 221019
email: newmedit@ciheam.org

Paper submission
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EDITORIAL

Governance for sustainability in the agrifood chain: challenges and new direction[1]

IRENE CANFORA*, VITO SANDRO LECCESE*, DOMENICO CRISTALLO*, DAMIANO PETRUZZELLA**, BIAGIO DI TERLIZZI**

Achieving sustainability in the agrifood supply chain, in environmental, economic and social dimension, demands more than a static framework of rules; it calls for governance understood as a dynamic set of processes, institutions, and stakeholders working in concert to reconcile environmental imperatives with economic viability and social equity. This concept extends beyond mere administrative mechanisms, touching on constitutional principles, private-sector codes of conduct, civil-society engagement, and transnational regulations.

Given the current context, marked by the breakdown of long-standing paradigms underpinning global food systems, it is essential to revise both the aims and the instruments of agri-food governance. This revision must address the issues highlighted in the 2030 Agenda – most notably, persistent food insecurity, escalating poverty (particularly in the Global South), and the ongoing climate emergency.

As the UN Secretary-General has warned, "Global food systems are broken and billions of people are paying the price". In the context of climate justice, he further notes that "those least responsible for the crisis are the most affected: the poorest people; the most vulnerable countries; Indigenous Peoples; women and girls", due to blocked supply chains, rising prices, and growing food insecurity. Ten years after the adoption of the SDGs for 2030, this stark reality shows the need to prioritise regions facing critical challenges and rapid population growth where "rebuilding" the relationships among the various actors along the supply chain (production, transformation, distribution, and consumption) remains essential to build more resilient and inclusive food systems. As these global urgencies increasingly reverberate in the European context, it is clear that agri-food governance mechanisms need to be rethought accordingly.

In light of these challenges, it becomes nec-

[1] This special issue is a part of the project: "Definition of an ethical legal model of sustainable food system relationships" in the framework of the project's activities ONFOODS Research and innovation network on food and nutrition Sustainability, Safety and Security – Working ON Foods (Next Generation EU) Funder: Project funded under the National Recovery and Resilience Plan (NRRP), Mission 4 Component 2 Investment 1.3 - Call for proposals No. 341 of 15 March 2022 of Italian Ministry of University and Research funded by the European Union – NextGenerationEU; Award Number: Project code PE00000003, Concession Decree No. 1550 of 11 October 2022 adopted by the Italian Ministry of University and Research, CUP D93C22000890001, Project title "ON Foods - Research and innovation network on food and nutrition Sustainability, Safety and Security – Working ON Foods".

* Università degli Studi di Bari Aldo Moro, Italy.
** CIHEAM Bari – Mediterranean Agronomic Institute of Bari, Italy.

essary to rethink the legal and economic tools needed to respond not only to agriculture's social and economic policy dimensions but also to the urgent climatic and environmental imperatives. While it remains crucial to "think globally," it is equally important to "act locally." Effective governance mechanisms should thus account for both global interdependencies and the distinct needs of individual territories, harnessing local food policies to promote sustainably oriented practices among private actors and public authorities alike.

This selection of papers, each from a different perspective, converge to illustrate how policy, law and technology can be aligned to shape a more resilient and ethically grounded agri-food system, by analysing key issues related to the "sustainable food system" defined as a comprehensive concept by the EU Commission. But they also show that governance is inherently relational, shaped by the interactions among diverse actors – governments, producers, labour organisations, and consumers – whose ability to forge alliances and manage conflicts determines the success of any sustainability policy. While the tension between ambition for transformative environmental measures and agrifood economics is a recurring theme, such tension should not be construed as irresolvable. Instead, the ideas captured here point to governance as an integrative paradigm, one that transcends the traditional divides of public/private or local/global in pursuit of effective sustainable outcomes.

Building on this, **Alan Matthews**, in *"Prospects for the European Green Deal in Agriculture and Food in the 2024-2029 Political Cycle"*, captures how shifting political and socioeconomic contexts influence the pursuit of sustainability targets, showing that competitiveness, farm income, and climate goals need not be mutually exclusive. Instead, new legislation and transition funds must align with expectations on both the producer and consumer sides, pointing toward an expanded form of governance wherein multiple interests coalesce around shared objectives.

Turning to environmental issues, **Esther Muñiz Espada**, in *"Legislative Balances Needed Between Environment and Agriculture"*, highlights a structural tension: the stricter the environmental standards, the higher the potential risk to farmers' financial stability. Here, flexible but principled policy-making becomes paramount, with adaptive regulation co-produced by public agencies, private actors, and civil society to reconcile conservation and profitability.

Moving from the broader regulatory context to specific policy implications, **Irene Canfora and Vito S. Leccese**, in *"The Social Conditionality: Its Implementation and Effects on Supply Chain Sustainability"*, underscores the centrality of social equity, fairness, and inclusion, suggesting that labor rights within the concept of "inclusive rural development" should be considered core pillars of agrifood governance. This resonates with the idea that sustainability, to be truly impactful, cannot be reduced to environmental metrics alone and must integrate labor and social considerations into each layer of the production process.

The focus then shifts to the role of geographical indications, highlighting how local governance mechanisms can harness cultural heritage for sustainable development. **Domenico Cristallo**, in *"Geographical Indications and Biodiversity: An Overview of Regulatory Challenges and Critical Perspectives"*, shows how local heritage can serve as a lever for both market differentiation and biodiversity conservation. Promoting sustainability in this sphere demands collective agreements among producers, oversight from public authorities, and active consumer engagement, all requiring flexible normative frameworks that evolve with changing social and environmental conditions.

Continuing this line of thought, **Valeria Paganizza**, in *"Where Competitiveness Meets Sustainability: Law, Policy, Implementation and the Environmental Challenge of Vineyards"*, delves into the tension between market competitiveness and environmental safeguards in vineyards, illustrating how existing policies may be insufficiently attuned to local realities and must evolve to integrate both profitability and ecological responsibility. Taken as a whole, these articles converge around governance as a multi-tiered, adaptive process rather than a static set of rules.

Having explored how institutional frameworks can reconcile environmental and social concerns with market competitiveness, the focus

now shifts – within the dimension of public governance – to the key role of livestock production, paving the way for examining livestock-related sustainability challenges.

Exploring these aspects, **Cecilia Pannacciulli**, in *"Agriculture Between Constitutional Dimension and One Hearth–One Health Approach"*, illustrates how, within the constitutional framework, a holistic perspective can address the concept of "one health." Emphasizing the recent amendments to the Italian Constitution, which explicitly recognize the environment, biodiversity, and animals as constitutionally protected interests, the author shows how the interconnection between the health of people, animals, and ecosystems is embedded in constitutional law. By moving beyond fragmented, sector-specific regulations toward a truly holistic vision, governance is redefined as an integrated framework that strengthens the resilience of both human societies and natural ecosystems.

The subsequent contribution, **Roberto Talenti**, in *"Grounding a Legal Research Agenda on the EU Mitigation of Livestock Emissions – A Systematic Literature Review"*, addresses the pressing issue of climate change within the livestock production, illustrating the necessity for regulatory frameworks that balance environmental imperatives with socio-economic realities. The author highlights the need for an approach that can rein in greenhouse gas emissions while respecting socioeconomic realities. Top-down impositions of strict standards may undermine rural economies unless accompanied by supportive measures, pointing to the requirement for coordinated, multi-stakeholder instruments developed through dialogue and cooperation.

Finally, turning to technological innovation and its impact on the agri-food chain, **Cecilia Rasetto**, in *"The Use of Blockchain Technology in the Food Traceability System"*, evaluates the potential of blockchain-based traceability solutions through a case study. The author examines the technological dimension of governance through blockchain-based traceability solutions, which can strengthen authenticity and sustainability if issues of data privacy, cybersecurity, and interoperability are well managed. This again underlines that technology's potential is realized through consensus-driven rules and transparent oversight, rather than through isolated technical solutions.

Governance weaves together tools from law, economics, social theory and environmental science into polycentric decision-making. While the pathways to sustainability remain fraught with tensions – economic, social and environmental – this integrative lens provides a framework for mediating such complexities by embracing stakeholder participation, acknowledging diverse local conditions and respecting broader global constraints.

In this perspective, the contributions to this volume propose a model of governance that is attuned to the interplay between local tradition, global legal frameworks and emerging societal demands. In sum, the articles collectively demonstrate that the regulation of the agrifood chain is not a technical exercise, but a multi-layered, dialogical process designed to manage interdependencies among different actors and competing imperatives.

Drawing on an interdisciplinary legacy – one that has evolved over time – this issue underlines how multilevel cooperation, flexible regulatory approaches and a commitment to social and environmental imperatives can lay the foundations for a truly sustainable agri-food system.

At the same time, the analysis also highlights key challenges and critical issues that need to be addressed in order to achieve a sustainable agri-food system.

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Prospects for the European Green Deal in agriculture and food in the 2024-2029 political cycle

ALAN MATTHEWS*

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Abstract

The previous EU political cycle 2019-2024 ushered in the European Green Deal on a wave of activism around climate change and environmental challenges. This was also reflected in ambitious targets for a transition to a more sustainable food and agriculture system. The 2024-2029 political cycle starts in a very different political context emphasising food security, competitiveness and farm income concerns against the background of Europe-wide farm protests. This article addresses how this changed political climate can affect the prospects for making further progress in implementing the European Green Deal in agriculture and food. It argues that Green Deal objectives have not been abandoned but foresees that future implementation will emphasise more just transition principles rather than the polluter pays. This implies a need to find additional financing to support the transition to more sustainable farming practices, but there are evident limits on the availability of public resources as well as on securing additional funding through the food supply chain. The solution may require recognising the heterogeneity of the farming sector, applying the polluter pays principle to the large industrial farms that provide most of our food while implementing the just transition principle for the majority of smaller farms.

Keywords: *Agriculture, Green Deal, Farm to Fork, Green transition, Just transition, Multi-annual Financial Framework, EU.*

1. Introduction

The 2019 European Parliament elections marked a significant shift towards the salience of environmental sustainability as voters showed strong support for green policies. Youth activists, inspired by figures like Greta Thunberg, played a crucial role in pushing for urgent climate action across Europe. This momentum led to the introduction of the European Green Deal by the European Commission in December 2019.

The Green Deal aims to make Europe the first climate-neutral continent by 2050, focusing on reducing greenhouse gas emissions, promoting a circular economy, and protecting biodiversity (European Commission, 2019). It led to a flurry of legislative initiatives. The landmark European Climate Law in 2021 set a legal target to achieve net zero greenhouse gas emissions by 2050 and an intermediate target for 2030, and led to a substantial revision of the EU's climate architecture. The REPowerEU plan was introduced to reduce

* University of Dublin, Ireland.
Corresponding author: alan.matthews@tcd.ie

dependence on fossil fuels, particularly from Russia, and to enhance energy security through investments in renewable energy and energy efficiency. Several legislative initiatives were approved to enhance environmental and social governance for companies, such as the Taxonomy Regulation, the Corporate Sustainability Reporting Directive (CSRD), and the Corporate Sustainability Due Diligence Directive (CSDDD), requiring companies to disclose information on their environmental and social impacts, ensuring greater transparency and accountability.

The Green Deal also had an agricultural and nature dimension through the Farm to Fork and Biodiversity Strategies. The Farm to Fork Strategy aims to create a fair, healthy, and environmentally-friendly food system, reducing the environmental impact of food production and promoting sustainable farming practices (European Commission, 2020a). It highlighted the need for a fundamental transformation in our food system and, for the first time in an EU context, recognised that the food chain needs to be addressed as a whole, with economic, environmental and societal concerns treated in parallel. The Biodiversity Strategy underlined that biodiversity loss and ecosystem collapse are one of the biggest threats facing humanity in the next decade and set out to restore biodiversity in Europe, protect natural habitats, and promote sustainable land use (European Commission, 2020b). The Farm to Fork and Biodiversity Strategies included a range of ambitious targets intended to put the EU food system on a transformative path to greater sustainability. The 2018 reform of the EU's Common Agricultural Policy (CAP), which was formally adopted in 2021 and introduced from 2023, reflected this concern with environmental sustainability. It increased the ring-fencing of CAP funding for agri-environmental objectives, introduced eco-schemes as a new agri-environmental instrument, and modestly increased the environmental conditions farmers should observe as a condition for eligibility for CAP payments (Röder *et al.*, 2024).

Both Commission Communications were formally approved by the Council and Parliament. However, the implementation of follow-up legislative initiatives faced significant push-back due to volatile agricultural markets. The COVID-19 pandemic and the Russian invasion of Ukraine led to high input costs and disrupted supply chains, exacerbating economic pressures on farmers. These challenges, coupled with farmer protests against low incomes and more stringent environmental regulations, created a contentious environment for adopting new policies. As a result, several ambitious reforms were delayed, blocked or weakened, reflecting the difficulty of balancing environmental goals with economic stability in the agricultural sector (Chapron, 2024).

The second half of 2024 saw a change in the EU's political leadership with a newly elected Parliament, changes in the political composition of the European Council and the Council of Ministers following national elections, and a new Commission. The question this article seeks to address is how this changed political climate will affect the prospects for making further progress in implementing the European Green Deal in agriculture and food. Will we see a further stalling of legislative files designed to achieve its objectives, or even a rolling back of some measures already adopted? Or will the evident impacts of ongoing climate change, the damages caused by water pollution and soil degradation, the ongoing loss of biodiversity, and the increasing costs of ill-health linked to food and diets, force the hand of legislators to introduce more ambitious measures to address these issues. The article is written at a very early stage in the 2024-2029 political cycle (in January 2025) and is inevitably speculative. It first examines the early statements of key players to gauge the political mood. It then examines some policy dilemmas that will influence the potential outcome, before drawing conclusions on the likely direction of travel.

2. Initial policy declarations

A starting point to understand the political orientation of the next Commission are the Political Guidelines 2024-2029 issued by Ursula von der Leyen in July 2024 (Von der Leyen, 2024a). This set out the policy agenda she proposed when seeking and obtaining reconfirmation of her position by the European Parliament as President of the Commission for a second term. The

Commission has the monopoly on the right of initiative in EU law-making, but it is the European Council that defines the general political direction and priorities for the EU. These were set out in its Strategic Agenda 2024-2029 adopted at its June 2024 meeting (European Council, 2024), and formed the basis on which Von der Leyen prepared her Guidelines. Other initiatives that informed the Guidelines were Enrico Letta's report in April 2024 on the future of the EU Single Market (Letta, 2024) and Mario Draghi's report on EU competitiveness published in September 2024 (Draghi, 2024). In turn, the Guidelines set the framework for the Mission Letters given to each individual Commissioner setting out the principal goals and activities for the coming period within each policy domain.

The Letta and Draghi reports were requested by the Commission to address critical challenges facing the European Union. Although neither report included a specific focus on food and agriculture, they focused attention on the need for the EU to strengthen its competitiveness and resilience and the role that the single market can play in facilitating this. These insights significantly influenced the European Council's Strategic Agenda 2024-2029. It incorporated recommendations from the reports, prioritising the deepening of the single market, digital and green transitions, and enhancing economic resilience. With respect to competitiveness, it committed to close the EU's growth, productivity and innovation gaps with international partners and main competitors, recognising that this requires a significant collective investment effort, mobilising both public and private funding. But it also committed to making a success of the green (and digital) transitions, reaffirming the goals of climate neutrality by 2050 and accelerating the energy transition.

We thus see the emergence of twin competing trends that also apply to agriculture and food. The need to boost EU competitiveness and growth (and, we might add, farm income) while staying the course on the European Green Deal and the decarbonisation agenda, and the desire for simplification and a reduction in the regulatory burden on businesses and farms without straying too far into deregulation and rolling back on sustainability goals.

The joint emphasis on competitiveness and sustainability is reflected in the paragraph on agriculture and food. "The European Union will promote a competitive, sustainable and resilient agricultural sector that continues to ensure food security. We will champion vibrant rural communities and strengthen the position of farmers in the food supply chain. We will continue to protect nature and reverse the degradation of ecosystems, including oceans. We will strengthen water resilience across the Union" (European Council, 2024). The commitment to a sustainable agriculture in the previous Strategic Agenda 2019-2024 is repeated, but on this occasion it is linked to a competitive and resilient agricultural sector.

Von der Leyen's Political Guidelines are notable in several additional respects. She underlined the need to stay the course on the goals set out in the European Green Deal but shifted the focus to implementing the existing legal framework. She announced a Clean Industrial Deal in the first 100 days of her mandate to channel investment into the climate and energy transition, as part of the preparations for a 90% emission-reduction target for 2040.

When it came to agriculture, reflecting the farmer protests that had taken place in several European capitals in the previous winter and spring (Finger *et al.*, 2024), she acknowledged that farmers and rural areas are under pressure "from the impact of climate change to unfair global competition, higher energy prices, a lack of younger farmers and difficulties in accessing capital". She made specific commitments intended to "show that Europe will protect its own food sovereignty and those who provide for us all". These include defending an EU income policy for Europe's farmers as "it is vital that farmers have a fair and sufficient income. They should not be forced to systematically sell their products below production costs". She wants to ensure that the common agricultural policy is more targeted, "and finds the right balance between incentives, investments and regulation". She also wants to enable farmers "to work their land without excessive bureaucracy, support family farms, and reward farmers working with nature, preserving our biodiversity and natural ecosystems and helping to decarbonise

our economy on the way to net-zero by 2050". She promises to "correct existing imbalances, strengthen farmers' position in the food value chain and further protect them against unfair trading practices", while doing more "to make agriculture better prepared for what climate change will bring". She undertakes to "present a plan for agriculture to cope with the necessary adaptation to climate change, and in parallel a strategy for the sustainable use of the precious resource of water" (Von der Leyen, 2024a).

Her Political Guidelines also proposed to build on the recommendations of the Strategic Dialogue on the Future of Agriculture to "present a Vision for Agriculture and Food in the first 100 days looking at how to ensure the long-term competitiveness and sustainability of our farming sector within the boundaries of our planet". The Strategic Dialogue was first announced by President von der Leyen in her State of the Union address in September 2023 and launched in January 2024 with the goal of depolarising the debates surrounding agriculture and the green transition. It brought together 29 major stakeholders from the European agri-food sectors, civil society, rural communities and academia in their individual capacities to reach a common understanding and vision for the future of EU's farming and food systems. Its wide-ranging consensus report was published in September 2024 (Strohschneider, 2024). It is hard to summarise its conclusions without distorting the balance between its recommendations.

The Strategic Dialogue report supported the maintenance and enforcement of existing EU environmental legislation. It called for farmers to be rewarded and incentivised for the provision of ecosystem services and recommended a substantial increase in financial support for climate and environmental actions including through the creation of new funds. It sought a more targeted CAP, with a clearer distinction between socio-economic support and environmental and sustainability objectives, and where income support would be focused on those farms in need to be based on a more objective measure of income. Farmers' position in the food chain should be strengthened by supporting co-operation, better addressing unfair trading practices, and ensuring that sustainability would be remunerated through the market, including through an EU-wide benchmarking system in agriculture and food systems aiming to harmonise methodologies of on-farm sustainability assessments. Pathways for sustainable animal farming should be created, including support for technological solutions for emissions reduction and the promotion of circular economy approaches. It concluded that in areas with high livestock concentrations, long-term solutions needed to be locally developed and funded with new finance.

President von der Leyen's Mission Letter to the incoming Commissioner for Agriculture and Food, Christophe Hansen, emphasised the importance of following up on the report of the Strategic Dialogue and, building on its recommendations, preparing a Vision for Agriculture and Food within the first 100 days of his mandate (Von der Leyen, 2024b). The focus should be on balancing the long-term competitiveness and sustainability of the EU farming and food sector within the boundaries of our planet. This Vision Paper, expected in mid-February 2025, will play a similar role to the Commission White Paper 'The future of food and agriculture' published in 2017 and which flagged some of the key elements later included in the Commission's legislative proposal in 2018 (European Commission, 2017). In January 2025, the Commission President announced that she had initiated 14 project groups within the Commission to ensure preparation and political steer of key cross-cutting political priorities including one to progress the Vision on Agriculture and Food (Von der Leyen, 2025). The Commission should put forward a proposal for the next Multi-annual Financial Framework covering the years 2028-2034 by July 2025 and this would normally be accompanied by a legislative package covering the main spending areas including agriculture. The Vision Paper will allow the Commission to gauge reaction to any novel proposals it might wish to make in its legislative proposal later in the year.

The elements in the Mission Letter to Commissioner Hansen relevant to the Green Deal echo points raised in the earlier documents. It mandates a more targeted approach to the CAP, with financial support more targeted to farmers who need it most, notably small-scale farmers,

while promoting positive environmental and social outcomes through rewards and incentives. The Commissioner is reminded that the implementation of the policy should be simpler, more targeted, and with the right balance between incentives, investments, and regulation. He is required to design and deploy a new approach to delivering on sustainability to support farmers in decarbonisation and preserving biodiversity. This should include the EU-wide benchmarking system proposed by the Strategic Dialogue for the agri-food sector. The Commissioner should also contribute to developing appropriate instruments for climate risk preparedness and crisis management and to the development of the European Water Resilience Strategy.

Also relevant are the Mission Letters to the Commissioners for Environment, Water Resilience and a Competitive Circular Economy, Jessika Roswall, and for Health and Animal Welfare, Olivér Várhelyi, respectively. In addition to leading the work on the European Water Resilience Strategy, the Environment Commissioner is charged with staying the course on the goals set out in the European Green Deal. Specifically on biodiversity, she is required to ensure that the EU meets its international biodiversity commitments in the Kunming Montreal Agreement as well as implementing the Nature Restoration Law. She is asked to prioritise the design of incentives for nature positive actions and private investment, leading work on nature credits (Von der Leyen, 2024c). Commissioner Várhelyi is asked to modernise the rules on animal welfare, to propose actions to prevent and reduce food waste, and to improve the sustainability, safety and affordability of food production and consumption across the food chain. He is responsible for the enforcement of food safety standards and will work to increase controls on imported products (Von der Leyen, 2024d).

What these general guidelines might mean in terms of legislative initiatives is usually revealed in the annual Commission Work Programme following the State of the Union Address in September. This then becomes the basis for a Joint Declaration with the Council and the Parliament on the EU legislative priorities for the coming year. Because of the change-over to a new political cycle in 2024, publication of the Commission Work Programme for 2025 has been delayed until mid-February 2025. This will give a clearer view of the intentions of the new Commission at the beginning of this political cycle.

One promised piece of legislation with indirect implications for food and agriculture is the proposed Omnibus Simplification Regulation due to be published on 26 February 2025. This arose following a meeting of the European Council in Budapest in November 2024 to discuss the Draghi report on competitiveness. Following that meeting, Von der Leyen announced a proposal to reduce the bureaucratic burden on firms of meeting the requirements of the three laws on environmental and social governance, the Taxonomy Regulation, the CSRD and the CSDDD. Even if the Commission proposals simply aim to limit disclosure requirements without altering the core content of the regulations, the fact that the co-legislature must agree to the changes opens up the possibility of wider amendments to the legislation. This will be a first opportunity to assess how new political majorities will be established and how they will use their voting strength on Green Deal issues.

3. Challenges for the green transition in agriculture and food

This section examines in greater detail how these tensions between competitiveness/farm income and sustainability objectives and between simplification and deregulation approaches are likely to play out in the agriculture and food policy domain. We focus on two policy areas as examples: who should pay for the transition to more sustainable agricultural practices, and the targeting of CAP expenditure. Trade-offs between objectives can be minimised and overcome if there is sufficient money to compensate the losers or those asked to bear the costs of transition. It is therefore also useful to look at the prospects for the EU long-term budget and the funding of the CAP within it. Trade-offs between objectives can also be minimised through research and innovation. The EU and Member States must continue to invest in identifying and diffusing new technologies and practices

that can help to reconcile different objectives. Despite its importance, the role of research and innovation is not explicitly further considered in the context of this article.

3.1. *Who should pay for the green transition?*

The debate on who should bear the costs of the green transition in agriculture in the EU revolves around two main principles: the polluter pays principle and the just transition principle. The polluter pays principle argues that those responsible for pollution should bear the costs of managing it to prevent damage to human health or the environment. In the context of agriculture, this means that farmers, particularly those engaged in industrial farming, should internalize the external costs associated with their practices. These costs include water pollution, high water abstraction, soil degradation, loss of biodiversity, ammonia emissions, and greenhouse gas emissions. Internalisation of external costs means that farmers would be required to take account of the broader costs to society of their farm management practices. This could be done either using market-based signals, such as taxes or quota-based trading schemes, or through regulation. For example, nitrate pollution of waterways can be tackled through a system of tradable nitrogen emission rights as implemented in the Netherlands, or through direct regulation of the amount of nitrogen that can be spread on fields as under the EU Nitrates Directive. Including agricultural emissions within an EU-wide emissions trading scheme is another example of a market-based system to limit the negative impacts of agricultural production on the environment (Trinomics, 2023).

However, while this principle is widely supported when applied to large, impersonal companies, there is resistance to applying it to farmers. In 2023 and 2024, farmer protests across Europe significantly pushed back against environmental measures based on the polluter pays principle. These protests were driven in part by concerns over the economic impact of strict environmental regulations and the complexity of their implementation. Many argue that imposing these costs on farmers, especially those with low incomes, without substantial financial support could put them out of business. In response to these widespread protests, the EU Commission and legislature made several concessions, weakening or removing some of the conditionality requirements that had been introduced in the 2021 CAP reform that farmers should meet to qualify for direct payments. One of the more significant changes introduced as part of the CAP Simplification Regulation (EU) 2024/1468 was the removal of the requirement that arable farmers should set aside a minimum of 4% of their arable area for non-productive features to protect biodiversity, instead requiring Member States to introduce a voluntary eco-scheme that would pay farmers to do this as part of their CAP Strategic Plans.

This is an example of implementing the alternative just transition principle to finance the green transition. The just transition principle emphasises that the shift to a sustainable food system should not disproportionately burden individual farmers. Instead, it advocates for support mechanisms to ensure that no one is left behind in the transition. Farmers should be compensated for adopting sustainable practices, with funding coming either from taxpayers or from consumers who should pay higher prices for sustainably-produced food. This goes beyond the widely-accepted 'public payments for public goods' principle where farmers are compensated for the provision of ecosystem services that have positive benefits for society (positive externalities). The just transition principle goes further to also recommend support to reduce polluting activities.

The distinction between positive external benefits that should be paid for by society (recognised as the provider gets principle) and negative external costs (where the polluter should pay) depends on how property rights in the environment are allocated in society. These are not objective scientific concepts but rather depend on the established legal framework. In one scenario, society claims that it has the right to enjoy fresh and unpolluted water, to experience a flourishing biodiversity, to expect that farmers will maintain healthy soils, to be able to enjoy clean air, and to enjoy the benefits of a stable climate. In this scenario, practices that

damage or reduce any of these rights would be penalised and those responsible would be asked to cease those practices. In an alternative scenario, farmers are assigned the right to use the environment as they see fit. If certain practices cause a deterioration in environmental quality, then it would be up to society to pay farmers sufficiently to make it worth their while to desist. The just transition principle in essence accepts that property rights in the environment are assigned to farmers as in the second scenario. Farmers should be paid to adopt more sustainable farming practices that do not damage the environment in the ways that can happen using conventional farming techniques.

An example of applying the just transition principle can be found in the recently-adopted Nature Restoration Law Regulation (EU) 2024/1991. Article 11 requires Member States to put in place restoration measures to enhance biodiversity in agricultural eco-systems. It requires an increasing trend at national level in at least two out of three indicators for agricultural ecosystems until satisfactory levels of biodiversity are achieved: (a) the grassland butterfly index; (b) stock of organic carbon in cropland mineral soils; (c) share of agricultural land with high-diversity landscape features. Specified improvements in the farmland bird index are also required. Member States must further put in place measures that aim to restore organic soils in agricultural use constituting drained peatlands with specified targets for the areas of such soils to be covered in 2030, in 2040 and in 2050. It is explicitly provided that the obligation for Member States to meet these rewetting targets does not imply an obligation for farmers and private landowners to rewet their land, for whom rewetting on agricultural land remains voluntary, without prejudice to obligations stemming from national law. Member States instead are expected to incentivise rewetting to make it an attractive option for farmers and private landowners.

Further evidence of the importance of the just transition principle in this political cycle are the Council Conclusions on a farmer-focused post 2027 Common Agricultural Policy adopted by the AGRIFISH Council under the Hungarian Presidency in December 2024 (Council of the European Union, 2024). The section on the green transition is headlined 'Further incentivising farmers towards green transition for a more sustainable agricultural sector'. It states that "the green transition can be achieved only in partnership with farmers, therefore EMPHASISES that they have to be adequately incentivised and made interested in applying ecologically-responsible agricultural production practices by remunerating them beyond the costs and income foregone for their ecosystem services." There is no explicit recognition by the agricultural ministers of the need to reverse the damages being done by agricultural production practices to agricultural ecosystems or the environment more generally. Instead, any move towards more sustainable practices is deemed equivalent to the provision of ecosystem services and therefore deserving of financial support.

In practice, property rights in the environment in EU law are not assigned exclusively either to society or to private actors. Important EU legislation imposes regulatory constraints on farming practices and inputs likely to damage biodiversity (the Birds and Habitats Directive and regulations on plant protection products), water quality (the Nitrates Directive), air quality (the Industrial and Livestock Rearing Emissions Directive), and other issues. The report of the Strategic Dialogue committed to the maintenance and enforcement of existing EU legislation and to finding actionable leverages to improve its implementation. However, it refrained from recommending further regulatory interventions to improve the sustainability of agricultural production and clearly favoured the application of the just transition principle. This immediately raises the question of where the funding to effectively advance the green transition under this principle can be found.

3.2. *Making better use of CAP resources*

Farmers already receive significant transfers through the EU's CAP as well as from national budgets. DG AGRI estimates that, on average across the EU, direct payments contribute around 23% to agricultural factor income (33% if CAP

payments under Pillar 2 schemes are included).[1] In addition, particularly since the COVID-19 pandemic and the Russian invasion of Ukraine, farmers have also benefited from a significant increase in national State aid.[2] An obvious question for the next political cycle is whether these funds are well targeted, and whether some of this funding might not be repurposed to better support the green transition.

CAP funding is distributed under two Pillars. Pillar 1 finances direct payments and market support expenditure, while Pillar 2 funds rural development expenditure including payments to farmers in areas of natural disadvantage and payments for agri-environment-climate management practices. In principle, under the CAP Strategic Plans Regulation (EU) 2021/2115 and the new delivery model that it introduced, Member States have very great discretion in how they can programme their allocated CAP funds. Funds can be shifted between Pillars up to specified limits. There are minimum spending limits (ring-fencing) on agri-environment-climate measures in both Pillar 1 (a minimum of 25%) and Pillar 2 (a minimum of 35%) but Member States are free to allocate higher percentages if they wish. Payments to farmers under the CAP are subject to enhanced conditionality which requires farmers to observe Statutory Management Requirements as well as a series of nationally-defined Good Agricultural and Environmental Conditions set out in the Regulation. At the same time, actions under the CAP are expected to contribute 40% of the CAP EU funds to the achievement of the climate-related objectives, to be calculated according to the established methodology. The distribution of CAP spending across nine specific objectives and one cross-cutting objective should be informed by an analysis of each country's specific situation in terms of strengths, weaknesses, threats and opportunities (SWOT analysis) and the identification of the needs that should be addressed. By addressing their specific needs, national CAP Strategic Plans (CSPs) are expected to be consistent with and contribute to the Union's environmental and climate legislation and commitments and, in particular, to the Union targets for 2030 set out in the Farm to Fork Strategy and the EU Biodiversity Strategy (European Commission, 2023c).

Nonetheless, 47% of total public spending under the CAP (including national contributions) under the CSPs is still allocated to direct payments for income support (excluding eco-schemes) (European Commission, 2023b). The bulk of these payments continue to be based on area and thus benefit larger farms with less need for income support. The 2021 CAP reform left the capping of payments voluntary, but required Member States to introduce a redistributive payments to top up payments on smaller farms. This now represents 10.7% of direct payments with an additional EUR 20 billion for direct payments targeting smaller farms. Further capping payments to larger farms could release additional funding to support the green transition.

3.3. *Prospects for the next MFF*

Negotiating the EU's long-term budget, the Multi-annual Financial Framework (MFF), is always a hard-fought and long-drawn out affair. The package includes both the MFF Regulation which defines how much the EU can spend, and the Own Resources Decision which lays down where EU revenue comes from. Both require unanimous agreement among the Member States in the Council, the MFF Regulation requires the consent of the Parliament while the Own Resources Decision must be ratified by every Member State according to its constitutional procedures. The current MFF, covering 2021-2027, sets the total amount of own resources allocated to the EU at 1.40% of the EU's Gross National Income (GNI) (up from 1.23 % in 2014-2020 to take account of the impact of the UK exit from the Union). The own resources ceiling has been increased by a further 0.6 percentage points to

[1] European Commission, 'CAP expenditure', https://agriculture.ec.europa.eu/data-and-analysis/financing/cap-expenditure_en.

[2] Farm Europe, 'State aid to agriculture: more than €18 Bn since 2021', https://www.farm-europe.eu/news/state-aid-to-agriculture-more-than-e18-bn-since-2021/.

2% of EU GNI on an exceptional and temporary basis (until 2058) to allow the EU to borrow on the markets to finance the Next Generation EU (NGEU) recovery instrument. In practice, there is a considerable margin under these ceilings. Following the Mid-Term Review of the MFF in 2024, the overall MFF ceiling for commitment appropriations in 2025 is estimated at 1.05% of EU GNI and the overall MFF ceiling for payment appropriations stands at 0.95% of GNI. The resulting margin for 2025 between the MFF ceiling for payment appropriations and the own resources ceiling for payment appropriations is thus 1.05% of GNI (European Commission, 2024).

The next MFF will need to address several competing priorities. The ongoing war in Ukraine has underscored the need for increased defence spending, while continued financial and humanitarian support for Ukraine remains a priority. The mid-term review of the current MFF included a €50 billion Ukraine Facility, highlighting the scale of commitment needed. To address competitiveness challenges, the EU must invest in innovation, digital transformation, and green technologies. The Strategic Technologies for Europe Platform (STEP) received €1.5 billion in the mid-term review, but more funding will be necessary. The EU must also address issues related to migration and border security, with more money needed for third countries to keep migrants in or to take them back. More money must also be found for instruments such as the solidarity and emergency aid reserve to address the growing frequency and increasing scale of crises and natural disasters. At the same time, payments to repay the borrowing undertaken to fund the NGEU recovery instrument will begin in 2028 and continue until 2058.

The scale of the EU budget relative to the size of the EU economy is still extremely small. Nonetheless, there has been great reluctance among Member States to provide the EU with additional own resources. The Commission presented proposals to introduce new own resources in 2018, based on the EU Emissions Trading System (ETS), a new common consolidated corporate tax base, and plastic packaging waste (European Commission, 2018), but only the plastic-based own resource has so far been introduced as of 1 January 2021. Following agreement with the Council, Parliament and Commission on a roadmap to introduce new resources during the 2021-2026 period in part to prepare for the repayment of NGEU borrowing, the Commission proposed in 2021 three new sources of revenue, including revenue generated by the Carbon Border Adjustment Mechanism (CBAM) on certain imports, revenue from a revised ETS, and revenue based on the reallocated profits of very large multinational companies (European Commission, 2021). This proposal was updated in 2023 to include the introduction of a new temporary statistical own resource on company profits as well as the technical adjustments needed for the collection of ETS and CBAM as new own resources but remains under discussion in the Council (European Commission, 2023a).

In the absence of new own resources, the MFF can only be increased through additional contributions from Member States (provided through the GNI own resource) or through additional borrowing. Many Member States are already struggling to meet their national fiscal targets, and their public debt to GDP ratios are already at very high levels. The EU could also raise funds by issuing EU bonds on financial markets as was done to finance the NGEU recovery instrument. This was the first time that the EU engaged in large-scale joint borrowing. The initiative was a response to the unprecedented economic impact of the COVID-19 pandemic. Agreement to undertake this borrowing was contingent on it being a one-time measure, with several Member States expressing reservations about making such borrowing a regular practice.

This budgetary context for the 2028-2034 MFF makes it very difficult to envisage an increase in the CAP budget, and even maintaining it in the face of competing spending priorities may be challenging. The CAP budget in the 2021-2027 MFF was maintained in nominal terms, but with high inflation in 2022-2023 its real value for farmers has diminished. Further enlargement of the Union to include the countries of the Western Balkans and the Eastern Partnership, particularly Ukraine, will also require additional CAP expenditure if accessions

take place before the end of 2034. The political priorities of the new Commission as well as the co-legislature reviewed previously emphasise the need to provide additional support for farm incomes including to support the green transition. If this is not forthcoming through the EU budget, then it will be left to those national governments that have the fiscal headroom to provide this support from national funds. Various mechanisms could be envisaged, including the introduction of co-financing for CAP Pillar 1 direct payments (Matthews, 2018) or increased State aid making use of the derogations under the Agricultural Block Exemption Regulation (EU) 2022/2472 or the Agricultural De Minimis Regulation (EU) 2024/3118 (which raised the ceiling of *de minimis* aid that a single holding may receive per Member State over any period of 3 years to EUR 50,000).

4. Conclusions – what prospects for the EGD in agriculture and food?

The previous EU political cycle 2019-2024 ushered in the European Green Deal on a wave of activism around climate change and other environmental concerns. With respect to fossil fuel decarbonisation in the energy and industrial sectors, significant legislative initiatives were taken including the passage of the European Climate Law in 2021 which significantly raised the 2030 targets for emissions reduction as well as enshrining the objective of a net zero emissions economy by 2050 into law. The impact of the Russian invasion of Ukraine on energy prices, and the subsequent efforts to reduce EU dependence on Russian gas supplies, also underlined the need for investment in alternative renewable sources of energy. However, the same high energy prices and resulting market price volatility for agricultural commodities had a negative impact on the farm sector (even if income from farming reached record levels in 2022 and 2023 reflecting higher commodity prices despite higher input costs). This was compounded by the increasing environmental demands being made of farmers at a time when the real value of CAP payments was decreasing due to higher inflation. Political opinion within the EU co-legislatures, which initially had approved of the Green Deal objectives in the agricultural sector, turned against making further demands on farmers with key pieces of legislation either being watered down or withdrawn. The outbreak of farmer protests and demonstrations between November 2023 and March 2024, often sparked by grassroots activists and social media rather than the traditional farmer unions, further influenced the political climate prior to the European Parliament elections in June 2024. These elections demonstrated a considerable loss of influence for green parties and a swing towards parties of the right whose agenda focused more on protecting incomes in agriculture.

This article assesses how this new political context will likely influence the future direction of agricultural policy in the coming political cycle 2024-2029. Our review of key political declarations from the Council and Commission confirms the greater focus on economic issues such as competitiveness and farm incomes, but also underlined the continued awareness of the need to address the climate and environmental issues that are central to the Green Deal. We hypothesised that the way in which these twin objectives can be reconciled is by putting less emphasis on the polluter pays principle (where farmers are expected to bear the costs to society of the damage caused by farming practices) and more emphasis on the just transition principle, which envisages that farmers should be compensated and rewarded for the transition to more sustainable farming practices either by taxpayers (through increased public support) or by consumers paying more for more sustainably-produced food.

The jury is still out on whether and how the supply chain can be organised to adequately remunerate more sustainable practices. Consumers in surveys often respond that they are prepared to pay more for higher-quality products, but actual shopping habits reveal that price continues to be the dominant choice criterion. This cost-consciousness has been reinforced during the recent bout of extraordinarily high food price inflation in European countries. The forthcoming proposal for an EU-wide sustainability benchmarking system may lead to a harmonised and consistent measurement system among public, private and

sectoral initiatives, but will need to be complemented by other initiatives designed to improve value sharing along the food supply chain.

In the short run, additional public resources to support the green transition, as called for by the report of the Strategic Dialogue, may seem to be a more feasible alternative. One option is to further repurpose existing EU spending on the CAP to provide additional support for the green transition. This may be a desirable option in itself, but it does not transfer additional resources. If drawing down these resources requires investment and additional costs for participating farmers, they would even perceive this as a further decrease in the value of public transfers that they receive. There is scope to shift some income-related funding by targeting spending on smaller farms, but the resources that might be released in this way for the green transition are relatively small, and even smaller when the demand to spread CAP resources over new accession countries is factored in.

Ultimately, a just transition approach can only work if additional resources are made available for farmers. There is significant debate over whether in the long run sustainable agriculture can be as profitable for farmers as conventional agriculture, but even those who claim that this is the case recognise that there will be immediate transition costs (Moret-Bailly and Muro, 2024). Higher CAP expenditure within the EU long-term budget would require a significant increase in the overall size of the MFF in relation to EU GNI. Our analysis above suggested that this will be hard to achieve. The alternative is for Member States to dig into their own resources and provide additional State aid to their own farmers, but fiscal limits can make that impractical even if the political will is there.

Charting a future course through these competing priorities will require continued investment in identifying and diffusing new technologies and practices that can help to reconcile these different objectives. We do not explicitly address this issue in this article. It will also require greater recognition of the heterogeneity of the EU farm sector.[3] Instead of treating farmers as a homogenous group, it would make sense to distinguish more clearly between the minority of large-scale, industrial farming units that produce most of our food and where the polluter pays principle could well be applied, and the majority of small-scale farming units whose continued survival plays an important role in many rural areas, and where applying the just transition principle can be more appropriate. Only in this way will it be possible to ensure that both farm income and competitiveness objectives can both be met.

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Legislative balances needed between environment and agriculture

ESTHER MUÑIZ ESPADA*

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Abstract

The pressure and the excess of environmental obligations of the European legislation on agriculture has ended up affecting the original purposes of agriculture and agri-foodstuffs, therefore, art. 39 of the TFEU. The time has therefore come to consider at the legislative level what should be the correct balance between the environment and agriculture or productivity. Agriculture, food and the environment are an inseparable equation. Bureaucracy and certain environmental obligations affect the profitability of the agricultural sector. Therefore, the legislator would have the following task at present: to analyze the level of the results of the application of these rules that impose more bureaucracy and to determine how they are having an effect, where it is necessary to intervene and correct, and how to modify or what to do away with. The profitability of this sector depends on legislative management. This means above all that it is necessary to point out where it is necessary to remove legislative hindrances or obstacles for an adequate profitability of the agricultural sector.

Keywords*: Environmental obligations, Agri-food, Territory, Regulatory planning strategies.*

1. Introduction

The current situation of the agricultural environment is marked by widespread discontent in the agro-livestock sector, largely due to bureaucratic requirements and the lack of profitability necessary to remain in this profession. About all, the pressure of some environmental obligations, where, on the other hand, most cases of fraud are concentrated, is an issue of enormous influence. The difficulty of being able to sell agricultural and livestock production above cost is another element of risk in contracting, which discourages people from remaining in the sector and discourages generational replacement in the future.

Likewise, insecurities are constant for agricultural markets, as has been reflected in the pandemic situation, as is the case with the Russia-Ukraine war, the high price of inputs or the incidence of climatic elements.

It could be said that there are numerous issues of concern for this sector.

Among all the difficulties, those related to the environment are particularly relevant. A deep reflection on the objectives of sustainable development 2030 is necessary, as there has not been sufficient debate on this topic and its impositions have been too automatically transferred. It could be added as well that the *European Green Deal* 2020 may be more of an

* Universidad de Valladolid, Spain.
Corresponding author: mariaesther.muniz@uva.es

obstacle than a support to the CAP. There is an excess of environmental obligations that contradict the traditional objectives of agriculture and, therefore, of art. 39 of the TFEU.

Certainly, the process of accumulation or oversizing of environmental and climate objectives has led to a concurrence or collision with other objectives: the more classic agricultural objectives, causing some contradictions with the purposes of art. 39 of the TFEU, which represents a basic pillar (Costato, 2008; Petit, 2020). It should be borne in mind that art. 39 is not a recommendation or a guideline, it is a mandatory rule, therefore, its contents are the results to be achieved with agricultural policies.

Therefore, the time has come to consider at the legislative level what should be the correct balance between the environment and agriculture or productivity. Agriculture, food and the environment form an inseparable equation.

The timing is extremely opportune for this exercise, 'the time for change is now'. Consider the new stage that can be opened with the final report of the *Strategic Dialogue on the future of agriculture in the EU,* September 2024, which has been presented by the chairman of the working group[1], Peter Strohschneider, under the title *A shared prospect for farming and food in Europe*[2]. His recommendations will guide the work of the European Commission in shaping its *Vision for Agriculture and Food*, to be presented during the first 100 days of President Von der Leyen's second term in office[3].

In addition, to respond to farmers' concerns, the Commission has taken targeted action to enable farmers to identify the administrative burden and complexity arising from CAP and other food and farming rules, both in relation to their application at national level and the related registration and notification obligations, by launching two consultations: consultation on unfair trading practices and consultation on simplification[4].

2. The pressure of environmental obligations

The future of the relevance of the environment in the agricultural sector was already visible even before the EU agricultural policy of 1985 (Winkler, 1994), the European Commission's document *on the future of the rural world* reflected this perception (EU Commission, 1988); subsequently, the EU's development in the defense of all things ecological became more visible, so that everything related to agriculture began to be conditioned by environmental recommendations or guidelines, and subsequently mandatory environmental standards were imposed on it. When successively the strategy on climate change was specified sustainability and climate became key to reforming all economic sectors, especially affecting the agricultural and agri-food sector.

The 2003 reform of the CAP intensified everything related to the environment, advocating a greener agriculture, and the evolution intensifies this direction, as it is not without reason that the EU signed the Kyoto Protocol. Subsequently, the CAP 2014-2020 accentuates environmental challenges as a consequence of international commitments. It is understood that the modernisation of the CAP is based on greater sustainability: leading the transition to a "more sustainable" agriculture, and with the mission to promote equally sustainable rural development across the Union. In particular, the Commission highlighted among the main priorities for the post-2020 CAP a greater ambition in the environment and climate action sectors. Thus, from

[1] It brings together Europe's diverse agri-food sectors, civil society, rural communities and academia to reach a common understanding and vision on the future of the agricultural and food systems, in a shared vision for EU agriculture.

[2] The report is addressed to the European Commission, the European Parliament, Member States and stakeholders.

[3] The aim is to build consensus among stakeholders in the agri-food chain, avoiding polarisation in the public debate on agri-food issues. As reported, the strategic dialogue brings together key stakeholders from across the agri-food chain, such as farmers, cooperatives, agri-food companies and rural communities, as well as non-governmental organisations and representatives of civil society, financial institutions and universities.

[4] https://agriculture.ec.europa.eu/consultations-eu-initiatives-agriculture-and-rural-development/farmers-consultation-simplification_en?prefLang=es.

the post-2020 CAP, the objective would essentially be to promote measures in the fields of environment and climate change.

These ambitions are further enhanced in the CAP 2023-2027 with a radical change under a new ecological architecture (Petit, 2020), among other factors because it is based not on more compliance, but on results with an intensive environmental framework (Petit, 2020). Strengthening that is desired by the influence of the *European Green Deal*, which is structure as the link that must guide all polices, and this influence is also present in the whole European agroforestry policy (Gamazo Chillon, 2024).

No doubt about it that the turning point in this strategy is the *European Green Deal*. It is part of the current economic, cultural, geopolitical and, of course, legal transformations. It is so strong that the aim is to make it one of the most far-reaching policies of recent years. It affects all sectors of the economy and industry, but especially those most closely related to the ecological transition, such as agriculture and food, which involves rural development (Muñiz Espada, 2021). The EU's Green Pact is a decisive step forward in terms of the environment and climate change. It is intended to bring about a real revolution in which the entire economic and business sector, especially agriculture, is to be reformed to meet the new challenges of renewable energy, the circular economy, digitalisation, the bioeconomy and other objectives.

In addition to all this, there are also hard environment requirements in the new Regulation (EU) 2023/1115 of the European Parliament and of the Council of 31 May 2023 concerning the placing on the Union market and the export from the Union of certain raw materials and products associated with deforestation and forest degradation. Specifically, it affects these products: cattle, timber, palm oil, soybeans, cocoa and coffee.

Indeed, the entire EU agroforestry policy complements the whole environmental field: in 2021 the Commission adopted a new *2030 Forest Strategy*, as an initiative of the *European Green Deal* 2020.

Thus, the set of regulations focuses on everything related to environmental protection and expansion of organic farming, but also, and above all, to curb climate change. In addition, nature restoration law entails new environmental obligations – Regulation (EU) 2024/1991 of the European Parliament and of the Council of 24 June 2024.

All this now constitutes the new bases as well for rural development with reinforced criteria, with more environmental criteria, so that the process of erosion of the agricultural discipline to the benefit of environmental matters has rightly been questioned.

On other other hand, not only is the agricultural environment becoming more environmentally expansion and the fight against climate change, but environmental protection has also become a cross-cutting competence – art. 11 TFEU –, with an intense regulatory influence conditioning all the functions of the agricultural and other economic sectors.

Because all of this we are in a phase of transformation that determines very significant legal and regulatory changes.

The criticism all of this which has not been long in coming, pointing out that it "would jeopardize the livelihoods of European farmers, disrupt long-established supply chains, reduce food production, raise prices for consumers and even destroy urban areas to make way for green spaces" – PPE, euronews.com –. The agricultural sector has directly blamed the environmental regulations for the excessive bureaucratic burden.

Reactions to the new policies has been presents in every country of UE: the press recently reported on the discontent of the agricultural sector in France, for example, due to "cost increases, pesticide bans, competition from Ukrainian products, compensation for the health crisis with delays... and a long list of grievances that have worn out the patience of a sector that has decided to move in France, as elsewhere in Europe, to a higher level of pressure on the administrations". Demonstrations have taken place all over Europe in 2023 at the beginning of 2024 (Plaza Llorente, 2024).

Several agrarian associations as well announced mobilizations to demand "reasonable" production prices until production costs are affordable. It could be said that once again the eternal battle of selling prices to the next link above the production costs, now under increasingly complicated conditions, and always

present the criticism of excessive bureaucracy by Brussels. On the other hand, it is necessary to take into account that if the pressure to fulfil obligations that are difficult to achieve increases there will be a higher level of fraud. Fraud, which in this context not only affects economic issues, but also something more important: the health of citizens and the safety of foodstuffs.

As a result of all this in September 2023, the President of the European Commission appeared before the European Parliament with the *State of the Union* speech with the idea of more dialogue and less polarisation also in relation to the debate on the environment and the future of agriculture in the EU.

It is therefore clear that there is an urgent need to analyze the level of the results of the application of these rules and to determine how they are having an effect, where it is necessary to intervene and correct, and how to modify or what to do away with. The profitability of this sector depends on the legislative ordination. This means, above all, that it is necessary to point out where legislative obstacles need to be removed in order to ensure the profitability of the agricultural sector.

3. Environmental influence on spatial planning

This rapid and insistent environmental expansion has also led to the creation of new forms of sharing in the utilities of property, granting a new function also to the territory and space itself (Bodiguel, Cardwell, 2006), with control over the use of this property justified under the idea of public interest, which influences, and not always positively, the concept of property rights. This, in turn, requires a more intensive policy or legal regime of compensation for loss of profitability for the owner of these areas reserved for special planning based on this public interest[5] (Muñiz Espada, 2021).

There is an erosion of the property rights of the owners affected by restrictions of ownership, e.g. in the respective habitat protection legislation. Sometimes these restrictions do not have sufficient compensations or restitution mechanisms for such restrictions; there is also a lack of collective compensation for losses from the development of activities on the agricultural and rural economy (Hernandez-Zakine, Durand, 2017).

In this way, the relations between agriculture, food and the environment take shape on the territory (Galloni, 1993), and must be integrated or managed from the territory as a coordinated and coherent management, each of them attending to their essential function.

In turn, integration and coordination in the rural environment, space which is insufficiently protected, requires its own model of development, that also involves the urban environment. However, a territorial cohesion policy has yet to be tackled, and its ineffectiveness and lack of an adequate model or due integration of the different uses of space prevent the integrated and ordered achievement of the different purposes that are integrated into it.

Thus, given that the integration of the different factors to be related must begin with the territory, until there is an efficient model of territorial cohesion there will not be an adequate relationship between all its elements, nor will the objectives set for sustainability be guaranteed; territorial cohesion is therefore an arduous undertaking that requires very considerable efforts to tackle this strategy, above all of an economic nature. And from a legislative point of view, this would require less sectoral legislation, because the regulatory systems are not independent and in the agricultural field there are no watertight compartments.

4. Environmental influence on agricultural markets

The pressure to comply with environmental obligations has important consequences on agricultural markets and the food chain.

While, on the one hand, the legislator strives

[5] All this especially affects Spain, because it has protected areas above the European average, Red Natura 2000 affects almost 30% of the territory and there are Biosphere Reserves in a privileged position, accounting for 12.4% of the surface, and Castilla y León is one of the communities with more Biosphere Reserves in Spain.

to seek balance in the food chain through specific laws, the same legislator destroys this balance by regulating on the environment. This is evident in Spanish regulation. The regulation of the food chain in Spain dates back to 2013[6] and since then there have been several reforms but it has never given the expected results (Muñiz Espada, 2024a). The main objective of guaranteeing producers a price above production costs continues to be a difficult mission, unless the economic situation itself helps (Caballero Lozano, 2024). In the *Strategic Dialogue on the future of agriculture in the EU* 2024, efficiency and competitiveness are promoted under the banner of sustainability, which undoubtedly makes the balancing forces more costly, thus expressing that the contracts signed between the actors in the chain should include provisions specifying the additional costs and benefits associated with European requirements on the environment, workers' rights and animal welfare.

On the other hand, the imbalances in the chain are constant, as we have seen with the pandemic situation, with the Russia-Ukraine war, with the fall in the prices of agricultural products due to the abolition of tariffs on imports of agricultural products from Ukraine, with the high price of inputs and with the impact of climatic factors. For one reason or another, farmers "discontent is constant, and although the Commission did lower its demands in the wake of the latest farmers" demonstrations across Europe, the adoption of the Nature Restoration Regulation shows that the insistence on climate change and environmental issues is not going backwards. But there is no doubt that all this has consequences on agricultural markets, increasing the prices of agricultural products, making it more difficult to stay in the sector and making production more expensive, which has an impact on food security objectives.

In any case, to ensure balance in agrifood markets cannot be achieved by regulatory intervention alone; above all, it is necessary to have a clear model of agricultural structure. As we have repeatedly pointed out, it is a problem of model, and the model of small farms is absolutely outdated, and it is a model that has been failing for decades. The negotiating capacity of the sector must be significantly improved, starting with the negotiating capacity of the OPAs, and a special multidisciplinary effort must be made to improve the productive structure to create stronger and better dimensioned farms (Muñiz Espada, 2020). On the other hand, the control over the functioning of the food supply chain should not fall under the responsibility above all on administrative sanctioning nature, but it should have an impact on private law, then not only with the imposition of administrative sanctions (Caballero Lozano, 2024).

The legislation must also take into account the special characteristics of agricultural production, with high levels of risk due to the dependence on biological processes that cannot always be controlled, meteorological events and changing market circumstances (price fluctuations, supply/demand, incidence of the perishable nature of products, etc.).

The regulation should protect the weakest link in the food chain: the primary production sector, the problem is largely made up of small and medium-sized farms (SMEs), many of which are still characterized by their family substratum. It is important to maintain the model of family agricultural: many of these farms make an enormous effort to carry out a quality production, but this is not rewarded with a fair and equitable

[6] Law 12/2013 of 2 August 2013 on measures to improve the functioning of the food supply chain, that defines the food supply chain as "the set of activities carried out by the various operators involved in the production, processing and distribution of agricultural and food products, excluding transport activities, and hotel and catering businesses with a turnover of less than ten million euros, excluding also businesses in accommodation services activities with a turnover of less than 50 million euros" – Art. 5(a) –. Final consumers are excluded from the operators, since according to Article 5(c) a food chain operator is "A natural or legal person in the food sector, including a buying or selling group, unit or joint venture, carrying out an economic activity within the food supply chain", so that "Final consumers shall not have the status of food chain operators". However, this does not prevent direct sales to final consumers from being a legal business within the food supply chain.

remuneration by the market. Thus, the great economic dependence of the suppliers (farmers) on the buyers makes them vulnerable to the market. Because of this the development and integration of new marketing channels, including short channels, offer added value to producers[7]. This will contribute to more dynamic agri-food systems as projected in the new path to be initiated because of the work of the *Strategic Dialogue on the future of agriculture in the EU* 2024.

The objectives of proximity sales of food products are: to increase the competitiveness and viability of farms in a specific region; to reduce the economic, energy and environmental costs associated with the process of transport, intermediation, promotion and sale of food products; to improve the position of primary producers within the value chain and within the agri-food or agro-industrial system; to increase the added value of food products in terms of quality; to correct possible inefficiencies in the long food chain; to strengthen the links between primary producers and consumers; and favouring the diversification of economic activity in rural areas, contributing to job creation and territorial structuring, improving their sustainability and resilience.

The sale of local agri-food products provides an alternative for mobilising and valuing the economic potential of local agriculture; it contributes to the consolidation of rural tourism; it promotes consumer information and knowledge about the qualities of producers and the quality of foodstuffs; local sales generate new social and ecological impacts of consumption patterns, promoting cooperation between the production and consumption links in the food chain. Local sales make it easier for primary producers to market their produce; in this way, agriculture and trade, together with the long food chain, facilitate the better functioning of agricultural markets.

Local sales have an undeniable environmental protection, favouring the implementation of the *European Green Deal*[8] by reducing the number of links in the food chain, with the consequent savings in greenhouse gas emissions, by significantly limiting the movement of people and raw materials due to the proximity of the producer to the point of sale and the proximity of the final consumer.

Short channels help to reduce the environmental impact of the food processing and retail sector by taking action on transport, storage, packaging and food waste[9]. This strategy is expected to offer "proposals to improve the position of farmers in the value chain". When it comes to sales of food products through platforms as a form of direct sales from producer to consumer, the lack of intermediaries as a way of making the product cheaper or the appreciation of a certain quality by consumers justifies the existence of specific regulations as a means of supporting the primary producer and consumers, as they generate a new form of consumption (Muñiz Espada, 2024b; Amat Llombart, 2024).

The Farm to Fork Strategy for a fair, healthy and environmentally food system, contained in the Communication from the Commission to the European Parliament, the Council, the

[7] Regulation (EU) 2021/2115 of the European Parliament and of the Council of 2 December 2021 laying down rules on support for strategic plans to be drawn up by the Member States under the common agricultural policy (CAP strategic plans), financed by the European Agricultural Guarantee Fund (EAGF) and the European Agricultural Fund for Rural Development (EAFRD), and repealing Regulations (EU) Nos. 1305/2013 and (EU) No. 1307/2013, considers it "necessary to improve the position of farmers in the value chain, in particular by fostering forms of cooperation that benefit farmers and encourage their participation, as well as by promoting short supply chains and improving market transparency" (cdo. 25). "Support should allow for the establishment and implementation of cooperation between at least two entities with a view to achieving the objectives of the CAP. Such support should be able to cover all aspects of such cooperation, such as, inter alia, 'the promotion of short supply chains and local markets" (cdo. 83). One of the specific objectives is to "improve the position of farmers in the value chain" (cf. Art. 6(1)(c)).

[8] *European Green Deal*, contained in the Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions; and its corollary, Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) N. 401/2009 and (EU) 2018/1999 ('*European Climate Legislation*').

[9] "From farm to fork: devising a fair, healthy and environmentally friendly food system" (section 2.1.6).

European Economic and Social Committee and the Committee of the Regions, Brussels, 20.5.2020 COM(2020) 381 final, emphasises the value of short supply chains with the aim of increasing the resilience of local and regional food systems, to reduce dependency on long-distance transport.

Direct sales or short food chains contribute to revaluing and promoting local products, to preserving the characteristics and territorial traditions of the products and the way they are made and presented; it helps to stimulate the local economy, to create employment, so that it assumes a special importance in the national economy in terms of production and employment and reduced external dependence. This close contact between producers and consumers favours beneficial community relations and greater social interaction, which is key in rural areas, and also provides interaction between urban and rural areas as another component of the much sought-after territorial cohesion, in addition to social and economic cohesion. In short, the formula combines the generation of new income for the agricultural sector with the interest of consumers. However, it is not lacking in legislative difficulties either, such as the adaptation of health and hygiene standards and directives to this form of sale.

The importance of its promotion is therefore clear, as is the development of the promotion of farmers' markets, as reflected in the report Strategic dialogue on the future of agriculture in the EU 2024.

Food chain legislation, long and short, is not only about ensuring a balance between all the actors in the food chain, or favouring the proper profitability of producers, it is also about providing proper quality in agri-food production, however abstract and difficult it may be to define what is meant by "quality". In any case, the essential objectives of the new agri-food policy framework are not only to ensure a certain quality, but also, and above all, its sustainability. In the food area, Brussels has declared that 'while food in Europe is quality, it must now also be sustainable'. Promoting sustainability and the ecological transition is a constant in the *Strategic Dialogue on the future of agriculture in the EU* 2024, which will be underpinned by innovation, digitalisation and research, and which will set the future direction of the food chain.

5. The new Agrofood European Strategy 2025

In the Commission non paper *Position of farmers in the food supply chain: next steps*, the Commission announced its intention to prepare a range of short, medium and longer-term actions to improve the position of farmers in the food chain and to protect them against unfair trading practices. During the AGRI FISH Council meeting on 26 February 2024, explain this document, Member States showed their willingness to tackle issues related to the food chain.

The Chairman of the European Parliament's committee for agriculture and rural development also identified in a recent letter, has been exposed, the areas where action could be taken. Some measures will benefit from the ongoing discussions within the Strategic Dialogue on the Future of Agriculture. In the meantime, some immediate and short-term measures could be taken:

A. Immediate measures

Over the very short term, the Commission proposes several non-legislative measures to reinforce the overall capacity of stakeholders and public authorities to understand and analyse the economic and legal challenges faced by farmers and other actors in the agri-food supply chain, as follows:

1. Creation and launch of an observatory of production costs, margins and trading practices in the agri-food supply chain involving the Commission, the Member States and the stakeholders (farmers, food industry, traders, retail and services, consumers, input providers) while considering the heterogeneity of the supply chain in the Member States.

2. Report on the implementation of the Unfair Trading Practices Directive in April 2024. This report will supplement the Interim report on UTP Directive's implementation that was issued in October 2021 covering 16 Member States only.

B. Short-term measures
The Commission is exploring targeted changes to the CMO and other CAP-related basic acts, that can contribute to reducing the transaction costs and correcting imbalances in the value chain, while preserving the fundamental principle of market orientation.
The provisions of the CMO could be reinforced in the three following areas:
i) Strengthening EU-level provisions on contracts involving farmers and their organisations with other actors in the chain:
ii) Further strengthening of economic Producer Organisations (POs) and their associations (APOs) and reduction of administrative burden for their recognition and constitution
iii) Setting up an inducive framework for fair-trade voluntary schemes and agreements aimed at improving the remuneration of farmers

C. Medium-long term measures
On the longer-term, the Commission will proceed with the steps foreseen in the normal policy cycle relative to the legislation, in particular regarding the UTP Directive: The first Evaluation of the UTP Directive has been launched in May 2023. Its main findings will feed into a report to the European Parliament and Council as well as to the European Economic and Social Committee and the Committee of the Regions in 2025, accompanied or followed, if appropriate, by legislative proposals. A targeted consultation of the relevant stakeholders and stakeholder workshops are planned for Q3/2024. In addition, a workshop with the UTP enforcement authorities is planned for Q2/2024.

D. Additional measures
- The Commission will keep promoting a better implementation and enforcement at EU level of existing rules on agricultural products.
- Public procurement of food provides the opportunity to create a market for more sustainable products (for example, the inclusion of an organic food supply in the catering for public canteens). The use of public procurement as a strategic tool to improve sustainability might trigger the transformation of food systems, as it impacts upon the different components of food systems and affects the entire food chain. The public procurement of food has the potential to promote food system resilience and adaptive change, promoting agricultural production practices that ensure environmental sustainability and promote biodiversity.
In addition, the Commission will continue providing funding programs to support the procurement of sustainable and local products, contributing to promotion and awareness campaigns to raise awareness among public authorities, businesses, and consumers about the benefits of purchasing sustainable and local products, as well as facilitating the collaboration and networking among public authorities, businesses, and other stakeholders to share best practices, exchange information, and foster partnerships for the procurement of sustainable and local products.
- Carbon farming: The recently agreed Union Certification Framework will create new business opportunities for farmers and foresters, who adopt more sustainable management practices, and is expected to strengthen their market position. The Commission will work together with an expert group to develop certification methodologies for carbon removals and soil emissions reductions and to swiftly start the certification process[10].

Consequently, a combination of the various legal measures is necessary, since the achievement of the primary objective depends on them: ensuring the profitability of the sector and guaranteeing supplies.

The objective remains to stimulate the development of pioneering markets for climate-neutral and circular products, both within and outside the EU. The action plan is to include a

[10] All relevant information can be found in the document available at the following link: https://www.tweedekamer.nl/downloads/document?id=2024D10316.

'sustainable products' policy based on a common methodology and principles.

All the challenges are therefore included in the phenomenon of the fight against climate change, within a European climate pact, where the challenges of biodiversity should also be taken into account. To this end, the EU is committed to continuing to promote a more rigorous 'Green Pact diplomacy', focused on convincing others and offering support to those who take on its sustainable development policy.

6. Conclusions and proposals

The deepening of environmental objectives and climate change policies that affect all economic sectors require an enormous economic effort from the States, with a complex management of their resources, mainly affecting the agricultural and food sector, and within this, above all the primary producer, as the most vulnerable part. The balance between all the agents in the chain is still pending, and it is precisely the increase in environmental obligations that has thrown it further out of balance, despite some legislative interventions, which are always very partial.

It is also surprising that, while environmental obligations affect the specific nature of the territories, there is still no improvement in territorial cohesion, and there is a lack of legislative measures to achieve territorial cohesion and a proper relationship between the various uses of space and the appropriate relationship between urban and rural areas. Likewise, in the context of the rural environment, progress must be made in the management and planning of forest areas, especially in Spain, which is the second largest EU country in terms of forest areas, but few of these are duly managed under a specific planning instrument.

The difficulties, in any case, are evident, due to the different regulatory levels involved in agriculture and rural development, making it very difficult to achieve the necessary regulatory coherence. On the other hand, the dispersion and fragmentation of regulations and the dispersion of information with numerous agricultural administrative registers, typical of some EU countries, prevents agricultural and rural development policy from being tackled with a criterion of unity or with a unitary approach. Likewise, information of agricultural importance should be organised in a uniform way around a single register and the dispersion of information through numerous types of administrative registers should be avoided. The business register is the most appropriate place to contain all the information on agri-food businesses.

In any case, when the relations between agriculture, food and environment are not easy to balance (Gadbin, 2011), a regulatory decision should be taken that is integrative in a flexible way, avoiding unnecessary pressures between thematic areas involved (Bodiguel, 2020).

Agriculture, food and the environment are inseparable, which is why any agricultural policy must have a comprehensive vision, and there must be a unitary vision of the entire value chain, taking into account the balance of profitability between all operators in the chain, eliminating the isolated consideration of sub-sectors.

The principle of food safety must be related to specific food needs, bearing in mind that art. 39 TFEU, as a legal norm, is mandatory and is not a recommendation or a simple guideline; therefore, the objectives of art. 39 are a priority.

Agriculture should be recognised for its valuable contribution to environmental conservation and its efforts to adapt to the natural phenomena that cause climate change should be acknowledged. Farming practices must remain environmentally welcoming, but without losing sight of productivity needs. However, given the current intensity of climate change policies, the right balance between environment and agriculture/productivity must be considered.

Promoting partnerships and cooperatives among primary producers is essential to influence the necessary balance between the interests of agriculture, food and the environment. This requires an integrated policy that is coordinated and coherent with each other. It is also necessary to create new marketing methods and to have specific regulations to encourage new sales channels for agri-food products, such as local channels; such specific regulations are essential for health and consumer protection issues. All of this implies a simplification of legislation organised around a general agricultural and rural law.

Although efforts have been made to improve the labelling of agri-food products, consumers' knowledge of food production systems must continue to be improved, with increasingly precise information on the product, which would also lead to recognition of the value of the investments made by agricultural entrepreneurs. In this respect, efforts should be made to standardise health checks on imports of foodstuffs and raw materials from third countries to ensure the competitiveness of national businesses.

It also recommended, that it is said, "strengthening risk management and crisis management tools, as well as preserving and better managing agricultural land, promoting water resilient agriculture and encouraging innovative methods of plant breeding". What is clear is that in this right balance between agriculture, food and environment, policies on water and water resource management are essential.

The future of agriculture in Europe is marked by the strengthening of the food chain and the recognition of simplification to ensure profitability and generational renewal. The current European strategies, marked by the *Strategic Dialogue on the future of agriculture in the EU*, September 2024, above all promote bureaucratic simplification. In this sense, the recent Spanish Royal Decree 1028/2024, amending various royal decrees on the CAP and taking up the main demands of farmers, introduces important changes in terms of simplifying CAP requirements, reducing bureaucracy and facilitating the management of eco-regimes or eco-schemes, simplifying administrative procedures in terms of biodiversity and sustainability, which is especially relevant for a country like Spain, where agriculture and agri-food represent a transcendental part of the gross domestic product, with record figures in agri-food exports.

There is no doubt that if Europe wants to maintain its leadership in the agri-food sector, it must recognise the sector's revindications and maintain a fair balance between agriculture, food and the environment, reducing the levels of bureaucracy and simplifying agricultural legislation and administration.

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The social conditionality: its implementation and effects on supply chain sustainability

IRENE CANFORA*, VITO SANDRO LECCESE*

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Abstract

The essay deals with the aspects of social conditionality as a mechanism recently introduced in the CAP payment system. It outlines the relevance of the provision within the sustainable food system in the agri-food supply chain, for the issues related to the protection of labour, in EU and national law. Within the rules established by the new Common Agricultural Policy 2023-27, in line with the objectives of social sustainability, the essay addresses the legal mechanism of the social conditionality instrument, which provides for the reduction of financial support for failure to comply with the rules aimed at protecting workers, by retracing the stages of its establishment and implementation in European legislation and at the national level. The essay analyses the Italian rules aimed at implementing the EU provision, pointing out the problems related to the implementation of the payment administrative system, considering the violation of labour standards; as well as to the penalties system, to assess the adequacy of the national system, to establish dissuasive and proportionate sanctions. Finally, the authors offer an outlook on possible future developments at the EU level.

Keywords*: Social sustainability, Common Agriculture Policy, Agrifood chain system, Social conditionality.*

1. The Social sustainability approach in the Common Agricultural Policy

The vision of the CAP 2023-27 is strongly influenced by the sustainability approach, which is part of the new model of the sustainable agri-food chain, as described by the Farm to Fork Strategy of the EU Commission (EU Commission, 2020). Within the objective of the CAP, this aspect is evident from Regulation 2021/2115, which establishes rules on support for strategic plans to be drawn up by Member States under the Common Agricultural Policy (CAP Strategic Plans) financed by the European Union. Article 5 establishes that "In accordance with the objectives of the CAP set out in Article 39 TFEU, with the objective to maintain the functioning of the internal market and a level playing field between farmers in the Union and with the principle of subsidiarity, support from the EAGF and the EAFRD shall aim to further improve the sustainable development of farming, food and rural areas and shall contribute to achieving the (*following*) general objectives in the economic, environmental and social spheres, which will contribute to the implementation of the 2030

* University of Bari, Italy.
Corresponding author: irene.canfora@uniba.it

Agenda for Sustainable Development". Among these objectives, the effort to strengthen the socio-economic fabric of rural areas—an enduring goal—includes, for the first time in the CAP's legal framework, a special focus on workers employed in the agricultural sector. Most recently, the approach aimed at enhancing social sustainability in the agricultural policy has been confirmed and strengthened at the European level.

First, the document commissioned by the EU Commission, "Strategic dialogue on the future of agriculture" (EU Commission, 2024), in the section "Recommendations", emphasizes the relevance of social aspects of the agricultural sector, which currently employs 30 million people, by focusing on issues such as "supporting future generation of farmers" and "attracting and protecting workers" (par. 4.2). The document outlines that "socially just working conditions are an indispensable part of production in the agri-food sector; conversely, sustainable production safeguards jobs, in particular in vibrant areas". In this framework, the assessments must take into consideration impacts of farmers activity on workers. In fact, on one hand, it stresses the importance of improving living and working conditions in rural areas, as this may enhance the attractiveness of the agrifood sector; on the other hand, addressing and eliminating abuses in the most vulnerable areas of work is identified as a priority for policy makers (p. 78).

The Strategic dialogue document calls for the full implementation of social conditionality in the CAP in all Member States, also by promoting building capacity of farmers to improve adherence to minimum labour standards and social protection of farmworkers. Furthermore, it takes into consideration the migrant workers position and the need of their effective protection, access to information and cultural integration.

Furthermore, fostering fair working conditions in rural areas is considered a key topic by the EU Commission in its Document "A Vision for Agriculture and Food Shaping together an attractive farming and agri-food sector for future generations" (EU Commission, 2025), according to which "food and feed production in the EU is also dependent on farm workers, which are frequently coming from other EU Member States or from third countries and too often work under precarious conditions. This needs to be, more than before, proactively addressed and considered in public policies. Linked to this, social dialogue and collective bargaining have an important role to play, in line with national law and traditions" (par. 3.4, p. 20).

Moreover, is evident that the deep review of the CAP for the period 2023-25, laid down by Regulations published on December 2021, was influenced by the changing of the market structure, even more depending from external factors, both regarding the access of raw agricultural materials from external countries addressed to the European market, as well as the migratory flows that affect in particular the labour market and the organization of seasonal employment in agricultural sector (EU Commission, Accompanying report to the Proposal of regulation on Strategic plans, 2018; Senatori, 2024; Palumbo, Corrado, 2020; Williams, Horodnic, 2018).

2. The social conditionality in the CAP 2023-27.

The introduction of rules concerning workers within the CAP regulation can be considered a crucial innovation in the legal framework of agricultural markets (Canfora, Leccese, 2022). For the first time, the compliance with the basic labour standard become a pre-requirement for the payments to farmers. In the context of the broader issues concerning social sustainability in the new CAP (Canfora, Leccese, 2024a), a regulatory profile, highly innovative compared to the pre-existing regulatory framework on agricultural policies, is provided for by the social conditionality, laid down in Article 14 of Regulation (EU) no. 2021/2015. The inclusion of this rule in the original Commission draft was strongly supported by European Parliament, whose role was crucial in the approval of the amendments that established the set of rules related to the social conditionality and the functioning of the mechanism.

Regarding the EU's financial support to national strategic plans, Regulation 2012/2115 extends the model of the "environmental" conditionality (the "cross- compliance", already

regulated by the previous CAP regulations, since the 2003 CAP Reform) to several matters regulated by labour law directives. The provision is expressed in the form of administrative penalties for farmers who fail to comply with rules designed to protect workers.

As regards Regulation 2021/2115, the European Union has moved in the direction of expanding the content of conditionality to the protection of workers, therefore using the CAP (whose relevance in the economic context obviously cannot be discounted) as a crowbar to unhinge behaviours that undermine the effectiveness of the rules established to protect employment. Especially since, in the past, proposals to incorporate aspects relating to occupational safety in the framework of the legislation on agricultural support schemes had never led to a legislative provision (EU Commission 2003; Hunt, 2014). The starting point of this instrument is the valorisation of the dignity of work and the acceptance of the perspective according to which, once defined in a legal system the protection of workers, the guarantee of their effectiveness must constitute a variable independent from market conditions.

Within the framework of the numerous remedies which have been implemented at the national level to ensure the effective application of labour protection regulations, those based on different forms of conditionality represent – not only today – an interesting frontier, because they impact on the cost-benefit analyse of economic operators. By resorting to them, the public decision-maker effectively influences those calculations by imposing economic disadvantages on companies that opt for non-compliance with the protection rules.

The real impact of the instrument on the concrete dynamics of employment relationships depends, on the one hand, on the list of protection rules whose effective application is intended to be promoted and, on the other one, on the incisiveness of the action of those who verify and monitor compliance with the rules in question, as well as on the extent of the disadvantages that affect companies that violate them (Leccese, Schiuma, 2018). The breadth of the purposes pursued with this choice and the current boundaries of the chosen protection legislation are very clear from the recitals of the Regulation, where it is stated that "(45) In order to contribute to the development of socially sustainable agriculture through better awareness, on the part of beneficiaries of CAP support, of the employment and social standards, a new mechanism integrating social concerns should be introduced" and "(46) to the compliance of farmers and other beneficiaries with basic standards concerning working and employment conditions for farm workers and occupational safety and health, in particular certain standards under Council Directive 89/391/EEC [i.e. the framework directive on the safety and health of workers] and Directives 2009/104/EC [concerning the minimum safety and health requirements for the use of work equipment by workers at work] and (EU) 2019/1152 [on transparent and predictable working conditions] of the European Parliament and of the Council. By 2025, the Commission should assess the feasibility of including article 7(1) of Regulation (EU) 492/2011 of the European Parliament and of the Council and should, if appropriate, propose legislation to that effect".

In turn, article 14(1), located in a Section of the Regulation specifically dedicated to Social Conditionality, establishes that "Member States shall indicate in their CAP Strategic Plans that, at the latest as from 1 January 2025, farmers and other beneficiaries receiving direct payments under Chapter II or annual payments under articles 70, 71 and 72 are to be subject to an administrative penalty if they do not comply with the requirements related to applicable working and employment conditions or employer obligations arising from the legal acts referred to in Annex IV" (i.e. the directives referred to in recital 46).

On a procedural level, then, Article 14(2) provides that "When including a system of administrative penalties in their CAP Strategic Plans as referred in paragraph 1, Member States shall, in accordance with their institutional provisions, consult relevant national social partners representing management and labour in the agriculture sector and shall fully respect their autonomy, as well as their right to negotiate and conclude collective agreements. That system of administrative penalties shall not affect the rights and obligations of the social partners

where they are, in accordance with national legal and collective bargaining frameworks, responsible for the implementation or enforcement of the legal acts referred to in Annex IV".

In particular, the mechanism of social conditionality, in accordance with Article 14 Reg 2021/2115 and the cited annex IV covers directives on two main aspects concerning labour protection.

First, the mechanism refers to the rules, already in force in Member States, following the implementation of the Directives 2009/104/EC and 89/391/EEC, on occupational safety and health.

The second field interested by the social conditionality rules is related to the transparent and predictable employment conditions. As provided by the Directive 2019/1152/EC, farm workers must be informed of employment conditions in writing, regardless of the hours worked. This information includes place and type of work, beginning and, where relevant, end of employment, information on probation period, paid leave, notice periods, remuneration, work pattern/schedule, as well as social security information.

The inclusion, among the mentioned directives, of the one on transparent and predictable working conditions, is particularly important if we consider the characteristics of the agricultural sector, in which a significant part of the violations occurs in undeclared and non-formalized work, often under the control of gangmasters. Therefore, the sanction for the violation of the relevant provisions of Directive 2019/1152, which requires providing the conditions of employment in writing and delivering the employment contract within seven working days, contribute to the objective of reducing the use of these forms of work, impacting, once again, on the cost-benefit analysis of the business operators.

The last reference of art 14, par. 2, provides the Member State with the right to entrust the implementation of directives relating to social policy to the collective bargaining system, provided that the collective agreements satisfy certain requirements, in particular general binding effects.

To ensure the effectiveness of this instrument, article 14(3) establishes that "The CAP Strategic Plan shall include rules on an effective and proportionate system of administrative penalties".

Furthermore, the control system of social conditionality is defined by Reg 2021/2116, art 87-89, providing that Member States shall set up a system providing for the application of administrative penalties to beneficiaries referred to in Article 14, who do not comply with the rules on social conditionality, by making use of their applicable control and enforcement systems in the field of social and employment legislation and applicable labour standards. In more detail, Art 88 and 89 draw the legal framework that Member States must respect in implementing the administrative sanction system at the national level.

These provisions give the Commission the power to adopt delegated acts supplementing the regulation, containing detailed rules on the application and calculation of sanctions, to "ensure a level playing field for Member States as well as the effectiveness, proportionality and dissuasive effect of administrative sanctions" (Article 89, paragraph 2).

3. Impact of social conditionality on the agrifood chain system

The introduction of social conditionality, in the CAP, and, above all, its full implementation at national level, is intended to have a concrete impact on improving social sustainability related to workers in agriculture.

The mechanism of social conditionality produces virtuous effects on different levels.

As far as the improvement of workers conditions, as elsewhere already outlined, the provision can be considered a *first step*, but nevertheless an *essential* step, in considering workers conditions improvement as integral part of the agricultural market system. This is mainly evident by the definition of a payment system conditioned by the need to respect, until now, only environmental and food safety aspects (Canfora, Leccese, 2024a). Considering the attention paid to environmental sustainability, related to the reduction of use of pesticides and to animal welfare in a holistic perspective, the consideration of labour aspects of the agricultural activity organization become a part of the broader consideration of the "sustainable farm system". This includes the dignity of work and the respect of

higher labour standards, as a key aspect of social sustainability in agriculture.

Secondly, this provision can be appreciated from the point of view of the concrete functioning of the agrifood chain regulation, as a key element of the machine's gears. As emerges from the various analyses of the phenomenon, the presence of undeclared work and illegal working conditions are related to the reduction of the profitability of agricultural producers, mainly depending on low prices of agricultural products paid by purchasers taking advantage of their bargaining power within the agrifood chain relationships (Canfora, 2022). In Italy, the *Triennial Plan against work exploitation and gang-master system* (2020-2022), defined by the Ministry of Labour, jointly with the Ministry of Agriculture and the Ministry of the Interior and extended until 2025, highlighted these aspects, establishing measures aimed at counteracting the illegal exploitation of workers in the Italian framework (Canfora, Leccese, 2021). Conversely, the unfair distribution of value within the agrifood chain is considered one of the elements that exacerbate this phenomenon, as the low revenue of farmers in purchasing agricultural products to the processors or retailers leads to a reduction in production costs, mainly on the cost of labour.

From another perspective, the violation of labour standards also affects the fair competition within the food chain. Indeed, the greater potential for the violation of labour standards, with the consequence to reduce the labour-related production costs, produces a competitive advantage based on illicit conduct of farmers which harms virtuous holdings.

This is an emerging profile, in a wider consideration of the fair competitiveness in the food chain overall. Let's consider the special attention paid by the European Union in this field, as shown by the approval of specific rules for the food supply chain, laid down by the EU Directive 633/2019 on unfair trading practices in business-to-business relationships in the agricultural and food supply chain. The Directive is legally based on Article 43 of the Treaty of functioning of the EU, since it is aimed at protecting the position of farmers within the agrifood chain, as the weaker party in the agrifood relationships, supporting the reduction of costs paid for the agricultural raw materials (Canfora, Leccese, 2024b).

Regarding agricultural holdings, the reduction of costs related to labour due to illicit behaviour, represents a key aspect to be considered in the perspective to reach fair competition conditions among farmers. This adds to the list of violations of environmental regulation rules, as provided by the "environmental conditionality".

Consequently, the definition of a "minimum set of rules" concerning the respect of labour standards established by the European legislation contributes to establishing the figure of the "*virtuous farmer"* as the recipient of financial support from the EU. Furthermore, these rules have a relevant impact on the harmonisation of minimum standards of legality expressed by the EU through the definition of "conditionality" as the "benchmark" for legality (compliance) defining a shared level of lawfulness that shall be respected by farmers at EU level.

In this perspective, social conditionality becomes a key aspect in establishing a fair and sustainable agrifood system, as it is part of the holistic perspective on sustainability in the agrifood sector, defined by the Commission in the Farm to Fork strategy and strengthened in the subsequent documents abovementioned. As part of the "social dimension" of sustainability in the field of agricultural policies, social conditionality fulfils the obligation to implement the SDG n.8, decent work and economic growth, as far as agricultural sector is considered as one of the most critical regarding the exploitation of workers.

4. Legal problems related to the implementation of social conditionality

The implementation of social conditionality at the national level brings out some problems that still need to be addressed at EU and national level, considering the absolute novelty of this provision in the framework of the CAP.

A major challenge in implementation is the timing foreseen in the EU regulation: according to Reg. no. 2021/2115, the mandatory deadline to implement the mechanism of social conditionality at national level is set by 2025, although Member states could start as early as 2023. De-

spite the relevance of the matter, considering the novelty of the provision and the need to adapt the internal system, only a few Member States have decided to apply social conditionality since 2023. Among them, Italy established to include social conditionality since the first application of the new direct payments system, in consideration of critical issues of irregular work at national level, as stressed by the EU Commission in its Remarks on the Strategic Plan submitted by Italy (EU Commission, 2022).

Therefore, the first problem is represented by the lack of timely harmonisation, due to the range of the period provided for entry into force of the social conditionality in EU Member States.

The second problem is that Member States are required to fully adapt their national payment system to aspects (not considered until now) related to the violation of labour law legislation.

This requires the adjustment of the administrative system aimed at detecting violations to ensure the effective transmission between the bodies responsible for monitoring labour standard violations and the payment national agencies re. This coordination is essential to reduce payments in cases of non-compliance with the rules established by the conditionality mechanism. It is also required by Member States to provide proportionate and dissuasive administrative penalties.

In this perspective, the Italian regulatory model of social conditionality implementation, as laid down in 2023, can be considered particularly meaningful in outlining criticalities and legal solutions.

5. The implementation of social conditionality in Italy

The national implementation of social conditionality in Italy is characterized by the effort to identify the public bodies involved in the process and the cross-functioning of checks, as well as by the definition of a set of administrative sanctions to be applied in case of violation of social conditionality.

In Italy, the consultation of the social partners foreseen in Article14(2) was swiftly initiated in our country by the competent minister, with the ambitious goal of ensuring that the implementation of the bsocial conditionality mechanism under the CAP occurs two years ahead of the January 2025 deadline.Top of Form

During and in the margins of the meetings, held in April and June 2022, a diversity of positions had emerged among the representatives of the employers and workers present at the table, with reference to the issue of the extent of the sanctions aimed at hitting companies that do not comply with the rules. This is a crucial issue for the resilience of the instrument, as shown both by the content of paragraph 3 of Article 14 of Reg. 2021/2115, quoted above, and by the attention paid to it by the workers' trade unions at the European level (EFFAT, European Federation of Food, Agriculture, and Tourism Trade Unions), with the not easy task of coordinating the implementation process of the discipline in the different Member States.

The consultations had then confirmed the need to ensure, also in this case, a real incisiveness of the action of those involved in inspecting and monitoring compliance with the rules (Leccese, Schiuma, 2018), to guarantee a real impact of the instrument on the concrete dynamics of labour relations.

Despite the scepticism expressed by some - also due to the early dissolution of the last legislature - with respect to the possibility of closing the game of the implementation of the provisions of Article 14 Reg. 2021/2115 and Article 87-89 Reg. 2021/2116 quickly and, in any case, anticipating the 2025 deadline, the objective was substantially achieved.

The process of adjustment started with a decree of the Minister of Agriculture, Food Sovereignty and Forestry of 11 November 2022 (*Discipline of the social conditionality system pursuant to Regulation (EU) 2021/2115 and Regulation (EU) 2021/2116*), which eminently dealt with the identification - in relation to the different directives covered by Annex IV of Reg. 2115 - of the competent authorities in charge of the application of the conditionality rules (National Labour Inspectorate, with control and sanctioning competences inherent to Directives 2019/1152, 89/391 and 2009/104; the National Fire Brigade, with competences inherent only to Directive 89/391; the Ministry of Health and

Health Authorities, with control and sanctioning competences inherent to Directives 89/391 and 2009/104) and of the data flows relating to the conditionality system.

That process was enriched with the step concerning the determination of sanctions, which were dictated by Legislative Decree No. 42 of 17 March 2023, implementation of Regulation (EU) 2021/2116, issued pursuant to Article 2 of Law No. 127 of 4 August 2022 (European delegation law) and then amended by Legislative Decree No. 188 of 23 November 2023.

Article 2 of Legislative Decree 42/2023 (included in Chapter II, concerning Sanctions for the violation of the rules of social conditionality) now establishes that farmers or other beneficiaries of direct payments under the CAP who have been "definitively found to be in breach of one or more national rules implementing the articles of the directives listed in Annex IV of Regulation (EU) 2021/2115" are sanctioned (Article 2, para. 1).

Moreover, if such persons are subject to preventive seizure of the farm as part of proceedings for the offences provided for in Article 603-bis of the Criminal Code (illegal brokering and exploitation of labour), the judicial authority must give "immediate notice to the paying agencies, which shall suspend the payment of benefits until the precautionary measure is revoked, unless the judge orders judicial supervision or appoints a judicial administrator to ensure the continuity of the business"(para. 1-bis).

The sanction mechanism is then based on a system of "reductions", the amount of which is "calculated on the basis of the total amount of payments [...] granted or to be granted to the beneficiary concerned in relation to the payment claims submitted during the calendar year in which the infringement occurred" (Article 3, para. 1 of Legislative Decree No. 42).

These reductions, in accordance with the provisions of Articles 87-89 of Regulation 2021/2116, are graduated, based on the "seriousness, extent, duration or repetition, as well as the intentionality of the non-compliance found" (Article 89(1)(2) of Regulation 2021/2116, which provides that penalties must in any event be effective, proportionate and dissuasive).

In particular, the reduction is established in three brackets, equal to 3, 5 or 10% of the abovementioned payments, depending on the seriousness of the infringement, defined according to the criteria set forth by specific decrees of the Minister of Agriculture, Food Sovereignty and Forestry, provided for in Article 25 of Legislative Decree No. 41 (to which we will return shortly); the 10% reduction applies in any case when the infringement concerns more than 8 workers (Article 3, par. 2, Legislative Decree No. 42).

In the original text of the Legislative Decree No 42, the reduction was graded differently and was equal to 1, 3 or 5%, based on the criteria laid down by the Ministerial Decrees. However, Article 85(5) of the reg. 2021/2116 (also applicable - *mutatis mutandis* - to the application and calculation of the penalties in question pursuant to Article 89(1)(3) of the regulation) sets, as a general rule, a reduction of 3% of the total amount of the payments; it also provides that the reduction is to be set at a higher percentage where "the non-compliance has serious consequences with regard to the achievement of the objective of the standard or requirement concerned or constitutes a direct risk to public health [...]".

For each calendar year, in the case of several infringements committed by a single beneficiary, the highest percentage reduction is applied (para. 6).

However, these percentages of reduction are, in turn, reduced (by 100, 50 and 25 per cent respectively) if farmers or other recipients of payments, after the competent authorities have been notified of an infringement for violation of a national rule implementing the provisions listed in Annex IV of Reg. 2115, "comply, within the timeframe indicated by the said authorities, with the requirements of the rule in question" (para. 5).

An aggravation of the sanction occurs, on the other hand, in cases where the same infringement "persists for more than one calendar year or is repeated another time within three consecutive calendar years": in this case, the percentage of reduction is 20% of the total amount of the payments (para. 3); finally, if the non-compliance is "intentional", the percentage of reduction rises to 30% of the total amount of the payments (para. 4) .

Also in these cases, the amendment made by

Legislative Decree 188/2023 led to an increase of the percentages, originally fixed at 10 and 15% respectively. On this aspect, Article 89(1)(3) of Regulation 2021/2116), provides, first, that where "the same non-compliance persists or is repeated within a period of three consecutive calendar years", a reduction percentage of 10% of the total amount of the payments shall apply as a general rule; second, that "further repetitions of the same non-compliance without justification by the beneficiary shall be considered as cases of intentional non-compliance", in which case a reduction percentage of 15% shall apply.

As mentioned, Article 3(2) of Legislative Decree No. 42 places a significant competence in the hands of the ministerial decree, which is then specifically detailed in Article 25 of the same decree: one or more decrees of the Minister of Agriculture, Food Sovereignty and Forestry are in fact assigned the task of adopting the implementing provisions and criteria for determining the reduction percentages established by a series of provisions of the legislative decree, including, as far as we are interested here, Article 3(2).

A ministerial decree dated 28 June 2023 (published in the G.U. on 11 August) then provided for the preparation of the criteria on the basis of which to graduate the extent of the reductions in question, which - having been issued under the original text of Legislative Decree no. 42/2023, refers to the original percentages set forth therein and not to the higher percentages introduced by Legislative Decree no. 188 (which is dated 23 November 2023); however, in our opinion, this is a discrepancy that does not affect the continued applicability of the criteria established by the Ministerial Decree for the purposes of the application of the three basic reduction bands (in the past equal to 1, 3 and 5% and now equal to 3, 5 and 10% of the amount of the payments).

What is most interesting to note here is that the mechanism determining the evaluation of the severity from which the reduction derives is based on the operation of numerical indices (indicators of severity, evidently) that, added together, determine the reconciliation to the three bands of deductions.

In fact, the table annexed to the Ministerial Decree establishes special indices attributed to infringements of each article of the directives mentioned in Annex IV of Reg. 2115 and of the internal transposing regulations: they range from low indices, equal to 1 or 2 (scores attributed to infringements of articles of dir. 2019/1152 and the corresponding articles of legislative decree 104/2022) to higher indices, reaching up to 7 (e.g. in the case of infringements of Article 7, Dir. 89/391, concerning protective and preventive services and workers to be designated for health and safety activities or the use of external services). It should be borne in mind that, pursuant to Article 14(4) of Reg. 2021/2115, "The legal acts referred to in Annex IV concerning the provisions to be subject to the system of administrative penalties referred to in paragraph 1 shall apply as in force and as transposed by the Member States".

Thus, the first band of deductions is intended to operate when the sum of these indices is between 1 and 3: the second band when the sum is between 4 and 18; the third band in cases when the sum is between 19 and 111.

6. Final remarks

The next step in the implementation of the social conditionality in the EU will consist in the alignment of all national systems within 2025, thus completing the harmonisation of the social conditionality rules in all Member States, and making them effective, in terms of protection of workers' rights and the effects on competition.

The difficulties encountered in implementing conditionality at national level, as well as the possible lack of homogeneity between the solutions adopted in each Member State may be an aspect on which the European institutions will have to reflect in the coming years.

From this point of view, it could be appropriate, at the EU level, to intervene through further specifications with respect to the framework outlined by reg. 2116/2021 regarding the control system of social conditionality. It could be relevant to align the criteria for the definition of penalties so that the effectively dissuasive nature of sanctions ensures compliance with the provisions of the directive on occupational safety and health as well as on transparent and predictable employment conditions.

Furthermore, it is not excluded that, in the future, the European Union will reconsider the scope of the application of social conditionality. Among other things, the extension of the rules covered by the mechanism is not at all prejudiced, as indeed hypothesized in the aforementioned recital no. 46 of the Regulation, according to which the Commission, by 2025, should evaluate the possibility of including in the scope of application of social conditionality also art. 7, par. 1, Reg. no. 492/2011 (relating to the free movement of workers within the Union), proposing, if necessary, legislation to this end.

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Where competitiveness meets sustainability: law, policy, implementation and the environmental challenge of vineyards

VALERIA PAGANIZZA*

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Abstract

In September 2023, the Court of Auditors published its report «Restructuring and planting vineyards in the EU. Unclear impact on competitiveness and limited environmental ambition». The report's findings emphasize that the impact of EU assistance on wine growers' competitiveness is uncertain. According to the document, the design and execution of the planting authorization scheme show deficiencies, while the EU wine policy fails to meet the environmental goals of the common agricultural policy. The Court of Auditors calls on the Commission to better target EU actions to increase the sector's environmental goals and encourage winegrowers' competitiveness. The Commission's answer stresses, however, the significant changes of the CAP 2023-2027 and the enhancement of environmental ambition for the wine sector. This paper seeks to highlight the necessity of resolving current conflicts, based on the findings and significant concerns identified by the Court of Auditors and on those emerging from the Commission's reply. It advocates for a policy that thoughtfully reconciles interests that may seem contradictory but would actually thrive under a balanced and pragmatic approach.

Keywords: *Wine, Competitiveness, Planting authorization scheme, Sustainability.*

1. Introduction and purpose of the study

The wine sector deserves particular attention in the extremely lively debate on sustainability. Data evidence its strategic importance in the European Union market and its trade relations: EUROSTAT statistics estimated that in 2022, the European Union members exported 7.2 billion liters of wine, including 3.2 billion destined for trade outside the EU (EUROSTAT, 2022b). According to the March 2024 report by the Comité Européen des Entreprises Vins (CEEV), titled «Economic, social and environmental importance of the wine sector in the EU», the wine production of the European Union accounts for 62% of the entire global production. Among the factors determining the EU's primacy, the document suggests the central role that both vineyards and wine have historically played in the European Union. According to EUROSTAT statistics, in 2020, the European Union had 3.2 million hectares of

* University of Parma, Italy.
Corresponding author: valeria.paganizza@unipr.it

vineyards, corresponding to about 45% of the global vineyard area (EUROSTAT, 2022a).

The wine market has also seen the gradual entry of so-called "new world wines", that is, wines from areas not traditionally suited to viticulture, which have demonstrated, over the years, competitive potential compared to products from the European Union (European Commission, 2014; Pomarici *et al*., 2021; Morrison and Rabellotti, 2014). At the same time, the European legislator has also reformulated the rules of the Common Market Organization for wine, with the aim of making winegrowers and producers more competitive. Recognizing the partial ineffectiveness of the instruments provided by Regulation (EC) no. 1493/1999 in «steering the wine sector towards a competitive and sustainable development», Regulation (EC) No. 479/2008 introduced support measures and rules governing production potential, along with regulatory measures and provisions governing trade with third countries (Recital no. 3 and art. 1, par. 2 of Reg. (EC) no. 479/2008). Next to the improvement of the competitiveness of wine producers, the other objectives were characterized by an undeniable pursuit of sustainability in its multiple dimensions. Recital No. 5 indeed listed the following objectives: «increasing the competitiveness of the Community's wine producers; strengthening the reputation of Community quality wine as the best in the world; recovering old markets and winning new ones in the Community and worldwide; creating a wine regime that operates through clear, simple and effective rules that balance supply and demand; creating a wine regime that preserves the best traditions of Community wine production, reinforcing the social fabric of many rural areas, and ensuring that all production respects the environment» (on this point, please refer to Albisinni, 2016, p. 529 and 2023, p. 399).

In consideration of the importance of Union expenditures, the measures adopted within the Common Market Organization for wine and other support instruments of the Common Agricultural Policy have also been subject to a retrospective evaluation (European Commission, 2020), as provided for by Article 34, paragraph 3 of Regulation (EU, Euratom) 2018/1046, which establishes the financial rules applicable to the general budget of the Union. It may be superfluous to highlight how the scope of these studies, the extreme variability in the implementation of measures, and the diversified periods of application of certain provisions (such as, for example, the rules on vineyard planting authorisation) can constitute critical elements in the evaluation. The Commission presents its results following the parameters of effectiveness, efficiency, coherence, relevance, and added value, in relation both to the specific objectives of the wine policy, in terms of competitiveness, sector adaptation to the market, profitability, market balance, and quality, and to the more general objectives of the common agricultural policy, including sustainability. In this context, the measures for vineyard conversion and restructuring, affecting 10% of the European Union's vineyards and accounting for over 50% of wine policy expenditure during the considered period, could have accelerated the change in production and vineyard management methods. This would have allowed for large-scale mechanization, resulting in a reduction in labour costs, and the establishment of systems that also ensure better water resource management (European Commission, 2020, point 6.1).

Despite this, the enhancement of quality, with varietal changes, conversion to protection schemes for denominations and geographical indications, and the reduction of density and yields, has resulted in an overall increase in costs (European Commission, 2020, point 6.3).

The achievement of environmental objectives emerges, in the Commission's document, in relation to the coherence of national support programs, as a merely hypothetical element: the "potential" of restructuring and conversion measures to play a significant role in adapting vineyards to climate change and protecting biodiversity is highlighted, allowing, as previously noted, for extensive mechanization and better management of water resources. The lower plant density and the absence of water stagnation suggest to the Institution an optimistic outlook for a reduction in pesticides in the long term. The evaluations conducted by the Commission, however, do not appear to be based

on any specific study (at least, no bibliographic references are present) nor on real data, a circumstance that raises doubts about the validity of the same considerations.

With a more critical eye, the European Court of Auditors addressed the issue of support instruments in the wine sector, publishing, in September 2023, the special report «Restructuring and planting vineyards in the EU. Unclear impact on competitiveness and limited environmental ambition» (European Court of Auditors, 2023).

In its role as the assessor of the Union's expenditures, the Institution intended to verify the efficiency of two distinct instruments: on the one hand, the funding system for vineyard restructuring, and on the other hand, the system for new planting authorisation, in light of the competitiveness and the ability to achieve the environmental objectives of the European Union. Competitiveness and sustainability are two aspects that certainly also emerge from the Commission's evaluation, albeit with different scope and depth, especially when examining the restructuring and conversion measures, and the system of authorizations for new plants. While the Commission's document discusses the former, it does not evaluate the latter due to the relatively short time span between the scheme's application and the Institution's study.

The report of the Court of Auditors and the Commission's answer reveal the existence of multiple conflicts, which in turn create obstacles to achieving sustainability in its broadest sense.

This paper seeks to highlight the necessity of resolving current conflicts, based on the findings and significant concerns identified by the Court of Auditors, which are not equally reflected in the Commission's working document. It advocates for a policy that thoughtfully reconciles interests that may seem contradictory but would actually thrive under a balanced and pragmatic approach.

2. Methodology

The paper is based on the analysis of the Court of Auditors' special report «Restructuring and planting vineyards in the EU. Unclear impact on competitiveness and limited environmental ambition» (European Court of Auditors, 2023), summarised in the following paragraphs. The document is considered by the Author as a milestone and benchmark, useful to take stock of some of the current weaknesses that the sustainability in the wine sector is experiencing, despite the existence of measures that were designed to support sustainable development. We then consider the European Commission's response to the Court of Auditors' recommendations to gain some insight into the current approach to the theme.

Agricultural law literature published in peer-reviewed journals was examined to better contextualise the two pillars of the Court of Auditors' special report, namely the restructuring and conversion measures, on the one hand, and the system of new planting authorisations, on the other hand.

3. The Court of Auditors' Special Report

As mentioned above, in September 2023, the European Court of Auditors published its special report following an audit conducted between April and December 2022 (Court of Auditors, 2023, paragraph 20) on the vineyard restructuring and conversion measure and the system of authorizations for new plantings in specific areas of five member states: Moravia in the Czech Republic; the Peloponnese in Greece; Castile-La Mancha in Spain; the Rhône Valley and Provence in France; and Tuscany in Italy (Court of Auditors, 2023, paragraph 20). The relevance criterion guided the selection of the audited states, given that the total funding for restructuring and conversion in these countries accounts for approximately 70% of the total funding for this measure.

Furthermore, the selection of this specific verification line stems from the significant investment in this measure by national support programs, which amounts to approximately half of the annual allocation for the years 2014-2018 and 2019-2023, as well as from the fact that the completion of the last audit dated back to 2012.

As for the system of authorizations for new planting, the Court of Auditors' investigation was the first since 2016, the year of its implementation. The conclusion reached by the Institution regarding both the expenditure related to reno-

vations and reconversions and the authorization system is that the objective of competitiveness is not actually being directly pursued, despite both measures being intended for this purpose.

3.1. *The special report's focus*

Before delving into the text of the Court of Auditors' Special Report, it might be useful to quickly recall the main features of the measures assessed by the EU Institution, namely the restructuring and conversion measures, and the system for new planting authorisations.

As for the restructuring and conversion measures, their history dates back to 1999, when Institutions introduced them, with the first structural amendment to the common market organization for wine (Sardone, 2013; Sardone, 2010). Article 11 of Council Regulation (EC) No 1493/1999 of 17 May 1999 on the common organisation of the market in wine established a system for the restructuring and conversion of vineyards (par. 1), with the aim of adapting production to market demand (par. 2). Only Member States that had «compiled the inventory of production potential» were eligible for the system, which covered varietal conversion, vineyard relocation, and improvements to vineyard management techniques.

Under Article 16 of Council Regulation (EC) no 1493/1999 (repealed by Council Regulation (EC) no 479/2008, then also repealed by Regulation (EC) no 491/2009), corresponding to current Article 145 of Regulation (EU) no 1308/2013, States had to record data pertaining to wine-growing potential (Germanò, 2000, p. 576). The control of the productive potential, which has been the core element of the EU wine regulatory framework (Germanò, Rook Basile and Lucifero, 2022, p. 99), has been developing in two directions. The first one, just partially described above, while talking about restructuring and conversion measures, aims at the improvement of wine growing and quality. The current system of restructuring and conversion of vineyards, regulated by Article 58, par. 1, let. (a) of Regulation (EU) 2021/2115, widens the former measures, including also environmental sustainability aspects in varietal conversion and in the improvements to vineyard management techniques.

The second direction related to the control of the production potential covers the system for new planting authorisation (the second element of the Special Report focus) and has been widely analysed by literature over the years (Lucifero, 2023, p. 1082-1088; Id., 2020 and 2017), since the previous form of planting rights (Germanò, 2000, 2007 and 2010). To control the production, the EU Legislator prohibited since the Seventies new vineyard planting (Germanò, Rook Basile and Lucifero, 2022, p. 100), with the recognition, in the following decades, of planting and replanting "right" according to Articles from 2 to 6 of Regulation 1493/1999). In very simple words, the possibility to plant new vines was conditioned on the grubbing-up of other vineyards of the same producer or by means of the transfer of the planting right from another winegrower (Article 4 of Council Regulation (EC) no 1493/1999. See, on rights circulation, Albisinni, 2011).

With Regulation (EC) no 479/2008, some significant changes were introduced in the system of planting rights (Germanò, Rook Basile and Lucifero, 2022, p. 101), till the deep reform by Regulation (EU) no 1308/2013 that instituted the system for the authorisation of new planting. The currently applicable system is characterised by an "organised" increase in vine-planted areas. According to Article 63 of Regulation (EU) no 1308/2013, «Member States shall make available each year authorisations for new plantings», to a certain rate established by the Regulation (1% of the total national area planted with vines). In compliance with the conditions set by Article 63, par. 3, Member States can decide to set a lower percentage than that stated by the Regulation.

In the following subparagraphs, we will analyse the Special Report of the EU Court of Auditors on the mentioned measures, with reference to competitiveness and environmental sustainability.

3.2. *Restructuring and conversion measures and competitiveness*

Although the support measures for restructuring and conversion concern the renewal of vineyards, the replacement of some varieties with others that are more resistant and productive (varietal conversion), a different placement or

replanting of vineyards, and the improvement of management techniques, with the ultimate goal of making Union winemakers more competitive, even in the global market, the Court of Auditors expresses doubts about the actual suitability for achieving the indicated objective. The Institution firstly draws attention to the designation of competitiveness, which the Commission defines as the ability to deliver quality products at competitive costs and prices, while also guaranteeing «reasonable benefits» for winegrowers (Court of Auditors, 2023, par. 24). The elements that would delimit competitiveness, in this sense, appear extremely generic and unsuitable for actual measurement: if, on one hand, the boundaries of quality are absolutely blurred, on the other hand, the comparison between products for which such "quality" has been defined becomes complex when one intends to also compare the price, on which different variables other than the same quality can have an impact. Not to mention the issue of benefits for winegrowers and the concept of reasonableness. The Court of Auditors then references the concept of competitiveness in Regulation (EU) No. 1308/2013, which is expressed in Recital No. 55 as a necessity for the European Union to maintain its market shares in the global wine market.

The second element of concern expressed by the Court of Auditors is the inability of the Member States involved in the audit to outline strategies and methods for achieving the competitiveness of winegrowers (left instead to the responsibility of individuals, like it is emphasized in par. 25 of the Special Report), the absence of impact studies on the application of the measures, and the lack of parameters for measuring competitiveness. Beyond the calculation of the areas of restructured or converted vineyards or the number of beneficiaries of the funding, the States subject to audit have not established parameters that allow for the effective measurement of changes in competitiveness (Court of Auditors, 2023, box 2).

At the same time, the report highlights the lack of an appropriate system for the collection and processing, by the Commission, of certain significant data that could allow for the evaluation of the variation in the competitiveness of the winegrowers who have benefitted from funding for restructuring and conversion.

The European Court of Auditors reports a third critical element, which is the lack of a substantive or ambitious evaluation of the submitted restructuring projects, and the decision to unconditionally approve all requests deemed admissible (Court of Auditors, 2023, par. 29).

3.3. *The system of new planting authorisation and competitiveness*

The system for authorising new vineyards is the second measure that the European Court of Auditors assesses in relation to the competitiveness profile. For this measure as well, the Institution finds no direct correlation with competitiveness, despite the measure impacting it to the extent that, by effectively limiting the expansion of vineyard areas, it aims to regulate supply, thereby avoiding production surpluses that would, in turn, lead to a drop in prices (Court of Auditors, 2023, par. 22).

One of the concerns raised by the Court of Auditors pertains to the failure to carry out an impact assessment for determining the maximum threshold for the increase in authorisations at the rate of 1% per year of the national vineyard area (Court of Auditors, 2023, par. 34).

Furthermore, the Court of Auditors notes that, despite the presence of a maximum threshold for the increase in areas, there is, on the contrary, no cap on production (Court of Auditors, 2023, par. 37).

Since the number of applications for the authorisation of new plants could exceed the maximum increase threshold, in case of excess, the Member States will have to allocate the available area. The Court of Auditors highlights, in this regard, the opportunity for national authorities to identify, both at the eligibility stage and at the distribution stage, parameters aimed at incentivising competitiveness. Among the criteria, the Court proposes to consider new operators and, in particular, young entrepreneurs; areas to be newly planted with different characteristics: areas included in land consolidation projects; areas that enhance the production of wine holdings exhibiting heightened competitiveness or

market presence; areas that could contribute to increasing the size of small and medium-sized wine holdings; or actions able to enhance the quality of products with geographical designations (Court of Auditors, 2023, par. 39).

3.4. *Restructuring and conversion measures and sustainability*

In the audit of the European Court of Auditors, the second focus was on the pursuit of the environmental objectives of the Common Agricultural Policy in the measures considered. Once again, the conclusions of the Institution are not the most reassuring.

Regarding restructuring and conversion measures, the institution draws attention to the weak or non-existent environmental ambition of the national strategic objectives and their corresponding target values. This is due to the mere possibility (not obligation) of incorporating these measures into the national strategies for the wine sector, which are included in the support programs (Court of Auditors, 2023, par. 46). Despite recognising the existence of sustainability improvement practices by winegrowers, the European Court of Auditors reports that the measures adopted in this regard (e.g., reduction in the use of synthetic substances and their replacement with natural pest antagonists) are actually correlated with additional funding measures (e.g., European Agricultural Fund for Rural Development).

In this context, the lack of evaluation of environmental ambition by the Commission, the lack of monitoring of supplementary indicators in the examination and approval of national support programs by the Institution, the absence of both a definition of sustainability and sustainable production systems, and finally, the lack of clarification by the Commission itself on how restructuring and conversion measures could have contributed to reducing the environmental footprint of the wine sector have led to an audit result that is extremely improvable (Court of Auditors, 2023, par. 48). On the other hand, as the Court of Auditors itself points out (Court of Auditors, 2023, par. 50), Member States could incentivise, in the disbursement of funds, projects with greater environmental ambition, through priority criteria that pursue the environmental objective. While noting that some of the audited countries have indeed prioritised environmental criteria, the special report under review nonetheless highlights that even some of the measures aimed at reducing the environmental footprint, such as the selection of new varieties or the conversion to organic production methods, have been adopted more to meet market demand than to implement conscious virtuous behaviours from an environmental perspective (Court of Auditors, 2023, par. 51). The special report provides the example of the Airén variety, a grapevine from Castilla La Mancha with minimal water requirements. Despite the positive environmental impact, it was not eligible for the benefits of restructuring and reconversion measures because it was not "competitive" in the market, where the demand was instead orientated towards the Syrah variety, which has higher water needs (Special Report box 5). This case features a further "conflict" between meeting environmental requirements in maintaining a drought-resistant grape variety, and market demand.

Even the measures that, by their very nature, should have had a positive impact, such as the improvement of management techniques, were not considered in the national support plans with reference to their environmental value (Court of Auditors, 2023, par. 52).

3.5. *The system of new planting authorisation and sustainability*

In analysing the authorisation system from the perspective of competitiveness, the European Court of Auditors highlights some elements that actually pertain more closely to sustainability, in at least two dimensions. The institution specifically emphasizes that the 1% threshold for vineyard area should be considered on a national scale. This implies that some member countries, as noted in the audit, may allocate the increase by concentrating it in specific areas, potentially leading to social and environmental consequences (Court of Auditor, 2023, par. 30).

Data, in this sense, are indicated by the same report in box 4: in the French Charentes-Cognac

basin, from the year following the implementation of the authorisation system, the average annual increase is 3%, while in the Spanish region of Ribera del Duero it is 4% annually, and this despite Spain having established a maximum quota for annual increases in vineyard areas of 0.5% of the national vineyard area.

One of the major issues identified, especially considering the extension of the authorisation system to 2045, was the absence of an impact assessment, with particular regard to the environmental profile (Court of Auditors, 2023, par. 57).

Even if the containment of supply is considered a positive aspect for the environment, as it can lead to less land exploitation and a reduced environmental footprint, the special report of the Court of Auditors highlights that the implementation of the authorisation system actually presents wide margins for improvement. Firstly, the document reveals that the environmental profile is considered in only one of the priority criteria used as parameters for authorising the new facility. And although some member states have chosen to include the aforementioned criterion, in any case, the distribution of authorizations occurs predominantly on a proportional basis (Court of Auditors, 2023, par. 60).

On the other hand, the authorisation system's rationale explicitly aims to prevent supply excesses that could threaten market stability, rather than openly considering the environmental aspect.

3.6. *The European Court of Auditors' recommendations*

In consideration of the audit results reported in Special Report 23/2023, the Court of Auditors has therefore formulated, towards the Commission, a list of recommendations aimed at promoting the competitiveness of the wine sector and achieving the environmental objectives. Regarding the first aspect, the Commission was invited to first provide a definition of the competitiveness of wine producers, in order to verify the achievement of the measure's objective. Secondly, the Institution was requested to transmit observations to the Member States in the event that the implementation of restructuring and conversion measures does not prove adequate to achieve the competitiveness objective. Finally, the European Court of Auditors recommends that the Commission evaluate the implementation of the aforementioned measure in conjunction with the Member States, in order to identify and exchange both good practices and information on potential risks (Court of Auditors, 2023, First recommendation).

Regarding the environmental aspect, the Court of Auditors recommends that the Commission evaluate whether the minimum 5% wine expenditure allocated to climate and the environment is considered adequate. In relation to the restructuring and conversion measure, the invitation is, once again, to exchange good practices and environmental protection results. Finally, with regard to the system for new planting authorisation, the Commission is requested to assess, in its interim review, the extent of the environmental impact resulting from the application of this system. Also for the environmental aspect, the Commission is then required to make observations to the Member States in the event that the restructuring and conversion obligations are not suitable for achieving the environmental objective (Court of Auditor, 2023, Second recommendation).

3.7. *The Commission's reply*

In response to the observations and recommendations of the European Court of Auditors, the Commission has provided some arguments that, while acknowledging the received indications, remind us how the CAP 2023-2027 has brought about significant changes (some of which are also recognised in the Court of Auditors' special report) and how the increase in environmental ambition for the wine sector is still alive (European Commission, 2023).

Regarding the observations related to the absence of an impact assessment for setting the threshold of a maximum 1% increase in the national vineyard area for the system of authorisations for new plants, the Commission explains that it is the result of a compromise aimed at ensuring the stability of the sector but, in doing so, does not provide reasons justifying the choice.

The Commission's response thus mainly con-

sists of describing the prospects both in terms of competitiveness and, above all, in pursuing environmental objectives for the period 2023-2027. In relation to the latter, the Institution recognises the need to achieve environmental objectives in all Member States and highlights how, within the Common Agricultural Policy, the wine sector can play an essential role in this regard, through the commitment of Member States to use at least 5% of their expenditure for interventions linked to environmental objectives. It is precisely the contribution that the sector will be able to provide to environmental policy in the years 2024-2025 that will be among the elements evaluated for the formulation of the Policy following the 2023-2027 period. The most significant element that emerges from the Commission's document and seems to be presented by the Institution as a premise to its responses is the emphasis on the exclusive attribution of responsibility for the implementation of the European Union's vineyard policy to the member states, both in terms of competitiveness and the pursuit of environmental objectives. On the other hand, as the document highlights, national management allows for a more adequate consideration of regional specificities.

4. Discussion

4.1. *Forgetting the four dimensions of sustainability*

The element that mostly emerges from the Court of Auditors' Special Report and the Commission's reply is that sustainability is considered mainly in environmental terms, with reference to the relevant specific objectives of the Common Agricultural Policy. Even though both the CAP and the measures that are assessed by the Court of Auditors meet the wider multidimensional shape of sustainability, the reader might perceive a low consideration of the non-ecological components. While such silence is not uncommon in general (Cristiani, 2019), the Special Report of the Court of Auditors intentionally focuses just on the specific environmental aspect. The same choice was made recently by the Institution in its Special Report 20/2024 «Common Agricultural Policy Plans. Greener, but not matching the EU's ambitions for the climate and the environment» (Court of Auditors, 2024).

This circumstance suggests however that the effectiveness of support measures should be assessed under the whole concept of sustainability, which includes the environmental, social and economic dimensions. In the author's opinion, though, also the cultural dimension of sustainability should be considered, when referring to themes – like wine and wine-growing – that are strictly connected to the territory, its tradition, its landscape and, in general, its culture. The European Commission appears to "endorse" this idea in its Report on the Cultural Dimension of Sustainable Development in EU Actions (COM/2022/709 final). However, even if this report lists the Common Agricultural Policy actions (section N) as an example of including the cultural dimension of sustainability, the result does not convince. On the one hand, it passes the task on to Member States, relying on the possibility that they include the cultural component in their strategic plans. The text then emphasizes, in a fragmented manner, how rural development and quality schemes take cultural aspects into account.

Besides the lack of real planning on the inclusion of the fourth dimension of sustainability in the EU Common Agricultural Policy, the EU Institutions' view would benefit from a wider strategy on the whole sustainability.

Focusing on a single dimension, without considering the others, does not offer a real vision of the issue: a measure is not sustainable if it does not match all the dimensions of sustainability or if it tries to find a balance among them.

4.2. *Conflicts*

The European Court of Auditors' Special Report, the Commission's response, and the recently mentioned report on the cultural dimension of sustainable development in the EU all reveal the existence of multiple conflicts that complicate the multidimensional path toward sustainability. We will attempt to provide a brief summary, while acknowledging that each "conflict" necessitates a dedicated paper.

1. Court of Auditors and Commission. The first "conflict" that emerges is between the two Institutions that played the main roles in our overview. The Court of Auditors, in its assessor role, evaluates the correspondence and adequacy of expenditures in relation to the identified measures, basing its recommendations on data provided by Member States. Conversely, the EU Commission adopts a defensive stance instead of providing compelling data-based responses to the Court of Auditors' observations.

We are not in a position to understand the dynamics that underlie the work of institutions, but the Commission's answer (and the feeling is reinforced also by the other documents mentioned in this paper) seems to suffer from a certain haste, especially on supporting statements with data.

Facts reported by the European Court of Auditors bring to light a more widespread problem of accountability in measures that are supported by the EU. While the Commission seem to justify spending through qualitative advantages and indirect impacts, the European Court of Auditors places a greater emphasis on quantifiable achievements. The conflict pertains thus on the diversity of methods used by the two institutions to address the same issue.

2. Commission – Member States. The second "conflict" calls on both the EU Commission and Member States to collaborate and take implementation responsibility. The special report from the Court of Auditors shows that the Member States play a key role in putting the common agricultural policy into action. They are in charge of setting «clear objectives» and «target groups» for the restructuring and conversion measures, as well as «eligibility and priority criteria» that will make the most of their effects (par. 23 of the Special Report). Also the EU Commission's answer emphasises the sole responsibility of member states in implementing the assessed measures.

If certain issues arise from the Special Report and are attributed to implementation weaknesses on the part of some members, it could raise doubts about the adequacy of the regulatory framework and communication between EU institutions and member states. Besides the responsibility that each state has, the «degree of freedom» recalled by the Commission (section II, 1, p. 3 of the Commission's answer) might actually hide part of the dark side of the decentralization of implementation. The debate on the positive and negative aspects deriving from a more incisive role of Member States (or, seen from a different point of view, a depowering of the EU centralisation) has been widely discussed and criticised also in the 2021 CAP reform (Costato and Russo, 2023, p. 140; Sotte, 2021), due to the fragmentation and shifting in responsibility that it could cause. The Special Report reveals that this may indeed be the case: the lack of coordination between the Commission and Member States, along with the nationalization of data collection, has a significant impact on monitoring activities. These activities vary from country to country in terms of competitiveness (see box no. 2 of the Special Report). Additionally, the Commission's consideration of environmental performance is lacking (see par. 56 of the Special Report). This leads to an absence (or shift) of accountability in the implementation of the EU measures to support the wine sector. Inherent conflicts thus arise between the Commission's role and national powers as a result of the partially decentralized character of the governance structure mentioned.

3. Institutions – Winegrowers. The third conflict that emerges is just a potential one and it is between Institutions and winegrowers. Being the last step of the support measure chain, winegrowers have the role of implementing actions to achieve competitiveness and sustainability. As the report states (par. 25), the authorities interviewed by the Court of Auditors attribute the responsibility for strategic choices to winegrowers, in a further shifting of responsibilities from the top to the bottom.

If for the wine sector some measures, like the support for restructuring and converting vineyards, have been in place for decades, and thus the role and responsibilities of winegrowers and farmers are somehow consolidated, the new instances for a wider sustainability might lack an adequate feasibility assessment, generating conflicts between rule makers and winegrowers. So, even if the Special Report does

not analyse the aspect of "viability" of duties on farmers, nevertheless it indirectly suggests that both policy and legislation should carefully consider the real applicability and effects of new adopting measures.

One of the most recent failures, in this sense, was the Proposal for a Regulation on the Sustainable Use of Pesticides COM (2022) 305, subject to harsh criticism for its substantial economic, social, and cultural unsustainability (see, in this regard, European Economic and Social Committee, 2022; Council Decision (EU) 2022/2572 of 19 December 2022 requesting the Commission to submit a study complementing the impact assessment of the proposal for a Regulation of the European Parliament and of the Council on the sustainable use of plant protection products). The interventions during the debate of the European Parliament on the 21st of November 2023 which led to the rejection of the proposal on the following day (see, for instance, Schneider, 2023) reveals the concerns expressed from the wine sector, mainly related to the ban on the use of pesticides, in natural and ecologically sensitive areas in the absence of suitable alternatives.

The case of the proposal for a regulation on sustainable use of pesticides suggests that some conflicts may arise from policy and legislation, when ambitious targets are set without considering the real implementing aspects of the set measures. Even though the systems scrutinised by the EU Court of Auditors do not show an immediate existing conflict, nonetheless the possibility should be taken into consideration, above all by the EU Commission, when putting forward future amending proposals.

4. Sustainability and competitiveness. Unlike the previous conflict, the fourth is not just potential; it is a verified one and is clearly reported by the Court of Auditors. It pertains to the contraposition between sustainability and competitiveness, as exemplified by the case of Airén. A traditional variety particularly resistant to drought was not included, with the Commission's approval, among those eligible for the benefits of funds allocated for restructuring and conversion, in favour of varieties like Syrah, which are more water-intensive. This illustrates the division in the wine sector between environmental objectives and market demand.

We could actually see, in this opposition, a partial recall of what we stated at the beginning of the discussion section, about the four dimensions of sustainability and the need to ensure that all of them are met or, at least, balanced.

5. Concluding remarks

As the reader can understand, the Court of Auditors' Special Report has been just the starting point (or excuse) to address some conflicts that would require specific attention, in dedicated research papers founded on verified and adequate datasets. Based on the findings and significant concerns identified by the Court of Auditors, which are not equally reflected in the Commission's documents, we, however, tried to highlight both the priority and the necessity of resolving current emerging conflicts.

Even though some interests may appear in opposition to one another, the cooperation and communication among all the involved parties (including farmers) is essential: if ambition is necessary, also performing a prior complete and independent impact assessment, which takes stock of the differences and the real limits to implementation, becomes indispensable.

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Geographical Indications and biodiversity: An overview of regulatory challenges and critical perspectives

DOMENICO CRISTALLO*

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Abstract

Geographical Indications (GIs) link cultural identity and biodiversity conservation by embedding local resources and practices into regulated product specifications. This paper examines GIs' potential to protect heritage breeds and plant varieties, especially under the new EU Regulation (EU) 2024/1143. By valorising "terroir," GIs can incentivize farmers to maintain traditional resources, thus helping counter genetic erosion and industrial standardization. Collective governance structures, such as producer groups, can foster shared knowledge and equitable decision-making, ensuring that cultural continuity aligns with ecological goals. However, several challenges persist: rigid specifications may stifle innovation, administrative procedures can deter smaller producers, and power imbalances can limit inclusive participation. The recent legal reforms—emphasizing sustainability, transparency, and digitization—bolster the GI system's capacity to incorporate biodiversity-friendly practices. In conclusion, while GIs are no panacea, their place-based, collective orientation positions them as promising tools for coupling economic viability with environmental stewardship.

Keywords*: Geographical indications, Biodiversity, Producer Groups, Sustainability, Market rules, Territory.*

1. Introduction

The modern agri-food sector is witnessing an ever-growing consumer preference for products that exhibit distinctive local characteristics, strong cultural identities, and verifiable ecological credentials (Borsellino *et al*., 2020). Geographical Indications (GIs) have emerged as a central tool in this space, especially within the European Union (EU), where they serve both as intellectual property rights and quality assurance mechanisms. Products recognized under GIs are said to embody the "*terroir*" of a region—an intricate interplay of soil, climate, local knowledge, and other socio-ecological factors (Canfora, 2024). This link between place and product exerts a powerful influence on consumer perceptions of authenticity, tradition, and quality. Given the multifaceted value that GIs represent—cultural, economic, ecological—they have attracted scholarly attention and policy reforms that aim to strengthen their sustainability potential.

Within this debate, a critical issue emerges regarding the relationship between GIs and bio-

* Research Fellow in agricultural and food law, University of Bari, Italy.
Corresponding author: domenico.cristallo@uniba.it

diversity conservation (Leone, 2021; Leone and Cristallo, 2023). Many rural landscapes in Europe and around the world face the pressing challenge of maintaining traditional practices and local genetic resources in the face of pressures from industrial agriculture, climate change, and market homogenization (Gocci and Luetge, 2020). Genetic erosion—whether of animal breeds or plant varieties—threatens long-term food security, ecosystem resilience, and cultural diversity (Leone, 2021). The protective and codifying framework of GIs offers an effective policy tool for reversing or mitigating these trends. By granting protected status to products derived from local breeds and varieties, GIs not only reward farmers and communities economically but also preserve genetic diversity by keeping native resources in use. As such, the synergy between GIs and biodiversity stands at the heart of many policy and academic conversations (FAO, 2018). When producers cultivate a traditional tomato ecotype or rear an indigenous sheep breed under a GI scheme, they contribute to the perpetuation of genetic lineages that might otherwise be lost. This dynamic underscores the notion that GIs can be a collective intellectual property model that fosters socio-economic development while sustaining local ecosystems (Di Lauro, 2020).

This paper investigates how GIs operate as a catalyst for the protection of both plant and animal biodiversity. The text begins by describing the conceptual underpinnings of GIs, focusing on their historical, cultural, and economic significance. Building on that foundation, it delineates how GIs evolved into legally recognized rights within the EU, culminating in Regulation (EU) 2024/1143. This recent legal framework, which consolidates and updates older regulations, is pivotal in clarifying the role of GIs in promoting sustainability goals. Subsequent sections examine the practical ways in which GIs foster biodiversity conservation, with specific attention to the role of local producer groups, traditional knowledge systems, and collective governance. The argument extends to address potential challenges and criticisms of the GI framework, including administrative burdens, risks of standardization, and power asymmetries that can emerge among stakeholders. The discussion also articulates how the updated provisions in Regulation (EU) 2024/1143 shave expanded or refined GI rules to align more effectively with sustainability imperatives.

The latter sections of the paper analyse future perspectives, including the need for adaptability in product specifications, deeper integration of animal welfare measures, and the continued embedding of biodiversity criteria in GI governance. In line with this forward-looking approach, the paper offers recommendations for policymakers, producer groups, and researchers, highlighting the importance of synergy among all these actors to fully harness the biodiversity benefits of GIs. The core proposition advanced here is that GIs, if managed collectively and dynamically, can produce substantial gains for local ecosystems, cultural heritage, and rural livelihoods. By blending market recognition, intellectual property protection, and environmental stewardship, Geographical Indications emerge as a paradigmatic model for how sustainable agriculture can be reconciled with socio-economic viability. It is therefore necessary to verify the regulatory contents of the relationship between GIs and biodiversity in order to understand the limitations and prospects of this regulatory instrument.

2. Conceptual background: linking Geographical Indications to biodiversity conservation

Geographical Indications rest upon the idea that certain products are intimately bound to specific geographical areas, where local environmental and cultural factors give those products unique characteristics or a distinctive reputation (Albisinni, 2020). Over the last century, numerous legal instruments have recognized the legitimacy of protecting these products through a specialized intellectual property right, ensuring that only those who adhere to codified geographical and production standards can use the registered name. This notion of origin-based product identity is not merely theoretical; it shapes consumer expectations and fosters rural development by creating an economic premium around intangible cultural assets (Bolognini, 2019).

Biodiversity, as broadly defined, encompass-

es variability among living organisms from all sources, including terrestrial, marine, and other aquatic ecosystems, as well as the ecological complexes of which they are part. Agricultural biodiversity, in particular, covers the variety and variability of plants, animals, and microorganisms used in farming (FAO, 2019). Traditional farming communities around the world have shaped agricultural biodiversity by domesticating and selectively breeding an immense range of species and varieties. This millennia-long process has led to a wealth of local landraces and animal breeds, each uniquely adapted to particular environmental constraints and cultural preferences.

The intersection between GIs and biodiversity arises from how GIs codify and valorise the production of locally distinctive goods, often those that rely on particular genetic resources (Leone and Cristallo, 2023). Because GIs stress the specificity of place, they frequently hinge upon the use of heritage varieties or traditional breeds. This trait-based approach, when institutionalized in product specifications, can motivate local actors to continue cultivating or rearing genetic resources that might lack the productivity or uniformity valued by industrial supply chains (Nirosha and Mansingh, 2025). Consequently, GIs can foster the on-farm or *in situ* conservation of genetic resources, ensuring that local biodiversity is maintained through actual use rather than relegated to gene banks or small-scale hobbyist farming. The existence of a stable or expanding market for GI-labelled products can reinforce these conservation efforts, creating a price premium tied to the uniqueness conferred by local biodiversity (Crescenzi *et al*., 2022). In essence, GIs can transform biodiversity from a vulnerable common good into an economically viable asset.

However, the relationship between GIs and biodiversity is not entirely straightforward. Critics have argued that formalising production methods into rigid product specifications could freeze certain practices at the expense of the ongoing evolution of local knowledge (Quiñones Ruiz, 2018). Others note that the commercial success of a GI does not automatically guarantee that biodiversity aspects are meaningfully conserved (Leone, 2021); producers could capitalise on the recognised name without fully committing to conserving the ancestral resources at the heart of that name's reputation. However, as normative frameworks such as Regulation (EU) 2024/1143 make explicit reference to sustainability and biodiversity, the potential synergy is becoming increasingly apparent. This synergy is based on a collective awareness of how local genetic resources confer distinctive qualities, and how these qualities, once codified and marketed, can create a mutually beneficial feedback loop between conservation and economic value.

3. Historical and legal evolution of Geographical Indications

GIs trace their origins to early European systems of local name protection that arose from ad hoc efforts to defend the authenticity of regional specialties. In the eighteenth century, merchants in certain regions clashed over the naming of wine and cheese, as producers sought legal recourse to combat appropriation of their local reputations. By the twentieth century, public authorities had begun establishing formal legal frameworks, with France taking a pioneering role through codified "appellations d'origine" for wine. Over time, international agreements such as the 1883 Paris Convention for the Protection of Industrial Property and, later, the 1994 Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) offered broader recognition for place-based product names. Within the European Union, the first structured GI legislation was introduced in 1992 under Council Regulation (EEC) No 2081/92, which marked a major step toward harmonizing geographical designation rules for agricultural products and foodstuffs (Canfora, 2024). This milestone opened the door to successive reforms and expansions (Trapè, 2019), eventually leading to more specialized legislation, including Regulation (EU) No 1151/2012 for foodstuffs, Regulation (EU) No 1308/2013 for wine, and Regulation (EU) 2019/787 for spirits. These instruments formalized the designations "Protected Designation of Origin" (PDO), "Protected Geographical Indication" (PGI), and "Traditional Speciality Guaranteed" (TSG). Under these systems, producers seeking to register a product

must show the specific qualities, production processes, and geographic link in a disciplinary or product specification. Once registered, the name is protected across the EU, preventing non-conforming producers—whether inside or outside the region—from using it. In the early 2000s, as consumers became more aware of ethical and environmental aspects of agriculture, GIs were increasingly recognized as tools for rural development and ecological stewardship (Flinzberger *et al*., 2022). Although various amendments to existing EU frameworks acknowledged environmental considerations, they were largely optional rather than mandatory. In practice, many GI consortia did embrace biodiversity and sustainability goals (Vandecandelaere *et al*., 2021), though the lack of a uniform approach sometimes limited the full potential of GIs in conservation strategies. Against this backdrop, Regulation (EU) 2024/1143 stands out as a landmark measure. By consolidating legal rules for wines, spirits, and agricultural products, it has clarified the responsibilities of producer groups and improved mechanisms to prevent unfair evocation or mislabelling. Beyond its organizational reforms, the new regulation positions GIs as essential components of cultural heritage and sustainable development, offering a clearer legal basis for integrating biodiversity objectives into everyday GI management, notably concerning the protection of local animal breeds.

4. Overview of Regulation (EU) 2024/1143

Regulation (EU) 2024/1143 brings together several strands of previous EU legislation and introduces specific measures aimed at ensuring that GIs keep pace with broader sustainability targets, including those spelled out in the European Green Deal and the Farm to Fork Strategy. The first clear innovation in this regulation is the unification of distinct GI frameworks for wine, spirits, and foodstuffs within one legislative instrument. Such consolidation eliminates duplicative clauses and contradictions that previously existed across separate legal texts and thereby facilitates more consistent enforcement at the Member State level.

A second key feature is its explicit recognition of sustainability—environmental, social, and economic—as a pillar of GI protection. The text not only encourages producer groups to document and adopt sustainability measures in their product specifications but also allows for modifications to existing specifications to integrate new environmental or biodiversity-related criteria (Cristallo, 2025). In this sense, the regulation provides a legal foundation for dynamic, adaptive management of GIs, wherein product rules can evolve to reflect the latest scientific findings or policy goals. In particular, for biodiversity, the regulation allows for the inclusion of explicit conservation targets (e.g., mandated inclusion of certain heritage crops, restrictions on chemical inputs, or guidelines for preserving local ecosystems) within the specification. Moreover, this regulatory framework can be complemented by voluntary tools that encourage stakeholders to go beyond the minimum requirements, fostering innovation and sustainability in product development and environmental conservation. Such measures can either be proposed by producer groups themselves or encouraged by the competent national authorities who oversee GI registration.

Another innovation is the use of digital tools to promote transparency. Regulation (EU) 2024/1143 promotes digitisation in line with the process of innovation in agri-food systems (Ferrari, 2024). Digitalisation can make information on local breeds, seed saving practices and organic standards easily accessible. By sharing real-time data with the public, researchers and market actors, this approach not only increases accountability but also builds consumer trust, especially when sustainability claims are at stake (Geppert *et al*., 2024).

The new regulation also expands the legal scope of protection against evocation and misuse. Although earlier regulations provided protection in principle, the updating of certain enforcement provisions and the move toward an EU-wide digital registry are expected to strengthen the capacity of authorities to clamp down on GI infringements. From a biodiversity standpoint, this heightened enforcement is valuable because preserving the link between a product and its authentic place of origin likewise preserves the breed or plant variety at the heart of

that product. If imitation products could proliferate, local producers would have less incentive to maintain the genealogical purity or distinctive attributes that define an authentic GI.

Finally, Regulation (EU) 2024/1143 represents a more explicit alignment with the EU's external trade policy, given the GI chapters included in many free trade agreements (Ribeiro de Almeida, 2024). This alignment further cements the global significance of GIs as an instrument for climate resiliency, biodiversity, and local economic development. Many consumer markets worldwide place premium value on EU-labelled products, not only for taste or cultural prestige but also for perceived sustainability and authenticity. The new regulation leverages this recognition and attempts to embed biodiversity protection more firmly in the entire GI "value proposition," thus creating a synergy that encourages local producers and traders to keep local resources intact.

5. Geographical Indications as a tool for biodiversity conservation

Although GIs are sometimes dismissed as niche marketing, a growing body of evidence reveals that they can be transformative in shaping land use and preserving local ecosystems. Farmers who cultivate or raise protected local resources typically embed them in complex cultural and ecological contexts, gleaned from centuries of traditional knowledge (Ferrari, 2019). This interplay of genes, environment, and culture constitutes the "*terroir*" that modern GI frameworks strive to protect. Because terroir-based production is inseparable from local biodiversity—soil microbes, pollinators, forage species, or local livestock breeds—strong GI protection often yields wide-ranging ecological benefits (Leone and Cristallo, 2023).

One avenue through which GIs encourage conservation lies in their economic logic. A GI product frequently garners a higher market price because it is marketed as premium and distinctive (Cei *et al.*, 2018). This premium can offset the potentially higher costs of rearing niche breeds, cultivating heirloom varieties, or adopting traditional but labour-intensive methods. Without a GI framework, farmers might struggle to compete with large-scale producers who rely on standardized, high-yield breeds or varieties. By contrast, when a GI invests cultural and economic value in local resources, it transforms them into an asset. Farmers thus have a market incentive to maintain the complexity of local genetic resources, which are essential to preserve the product's distinctiveness and the authenticity expected by consumers. Over time, the synergy between local identity and consumer recognition can nurture a virtuous circle of conservation.

Conservation is further reinforced by the communal aspect of GIs. Unlike patents or trademarks owned by single entities, GIs typically involve a collective right managed by producer groups or consortia. These groups collectively devise, monitor, and enforce the production rules contained in the product specification (Genovese, 2023). The collective nature of GIs fosters knowledge sharing, with older farmers passing along the intricacies of sowing, breeding, or processing to younger generations. In many regions, such collaboration is invaluable for preserving intangible cultural heritage alongside biological resources. Because the GI system ties a product's identity to a specific region, it fosters strong local ties and a sense of stewardship among producers, who understand that neglecting or eroding the local resource base could undermine the product's reputation and thus threaten their livelihood (Guerra, 2010).

An example of how GIs support biodiversity in practice could be seen in the many cheese-producing regions in Europe. Often, the cheese's unique aroma and texture derive from a combination of local forage species, indigenous livestock breeds, and artisanal cheesemaking traditions. The product specification might specify that cows must graze on biodiverse alpine pastures for a certain period each year, or that certain feed components be locally produced. These provisions ensure that the multi-species grasslands—important habitats for pollinators and wild flora—remain actively managed rather than abandoned or converted to monocultures (Lambert-Derkimba *et al*., 2010). In this way, the GI effectively merges economic profitability with ecological stewardship, reaffirming the presence of local biodiversity.

Moreover, GIs are also a valuable tool for the active conservation of biodiversity. Article 46 of the Regulation allows for a protected geographical indication to be granted to products whose unique qualities, reputation or specific characteristics are closely linked to their place of origin. This may include the recognition of a specific plant variety or animal breed. In essence, the GI system both celebrates local cultural and economic heritage and encourages the conservation of indigenous genetic resources, giving producers a clear incentive to nurture and maintain these unique biological treasures (Leone and Cristallo, 2023).

Nonetheless, the direct impact of GIs on biodiversity can vary. Some GIs might emphasize historical or cultural practices without necessarily prioritizing ecological considerations; in such cases, biodiversity preservation might still occur incidentally but not always to the same extent. This is where the evolving regulatory environment, exemplified by Regulation (EU) 2024/1143, becomes crucial. By explicitly endorsing sustainability as a key component of GI protection, EU authorities and national competent bodies encourage producer groups to adopt more robust biodiversity measures and to evaluate them systematically. This regulatory scaffolding pushes GIs beyond narrow marketing niches, cultivating in them a more inclusive approach in line with agroecological principles.

6. The role of producer groups and collective management

One of the main features of GIs is the principle of collective organisation. As the literature consistently underscores, GIs are not typically owned by a single individual but function as a shared resource overseen by a group or consortium representing all eligible producers within a defined geographical area (Di Lauro, 2020). These consortia possess a range of powers that extend beyond registering or defending the GI, including the coordination of production protocols, compliance measures, and joint promotional strategies. The communal dimension of such an arrangement is especially significant for biodiversity, since it allows for a territory-based approach rather than leaving each farm to operate in isolation.

Producer groups[1] can strengthen the management of local biodiversity by establishing internal rules related to seed sourcing, animal breeding programs, and rotational grazing or integrated pest management practices. Although Regulation (EU) 2024/1143 does not explicitly require these consortia to negotiate with public authorities, it fosters an environment in which collaboration with regional or national institutions can prove beneficial for biodiversity goals (Rizzuto, 2024). In particular, Article 7 of the regulation enables producer groups to introduce specific sustainability measures either by integrating them into the product specification or by adopting other private-law instruments such as marks or certifications (Di Lauro, 2024). The text clarifies that such measures may focus on environmental, social, or economic objectives, thus granting groups the possibility to embed biodiversity-friendly criteria in their disciplinary. By codifying these points—whether they pertain to local breeds or minimal chemical inputs—the consortium can ensure that a GI's identity remains linked to the preservation of unique ecological resources. This collective dimension is pivotal for biodiversity because it allows a shared, territory-based strategy rather than leaving each farm isolated.

A further innovation in Regulation (EU) 2024/1143 concerns the extension of stakeholder participation in producer groups, with the type of stakeholders being defined by reference to Article 157 of Regulation (EU) No 1308/2013. According to the regulation, Member States may allow operators and representatives of economic activities connected to one or more phases of the GI supply chain, along with other interested stakeholders, to become part of the group—so long as they hold a specific interest in the prod-

[1] The new regulation distinguishes between ordinary producer groups and recognized producer groups, granting the latter broader powers and enabling them to extend sustainability norms to all producers even if these norms are not incorporated into the product specification.

uct. The regulation explicitly states that these additional members do not exercise control over the group of producers. This mechanism brings an expanded array of perspectives—possibly including processors, retailers, or even NGOs—into the same organizational setting as primary producers, thereby creating a more inclusive governance model. In the context of biodiversity, such diversity of membership can prove invaluable. Smaller-scale producers may find like-minded partners among other stakeholders who value ecological assets, while larger or more commercially oriented actors can gain insights into the benefits of preserving local genetic resources.

Collective management also extends to how the GI's disciplinary is updated over time. In some cases, older GIs might have been written at a time when biodiversity concerns were less salient. Under the impetus of Regulation (EU) 2024/1143, these groups can propose amendments that integrate biodiversity requirements—perhaps specifying that local animal breeds must compose a certain share of the herd, or that a specific range of local cereals, vegetables, or pulses must be used. These updates can be grounded in ongoing scientific research. Producer groups sometimes collaborate with universities, extension agencies, or conservation NGOs to better understand the ecological footprint of their production and to identify the native resources that need protection (Nirosha and Mansingh, 2025).

The ability of a GI consortium to adopt and enforce biodiversity measures is not automatic. In certain contexts, the group may be dominated by large or industrial producers who have less interest in investing in genetic conservation. However, the widely recognized notion in GI legislation that these consortia represent the general interest of the local economy can create internal checks and balances. Smaller-scale, ecologically minded producers can play a vocal role, and local governments or consumer advocacy groups might also pressure the consortium to embrace higher sustainability standards. Enforcement then becomes a matter of local prestige and market credibility: if a GI fails to meet its stated biodiversity or environmental claims, its reputation could be severely damaged.

7. Plant biodiversity, traditional knowledge, and Geographical Indications

A large part of agricultural biodiversity revolves around plant diversity. Over generations, smallholder farmers have cultivated a vast array of landraces, each carrying distinctive genetic traits suited to local conditions. Large-scale industrial agriculture has often displaced these landraces in favour of a handful of high-yield or disease-resistant varieties—an understandable strategy for food security but one that narrows the genetic base (Dasgupta, 2021). This homogenization can undermine the resilience of farming systems in the face of climate change and evolving pest pressures. GIs, by tying a product's authenticity to a particular local variety, provide a constructive counterpoint to the standardization trend.

Traditional knowledge systems also occupy a vital role within GI frameworks (Arfini and Bellassen, 2019). Such knowledge often includes sowing and harvesting calendars attuned to microclimatic conditions, as well as specialized processing or storage methods that maintain the organoleptic qualities of heritage crops. In many cases, this knowledge is transmitted orally from generation to generation; formal recognition under a GI can help record it systematically within product specifications. Regulation (EU) 2024/1143 encourages acknowledging local knowledge as a legitimate basis for conferring a product's specificity, thus reinforcing the intangible cultural heritage that accompanies biodiversity. For instance, the regulation clarifies that a GI can incorporate historical references and ethnobotanical evidence to strengthen the argument for a unique link to the territory (Albisinni, 2024; Costantino, 2024). When integrated into a legally protected disciplinary, such knowledge is less likely to be lost or eclipsed by globalizing forces.

An illustrative example might be found in orchard-based GIs, where fruit varieties developed through centuries of local breeding show adaptation to regional pests or climate conditions. If the product specification requires these specific varieties, and if producers see a financial return through GI marketing, the orchard becomes an active repository of genetic diversity. Farmers

can further refine these varieties, selecting for taste, resistance, or yield without losing the link to local heritage. In doing so, they perpetuate a micro-evolutionary process that keeps agriculture adaptive. In many southern European regions, GI-labelled fresh fruits or nuts have spurred orchard revitalization projects, reversing a decades-long trend of orchard abandonment (Arfini and Bellassen, 2019). The reintroduction or preservation of pollinator habitats often goes hand in hand with orchard upkeep, highlighting the interconnectedness of local knowledge, plant diversity, and farmland biodiversity.

8. Animal biodiversity and GIs: legal and practical perspectives

The conservation of animal biodiversity within GI systems has attracted particular interest in the last two decades, especially regarding livestock species with distinctive genetic traits. Traditional breeds often show resilience to local climatic extremes or disease pressures, making them an invaluable resource for climate adaptation. Nonetheless, these breeds may exhibit relatively low productivity in industrial contexts, prompting farmers to replace them with high-performance hybrids. GIs can counteract this trend by embedding breed-specific requirements in the product specification, so that only animals of a named local breed can be used to produce the GI-labelled product. Doing so ensures economic viability for these animals and fosters ongoing breeding programs that maintain or even enhance genetic diversity.

Literature argues that the GI framework can effectively protect farm animal biodiversity by recognizing the breed as intrinsic to the product's identity (Leone and Cristallo, 2023). According to this analysis, the explicit mention of breed characteristics within a GI specification allows for robust legal protection against products made with other breeds. This fosters an environment in which local breed associations collaborate with GI consortia to monitor parentage and manage herd books. Regulation (EU) 2024/1143 reinforces such measures, stressing the need for well-documented links between breed, region, and product. Producer groups are also encouraged to detail how the rearing conditions—outdoor grazing, minimal antibiotic usage, local feed—support the distinctiveness of these animals and, by extension, the final product. These explicit references to animal welfare become another pillar of sustainability, since healthy, well-adapted local animals often align with lower input farming systems that support a broader range of farmland biodiversity.

Although these measures are promising, several challenges persist. Certification and monitoring can be complex, especially if breeders are geographically dispersed or if local record-keeping systems are underdeveloped (Canfora, 2015). The cost of verifying breed lineage, controlling inbreeding, and ensuring compliance with product specifications can be significant. Nonetheless, the communal nature of GIs often helps mitigate such expenses. Producer groups can pool resources to hire accredited certifying bodies, invest in modern genetic testing, or negotiate with local governments for financial assistance. Over the long term, the premium that GI products fetch in the market often repays these collective investments.

Another dimension concerns the interplay between GI rules and broader animal-welfare regulations. While some Member States have advanced legislation requiring certain welfare standards, others have weaker frameworks. The new regulation clarifies that GI product specifications should not run contrary to general EU animal welfare standards, and it encourages further integration of welfare criteria in the specifications. Because GI-labelled products are often associated with higher quality, public expectations of humane animal husbandry are also high. This synergy between animal welfare and biodiversity is particularly evident in free-range or pasture-based systems (Lambert-Derkimba *et al*., 2010). If local herds can graze diverse grasslands, the region's overall biological diversity may be enriched through the maintenance of semi-natural habitats, which also serve as a refuge for wild species of plants and insects. The interplay of local knowledge, breed specifics, and GI collective rules thus weaves a tightly knit strategy for sustaining rural ecosystems.

9. Challenges and criticisms

Although GIs hold significant promise for safeguarding biodiversity, this system is not without its complexities and critiques. One persistent issue is the possibility of standardization, ironically arising from the requirement to specify methods and inputs in considerable detail (Gocci and Leutge, 2020). Critics argue that rigid GI specifications can freeze local knowledge and exclude other legitimate variations of production. For instance, producers in adjacent micro-zones might use equally traditional but slightly different techniques that, under a narrow specification, become invalidated. This dynamic could narrow the range of local diversity rather than expand it, though it is also worth noting that many consortia make provisions for small local variations within the recognized region.

A related concern surfaces around the administrative demands of GI registration and oversight. Smaller farmers or cooperative groups sometimes face difficulties navigating EU-level procedures, which can require complex documentation, scientific proof of historical use or ties to the region, and repeated interactions with national and European authorities. While Regulation (EU) 2024/1143 aims to simplify procedures through digitization and more transparent guidelines, real-world implementation can still be onerous, especially for producers with limited resources or technical expertise.

Moreover, GIs can sometimes exacerbate power imbalances within local communities. The advantage may fall to those already possessing capital and networks, while smaller or more marginalized producers struggle to participate meaningfully in the GI's governance structure. Producer groups, in principle, are democratic or at least representative bodies, yet they can be dominated by a handful of large producers who might have narrower interests concerning biodiversity. If, for example, large producers prefer to streamline production using fewer genetic lines or rely on standardized feed, the GI's biodiversity potential can be undermined. This dynamic underscores the importance of robust internal governance rules that ensure equitable representation and decision-making. (Rizzuto, 2024)

Another challenge lies in the success of GI-labelled products themselves. Though many GIs establish a premium market niche, not all manage to maintain it (Quiñones Ruiz, 2018). Market realities, such as consumer price sensitivity or competition from cheaper imitation goods, can erode the profitability that once sustained biodiversity-friendly production. The revised scope of protection under Regulation (EU) 2024/1143 helps mitigate this problem, yet global trade complications and online marketplaces can still pose risks. Enforcement across borders, especially in non-EU jurisdictions, remains complicated, although the EU's bilateral trade agreements increasingly include GI protections, offering some legal avenues for recourse.

Critics also highlight the fact that biodiversity conservation, while theoretically encouraged, is still not always a firm requirement across all GIs. The scope for genuine biodiversity impact depends heavily on how each consortium designs its specifications and how strictly national authorities or third-party certifiers enforce them (Cristallo, 2025). Many GIs do flourish on the basis of intangible cultural reputations rather than explicit biodiversity attributes, which can mean that, in practice, biodiversity is more a side effect than a central objective. Proponents of GIs argue that as consumer demand for "sustainable," "heritage," and "eco-friendly" products continues to rise, more consortia will see the benefits of foregrounding biodiversity in their marketing and production rules. The potential is undeniably strong, but it depends on the synergy of effective governance, conscientious production, supportive market contexts, and consistent legal backing.

10. Future perspectives and recommendations

The evolving discourse around GIs and biodiversity suggests that the system is poised to become a core instrument of agroecological transformation, but certain steps must be taken to enhance its efficacy. One recommendation is the adoption of adaptive management strategies that allow GIs to respond to both ecological and socio-economic changes. Instead of freezing traditional methods, consortia could design product

specifications that integrate ongoing research findings, potentially introducing new landraces or refining breeding methods in a way that remains true to the product's identity. Flexible specifications that permit innovative, biodiversity-friendly practices could prevent the ossification of local knowledge while still preserving authenticity.

Another pressing need is to support smaller producers who often face the steepest barriers to GI adoption. Technical assistance and financial incentives for biodiversity-oriented practices, such as covering the costs of genetic testing or training in seed multiplication, would help these producers contribute more robustly to the GI system.

In addition, greater collaboration between research institutions and GI consortia is advisable. Academic studies can help measure the biodiversity outcomes of specific GI rules, clarifying which aspects—like breed specificity, rotational grazing, or pesticide restrictions—are most beneficial. Coupled with long-term ecological monitoring, such evidence can guide incremental improvements in the product specification. These collaborations can also enhance consumer transparency by providing scientifically grounded data on why a product is truly biodiversity-friendly.

An important recommendation lies in broadening the scope of recognized resources in GI documentation. Rather than focusing solely on direct production inputs, consortia could be encouraged to consider the entire ecosystem context, including pollinator habitats, water management, and soil microbe diversity. Although the new regulation permits a more comprehensive approach, explicit guidance on how to integrate such information could help producer groups draft robust, ecosystem-focused product specifications that genuinely champion local biodiversity.

It is likewise essential to reinforce consumer awareness through educational campaigns and targeted labelling. Many consumers already recognize the EU logos for PDO, PGI, or TSG, but they may be less informed about the biodiversity elements behind these labels (Leone, 2021). Public authorities and producer groups can work together to develop communication materials that highlight how local breeds or plant varieties shape the flavour, texture, or aroma of the product and how these genetic resources would be at risk without a GI framework. Linking such narratives to broader environmental discussions—like climate change and resilience—can deepen consumer appreciation and make them more willing to pay a premium, which in turn supports conservation efforts at the farm level.

Finally, global collaboration is increasingly important. The EU maintains a portfolio of trade agreements with GI provisions, reflecting a growing international awareness of the need to global approach to sustainability (Di Lauro, 2018). By using these agreements as platforms for sharing best practices in biodiversity management, the EU and its partners can expand the conservation benefits of GIs beyond Europe. International recognition of GIs may also foster improved sustainability standards in other regions with similarly rich agricultural histories. As climate change threatens many traditional farming systems, the model of local identity plus biodiversity stewardship has the potential to gain traction worldwide, safeguarding genetic resources of global significance (Di Lauro, 2022).

11. Conclusion

Geographical Indications represent a unique confluence of legal protection, cultural valorisation, and potential ecological stewardship. The revised legal framework articulated in Regulation (EU) 2024/1143 consolidates previous rules for wines, spirits, and agricultural products under a single instrument and explicitly references sustainability and biodiversity objectives (Albisinni, 2024). In doing so, it further legitimizes a path that many producers, stakeholders, and local communities have already been pursuing: the adaptive management of agricultural biodiversity through collective governance and market-based recognition.

It is evident that GIs can shield localized animal breeds from extinction, incorporate heritage plant varieties into mainstream production, and embed longstanding cultural practices into product specifications. This synergy has allowed many rural areas to avoid the uniformity of industrial models, preserving both ecological complexity and intangible heritage. By converting intangible local resources into market

assets, GIs can generate a stable income stream that underwrites biodiversity-friendly practices. The presence of a strong GI can therefore reduce the vulnerability of rural economies, discourage out-migration, and foster pride in local identity, all while ensuring that distinctive genetic resources remain actively used.

The debate is not without nuance. Overly rigid product specifications, administrative hurdles, and possible domination by large stakeholders can hamper GIs' capacity to foster biodiversity. Ensuring equitable governance, flexible adaptation to changing environmental conditions, and robust enforcement against fraudulent uses of GI names are all ongoing tasks. Nonetheless, the overarching direction points to GIs being an increasingly central part of the EU's effort to realign agriculture with sustainability imperatives, especially in an era of pressing climate and ecological challenges.

In a future shaped by climate uncertainty and evolving consumer demands, the potential of GIs to promote biodiversity will likely expand. Producer groups may incorporate explicit requirements to protect local species, governments may incentivize synergy between GIs and protected areas, and global dialogues may lead to stronger international support for origin-based products. While not a panacea, GIs have demonstrated a remarkable capacity to align economic, cultural, and environmental values under a single cooperative framework. By drawing on collective action, intellectual property rights, and scientific knowledge, GIs can help shape an agricultural landscape that retains its character, resilience, and biological richness for future generations. In that sense, the ongoing evolution of GIs within EU legislation and beyond offers an inspiring blueprint for how local communities, markets, and ecosystems can flourish together in an increasingly globalized world.

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Agriculture between constitutional dimension and *One Hearth-One Health approach*

CECILIA PANNACCIULLI*

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Abstract

This paper focuses on the effects that the new emerging vision of the man-nature relationship - from the recent review of the articles 9 and 41 of the Italian Constitution - has generated on the agricultural sector. Within this new perspective, the "rational exploitation of the soil" and the "fair social relations" (ex-art. 44 It. Cost.) become the object of an evolutionary reading prompted by the unavoidable needs of the ecological transition, highlighted by the One Earth-One Health perspective, where the integrated and unifying approach to health safeguard goes along with the importance of an adequate protection of air, water, soil, climate, food and clean energy production. Moreover, some serious criticisms of this irenic framework are not to be underestimated: one above all is the juridical conversion of the One Hearth-One Health approach, because it does not correspond to a One Law. Due to the ever-deepening relationship between natural and human sciences, constitutional law appears to be best suited to overcome the antagonism between environmental requirements and development models in an integrated and "proportionate" perspective.

Keywords*: One Hearth-One Health, Constitutional dimension of agriculture, Olive oil production chain, Conflict agriculture-renewable energy plants, Balancing and proportionality principle.*

1. Constitutionalism and environmental awareness

The recent revision of the Articles 9 and 41 of the Italian Constitution (*ex multis:* Nicotra, 2021; Cecchetti, 2021; Bifulco, 2022) has introduced three innovative constitutional guarantee profiles into the legal system: 1) the inclusion of the environment protection, biodiversity and ecosystems among fundamental principles, with specific reference to the interests of future generations; 2) the expressed provision for the animals protection as an element of autonomous importance in the context of environmental systems; 3) the legislative orientation of the public and private economic initiative for environmental (as well as social) purposes which, from now on, cannot be carried out in a way that harms health and the environment.

The question is whether constitutional reform represents a paradigm shift (Amirante, 2022). There has been talk about a renewal of the social contract (Camerlengo, 2020; Ost, 2021; Morrone, 2022), no longer focused just on the relationship between citizens and public authorities, but also on the affirmation of the principles of interdependence between the individual, society and nature.

* University of Bari, Italy.
Corresponding author: cecilia.pannacciulli@uniba.it

Human health depends on the health of the Planet. Earth's natural systems (air, water, land, biodiversity, climate) are our life support systems.

Yet climate change, biodiversity loss, scarcity of land and freshwater, pollution and other threats are degrading these systems. The emerging field of Planetary health aims to understand how these changes threaten our health and how to protect ourselves and the rest of the biosphere. Think of the need for proper water policies that would require investment in next-generation machinery, sustainable infrastructures and precision irrigation. Human, animal and Planet health are, as never before, interdependent and their guarantee is implemented through an integrated, unifying approach, a *One Earth-One Health* perspective recently addressed by the "One Health Joint Plan of Action-2022-2026" in which, alongside the integrated and unifying approach to health safety, the importance of adequate protection of air, water, soil, climate and a sustainable food (Canfora I., 2023) and energy system shall be taken into account.

Therefore, the constitutional revision suggests - consistently with the widespread emergence (in almost all the existing Constitutions) of the constitutional norms on the protection of the environment (Cuocolo, 2022), and with the latest European Union Programs in this area (*European Green Deal, One Hearth-One Health, EU's Biodiversity Strategy for 2030, Farm to Fork*) – a new connection between man and nature, promoting strategies to implement a holistic approach to the protection of the Planet (Myers and Frumkin, 2022). The latter becomes one of the protagonists of constitutionalism which, for the first time, guarantees the fulfillment of environmental demands as an ordering criterion both of action of public authorities, and of individual and collective behavior (Amirante and Bagni, 2022).

Until recently, as outlined in an authoritative and agreeable way, "the sectoral and parcelled approach to the study of environmental issues has led environmental law to develop on two parallel tracks: that of international law and that of administrative law, which are rarely in touch with each other. However, the emergence of the environmental crisis requires a holistic and interdisciplinary approach to the issue. In fact, the environmental law norms result from the convergence of technical-scientific knowledge and political-social choices. The constitutional dimension represents the only level capable of making the principles of international law concerning environmental matters more consistent" (Amirante, 2023). The constitutional provisions, open to the international dimension and binding for all domestic sources of law at the same time, represent the only source capable of imposing on national collectivities in an adequate and proportionate way. Indeed, the constitutional dimension - in a more appropriate and "consolidated" way (Cecchetti, 2021) than the international and eurounion one, but also less fragmented and sectoral than the administrative or jurisprudential level (Cecchetti, 2022) - is the most suitable to "relocate" the political sphere "inside" nature and to promote a different type of socio-economic development, no longer focused on the indiscriminate consumption and exploitation of soil and resources, but based on the integrated centrality of man "into" nature, in synergy with the environment. The constitutional positivization of the environmental awareness acquired by society and through pronouncements of different levels of jurisdiction, provides certain references to citizens and interpreters, reducing possible retreats or excessive discretionary power and marking the transition from antagonism to integration between environmental requirements and development models (Monteduro, 2020).

2. Legalization of the *One Hearth-One Health approach*: critical issues

The incorporation of the principles that aim to guarantee "a single healthy life system" (Carducci, 2020) into the Constitution has positivized "the interrelation between man and the living systems of which he is part" (Monteduro, 2019), by setting in a unique and strengthened way the awareness and values now rooted in the community and national jurisprudence. However, a higher and problematic degree of flexibility has been implicitly introduced into the regulatory system (Grassi, 2023). In fact, the extreme heterogeneity and interdisciplinarity of the sources

of environmental law (or, perhaps, *rectius*, "of environments"), poses as fundamental issue the balance between opposing values and interests (for example, the continuous tensions between environmental protection and property rights) or potentially antagonistic though being part of a homogeneous, albeit abstract, perspective of protection: consider the very current conflict between land use for renewable energy production and the installations impact on landscape, agriculture and biodiversity. If the *One Hearth-One Health approach* clearly recalls an ecological balance between the environment, human collectivity and the remaining animal kingdom, it becomes both necessary and particularly complex to change this holistic vision at the level of the legal system, because of the difficulty in coordinating the various levels of government competent to implement it, and because of the lack of interdisciplinary organization that requires such an approach on the institutional level. It is also considered that, even if the environmental phenomena have no boundaries, the *habitat* in which they manifest is territorially defined and variously characterized at the same time, making clear the need for interventions that - according to the mobile criteria defined by the principle of subsidiarity - give priority to state and regional regulation.

We can consider several consequences from the above said: 1) constitutional law, also in its comparative aspects, has a central role of the regulation of the relations between man and nature; 2) the legal order no longer regulates the plurality of environments as "separate units" but as interconnected and interdependent dimensions; 3) the absence of a precise distribution of functions and constitutionally provided coordination mechanisms brings up the issue of a high conflict between State and Regions; 4) the territory, understood both as soil and a space including air, water and subsoil, becomes a structural element of environmental protection: in fact, this is the place where conflicts between the interests concerning the various fields and different timings of its development, are created and have to be resolved; 5) the resolution of the conflict between environmental and economic interests also depends on scientific knowledge and technical solutions.

Therefore, the problem of regulating the way in which science is allowed to give its indications exists. Science is uncertain, so the regulation of how we arrive at this kind of results becomes fundamental. In this regard, a problem arises: within what limits the choices of the legislator may be called into question, and to what extent the constitutional courts and other jurisdictions may interpret the constitutional rules in environmental matters, given the concrete possibility to exercise themselves part of the political discretion needs to be assessed. At State level, as in the case of India, the emphasis should probably be on the role of specialized environmental jurisdictions (often referred to as "green jurisdictions") as "drivers" stimulating regulatory and constitutional innovation within environmental law. In any case, a change of perspective which leads to the idea of overcoming the traditional logic of balancing opposing interests needs to give birth to new logics of "integrated" protection. An increasing number of rights depends, more and more, on the maintenance of certain environmental conditions; thus, their guarantee has to be carried out through the protection of the respective instances, which need to be protected, not "despite" the presence of other interests, but just "in function" of such interests and rights which presuppose specific environmental conditions. However, as we will see later, here is the question whether, on a legal-constitutional level, the logic of "balancing" should be changed in favor of the "prevalence" of environmental interest above any other.

3. The constitutional dimension of agriculture in the *One Hearth-One Health* perspective

It seems obvious, starting from these premises, that the environmental constitutionalism and specifically the Italian constitutional revision are intended to reverberate their effects on the agriculture sector too, towards which the Italian Constitution devotes an entire article, the 44th (vv. aa., 2019). Hence, in the light of the new ecological perspective introduced by the reform, we can make an evolutionary reading of it. I refer to the two purposes to which the agricul-

tural activity and property must be inspired ex article 44: the achieving of "rational exploitation of the soil" and the "establishment of fair social relations". So, the *One Hearth-One Health* perspective gives the adjective "rational" a strong profile of flexibility (D'Addezio, 2019). This allows us to look at agricultural production, not only in economic and quantitative terms, but also qualitative. For this reason, it seems to be required the adoption of legislative measures aimed at the preservation of natural resources (D'Addezio, 2022; Simoncini, 2012). On this premises, it follows that the rational exploitation of the soil, while maintaining an important rooting in agriculture, also has close ties with other constitutionally relevant areas such as soil protection, land government, the regulation and use of water resources and the protection of the environment and the landscape with a view to sustainability. Under this perspective, the unity of the public interests that invest the soil involves a constitutionally oriented government. It is an ecological transition which, although focused on the "agrarian question" at the time of the drafting of the art. 44 Cost., is projected in a current issue where the reasons of food and water management are competing with those of energy security and freedom of enterprise; but it's also a vision that acknowledges the multifunctional nature of agriculture - just think of olive growing as an example – which constitutes a whole social, cultural, food and tourist heritage of great value.

Turning now to the definition of "fair social relations", it allows agriculture to be placed in a solidaristic framework that values the intangible elements that have characterized it in its evolutionary path, such as, for example, the spread of networks of reciprocity and mutual support. The farmer, therefore, abandons the role of mere producer of food and agricultural products and becomes, in addition, a provider of services in favor of the community in many ways: protecting the environment, preserving biodiversity and natural resources, designing the landscape, contributing to the socio-economic survival of rural areas and so on. These goods, in fact, must also be protected for the benefit of future generations, precisely because they are linked to the realization of the interests of all citizens: think of those experiences of agriculture that protect the land, as well as those that preserve native plant and animal varieties. The subjects carrying out these activities are not always the same: citizens, in the case of urban gardens; community cooperatives or other Third sector entities; protagonists of different experiences of collective management of the land, as well as agricultural enterprises when they engage in social or educational agriculture; G.A.L. (Local Action Groups) promoting "inner areas" (Pannacciulli, 2023) according to the *placed-based* approach. The considerations regarding the changing pattern of consumption and development are also certainly applicable to agricultural activities. The new constitutional paradigm cannot, then, disregard the principle of sustainability (environmental, social and economic), which implies an agriculture respectful of ecological balance and a development system aimed at a greater social equity in access to natural resources. This paradigm also requires a new model of production and consumption by reducing waste, increasing recycling and extending the life cycle of products, the so-called circular economy, with a view on real ecological regeneration. One of the most important challenges that our society needs to face is to make possible the coexistence between ecological and economic systems. An example, among many, is the olive oil industry. The olive tree is suitable for several ecosystems which are very different from each other. Olive oil is a product that can be intrinsically called "sustainable", because, tracing the stages of its production, starting from the origin, turns out that the olive tree has a much lower water requirement than other crops, a high efficiency in water use and an incredible capacity of CO_2 absorption and storage, proving to be a solid ally against climate change. From another point of view, this sector is particularly suitable for the implementation of circular economy projects in industrial processes, such as the use of pruning residues to produce thermal energy, the oil waste for energy production in biogas plants, virgin pomace for the extraction of compounds for cosmetic and pharmaceutical uses, detergents, paints and bioplastics. The by-products of the olive-oil chain can bring several benefits to

the bovine and ovine livestock chains, ranging from the production of quality feed for animal welfare to the functional quality of milk and cheese, with beneficial implications for human health, to the production of sustainable food packaging as biodegradable and bioactive.

4. Conclusions (Agriculture *versus* energy transition?)

Lastly, a final thought on the conflict between the multiple agriculture related interests and the urgency of the energy transition is needed. Under the pressure of international and supranational obligations, the implementation of decarbonization policies for climate mitigation, given their strategic importance for the essential ecological transition, is now to be considered a "priority" internally to each country (Bruti Liberati, 2021; Piperata, 2023): this implies that the suitability of a territory for the location of green energy production plants takes primacy above all the various interests which need to be balanced. On the one hand, this priority amplifies the conflict with other constitutionally protected values and assets (Carpentieri, 2021; Celati, 2023; Spuntarelli, 2023; Tonoletti, 2021), such as landscape, agriculture, biodiversity and even the quality of life, which become mostly recessive in relation to the goal of the widest diffusion of the energy-producing installations which use renewable sources; on the other hand, it reduces the application spaces for the vertical subsidiarity principle (with particular mortification of the local administrations), centralizing the allocation and balancing choices at an exclusive state competence level. Now the conflict is not only potential, but concretely fueled by legislative interventions that, in the wake-up call of climate emergency (Carducci, 2022), have accelerated and simplified the procedures for permitting plants, scheduling their planning, building and operativity consistently with the *overriding public interest*.

It also needs to be considered the existence of a consolidated jurisprudential orientation (constitutional and administrative) which is increasingly prone to ensure the principle of «maximum spread of installations from renewable energy sources» (Corte cost. It., sentt. nn. 27/2023; 121 and 216/2022; 267/2016; Cons. Stato, Sez. IV, 08.09.2023, n. 8235) without, however, "resolving the contradictions [...] that accompany the energy transition processes represented by the Green Deal, nor does it offer any general criteria to be used to reconcile conflicting interests" (Piperata, 2023). Therefore, given the intimate link between the free private economic initiative in the field of renewable energies and the environmental protection requirements, the first ends up being accorded a *favor* because it makes possible the accomplishment of a strategic interest: moreover, for the same reason, the *favor* provides a rationale for the containment of administrative burdens and the simplification of the transformation processes in the territory.

Such arguments risk to stiffen the protection of the environment – promoted by art. 9 and 41 Cost. – on industrial environmentalism positions (Carpentieri, 2021; Pignatelli, 2023) with little regard for the balance between conflicting interests, as the latter is mainly oriented by the prevailing interest in decarbonization compared to other public antagonistic interests and rights. In fact, the problem of proper balance cannot be solved by merely recognizing what is the priority among opposing interests, but more significantly by assessing the suitability of the medium for the purpose and the way in which recessive interest is sacrificed. Furthermore, once a strategic priority is assigned to a specific interest, and the latter is institutionally encouraged through the acceleration of authorization procedures, it becomes almost impossible to "balance" it with any other. It is often the refusal or inability to balance interests and values that hinders or delays transition processes.

Then, if environment protection affects "a complex and unitary property, considered by constitutional jurisprudence a primary and absolute value" (Corte Cost. It., sent. n. 367/2007), the ambiguity of coexistence, in the same spectrum of protection, of both the conservative vocation (landscapes, activities, ecosystems and traditional cultures) and the transformative one (building industrial plants capable of reducing climate-related emissions), can only be overcome in terms of "integration" (Corte Cost. It.,

sent. n. 85/2013), certainly not through hierarchy or exclusion. This also applies to the empowerment of regional legislators and the participation of local communities in ecological transition processes. The Regions should, in fact, "play a delicate role of intermediary between the general directions of development of renewables and the needs diffused in the territory, that is between competing general interests" (Celati, 2023).

Currently, the aprioristic definition of *primacy*, directly affecting the balancing criteria, and the lack of adaptation of regional planning tools, reduce, on the one hand, the other public interests of constitutional status; on the other hand, the value of the vertical subsidiarity principle is diminished, consequently mortifying local administrations. Thus, the multiple projects authorized for the construction and management of renewable energy plants, shielding themselves behind the character of «public utility», often take place in territories which are rich in biodiversity or threaten damages to agricultural enterprises that adopt an ecological approach, even leading to the expropriation of productive soils.

This perspective should be avoided, not only at local level, but geopolitically too: greenwashing, water grabbing, land grabbing and cat bonds remind us that sometimes environmentalism works as an excuse for business to replicate the same old dynamics of colonial power through the practices of manipulating the bond market and the public debt of poorer countries, though very rich in natural resources. It is necessary to be always vigilant.

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Grounding a legal research agenda on the EU mitigation of livestock emissions – A systematic literature review

ROBERTO TALENTI*

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Abstract

Livestock farming constitutes a significant source of greenhouse gas (GHG) emissions, presenting a challenge to the fulfilment of regional and international climate change mitigation. However, research on the mitigation of livestock emissions remains underrepresented in environmental legal scholarship. The current exploratory study aims to bridge this gap by systematically addressing legal research focused on reducing GHG emissions from livestock. Given the distinct characteristics of various regional contexts, this work places a particular emphasis on the European Union (EU). Indeed, while maintaining ambitious climate change mitigation obligations, the EU records unhealthily high levels of animal food production and consumption. Furthermore, considering both its strong enforcement powers and the central role it plays as one of the main producers and consumers of animal food products worldwide, the EU is in a privileged position for conditioning global animal food systems. The article begins by outlining the scale and features of livestock's impact on climate change. It then reviews the existing legal literature on the mitigation of livestock emissions, with a special focus on EU-specific analyses. After highlighting insights from current legal scholarship, assessing its alignment with scientific evidence, and identifying research gaps, the article proposes the development of a legal research agenda focused on the EU mitigation of livestock GHG emissions, informed by four preliminary observations. The observations clarify that: 1- the livestock sector has traditionally been neglected in climate change law and policy documents; 2- there is shortage of legal research on the mitigation of livestock emissions at the EU level; 3- curbing livestock related GHG emissions will have a major role to play for the EU to meet international and regional climate change mitigation obligations; 4- at the EU level, there is no possibility to decouple livestock production and consumption from GHG emissions.

Keywords*: GHG emissions, Mitigation, Climate change, Livestock.*

1. Introduction: on law and livestock

Despite being "at odds with the imperative to restrict global temperature rise in order to avert catastrophic climate change", livestock production, consumption, and private and public funding are on the rise at the global level (OECD & FAO, 2020; Our World in Data, 2023; Kortleve *et al*., 2024).

It is worth noting that not even the European Union, long deemed to be a global leader in the fight against climate change, is doing well on this regard. Indeed, livestock emissions still constitute the lion's share of European agricul-

* Scuola Universitaria Superiore Sant'Anna, Pisa, Italy.
Corresponding author: roberto.talenti@santannapisa.it

tural emissions, and the EU keeps spending over 80% of its Common Agricultural Policy budget to support emission-intensive animal products (European Commission *et al*., 2020; Kortleve *et al*., 2024). This is done, at least by façade, in the hope that investments in animal agriculture will increase livestock productivity and finally curb its associated greenhouse gas (GHG) emissions.

While due distinctions need to be made between high- and low-income countries when it comes to identifying best ways to reduce livestock emissions,[1] it is crucial to observe that climate change law and policy documents have traditionally disregarded the livestock sector (Donahue, 2008; Bailey *et al*., 2014; Kristiansen *et al*., 2020; Rose *et al*., 2021). The discrepancy between, on the one hand, overwhelming scientific evidence on the need to urgently reduce global livestock production and consumption related GHG emissions (thereinafter *livestock emissions*) and, on the other hand, the shortage of law and policy documents addressing the issue at stake, is concerning, and it suggests the existence of significant regulatory gaps.

This situation might be particularly alarming at the EU level. Indeed, the EU, while maintaining relatively ambitious climate change mitigation obligations, still records unhealthily high levels of animal food production and consumption. Furthermore, considering both its strong enforcement powers and the central role it plays as one of the main producers and consumers of animal food products worldwide, the EU is in a privileged position for conditioning global animal food systems.

This article begins by recognizing that, despite the urgent need to mitigate livestock GHG emissions, the livestock sector has largely been neglected by legal scholars addressing climate change mitigation both at the global and EU level. Indeed, while most climate legal scholarship has focused on sectors such as energy, industry, transportation, and building, the agricultural sector in general, and the livestock sector in particular, appears to have been generally overlooked (Klass, 2013; Boute, 2023).

Against this background, this article seeks to examine the extent to which legal scholars have delved into the issue of livestock emissions. It aims to derive valuable insights from their work, assess how well their analyses align with existing scientific knowledge, and focus particularly on the scholars' examination of the issue at the EU level. To do so, this work will critically review the relevant legal literature on the mitigation of livestock emissions, derive preliminary observations, and propose a research agenda based on these findings.

This process is essential for several key reasons. First, it highlights the urgency of the issue for both academics and legislators, thereby fostering greater awareness and engagement. Second, it provides legal scholars and lawmakers with insights into the most discussed methods for reducing livestock emissions. Third, it allows for a reflection on the extent to which legal scholars' recommendations are consistent with scientific findings on the optimal methods for reducing livestock emissions. Fourth, it offers a broader perspective on how comprehensively legal scholars have addressed the challenges associated with mitigating livestock emissions thus far. Finally, it identifies gaps in current research, highlighting areas that necessitate further scholarly exploration.

Importantly, as the literature review will reveal, the mitigation of livestock emissions remains a relatively uncharted issue in EU legal scholarship. While relevant nuances to this general observation will be provided along the article, this research will not investigate over the reasons behind this general trend. Nonetheless, it is important to note that while the general tendency to overlook this sector could once be justified by the difficulty of tracking livestock emissions, advancements in emission account-

[1] As section §2 will clarify, efforts to increase production efficiency will hardly allow to achieve any climate change mitigation target in those (mostly high-income) countries, where livestock production methods have already reached a mature level of efficiency. Moreover, in high-productivity countries where animal food consumption already exceeds national dietary guidelines, reduction in animal food production and consumption patterns would also bring significant environmental and health co-benefits. (Scherer *et al*., 2019; Springmann *et al*., 2020; van der Veen *et al*., 2022).

ing techniques may render this justification obsolete (Moran *et al*., 2011; Nejad *et al.*, 2024). Instead, problems of political nature still persist, and may contribute to justifying law scholarly general distance from the issue at stake. These include the unpopularity of tackling major agri-food producers' economic interests and their ability to frame reliance on unhealthy levels of meat consumption as a matter of freedom or cultural tradition, which in turn fuels public resistance to dietary changes[2].

Accordingly, section §2 will focus on the features of livestock impact on climate change, both at the global and EU level. While primarily descriptive, this section plays a central role by providing scientific evidence on the urgent need to curb livestock emissions and outlining the pathways available to achieve this goal. Following this, section §3 will offer a systematic review of legal literature on the mitigation of livestock GHG emissions. This review will provide insights into the features of legal scholars' research, while section §4 will provide reflections on their alignment with scientific evidence[3]. Additionally, it will help identifying existing research gaps. Finally, noting a significant lack of legal research specifically addressing the EU context, section §5 will advocate for the development of a legal research agenda focused on the EU mitigation of livestock emissions. It will also synthesize four preliminary observations that could serve as the foundation for this agenda.

2. Livestock contribution to climate change

2.1. *Global and EU livestock emissions: on track towards climate neutrality?*

The considerable challenge represented by increasing livestock production and consumption levels on a global scale became apparent since Delgado *et al*.'s publication of the work "Livestock to 2020 – The Next Food Revolution" (Delgado *et al*., 1999). Already in 1999, indeed, it was clear that relying on this intrinsically polluting and inefficient food technology in an increasingly contaminated planet with a growing population conflict with any definition of sustainability. In the words of Delgato *et al*.:

> "A revolution is taking place in global agriculture that has profound implications for our health, livelihoods, and environment. Population growth, urbanization, and income growth in developing countries are fuelling a massive global increase in demand for food of animal origin. […] The Livestock Revolu-

[2] As journalist Arthur Nelsen and Damian Carrington from the Guardian have reported, livestock lobbies and biggest animal food producing states have played a major role at the FAO level in order to undervalue the role of animal farming's contribution to climate change (link to the articles: https://www.theguardian.com/environment/2023/oct/20/ex-officials-at-un-farming-fao-say-work-on-methane-emissions-was-censored; https://www.theguardian.com/environment/2023/oct/20/the-anti-livestock-people-are-a-pest-how-un-fao-played-down-role-of-farming-in-climate-change?CMP=Share_AndroidApp_Other; https://www.theguardian.com/environment/2024/mar/18/bewildering-to-omit-meat-eating-reduction-from-un-climate-plan; https://www.theguardian.com/environment/2024/apr/19/un-livestock-emissions-report-seriously-distorted-our-work-say-experts). This brought scientist as Paul Behrens and Matthew Hayek to denounce that the FAO has 'seriously distorted' the content of their research and underestimated the potential benefit arising from a reduction in animal food production and consumption levels (link to the article: https://www.theguardian.com/environment/2024/apr/19/un-livestock-emissions-report-seriously-distorted-our-work-say-experts). Furthermore, an inquire conducted by Unearthed and revised by the Guardian reveals that the "Dublin Declaration of Scientists on the Societal Role of Livestock" (i.e., a document prising the positive effects of animal food production and consumption signed by allegedly independent scientists), was actually designed by, and to serve the interests of, the livestock industry (link to the article: https://unearthed.greenpeace.org/2023/10/27/dublin-declaration-meat-livestock-industry/). All this aligns with findings from the report: *New Merchants of Doubts*, published in 2024 by the Changing Markets Foundation. According to the 2024 Report, the big meat and dairy industry continues downplaying the sector's impact, slowing down environmental regulations, and setting their own political agendas through distracting, delaying, and derailing.

[3] Specifically, this work will evaluate whether the measures and policies proposed in legal scholarly research aimed at mitigating livestock emissions align with the requirement for reducing livestock emissions in high-income countries by reducing livestock production and consumption patterns.

tion will stretch the capacity of existing production and distribution systems and exacerbate environmental and public health problems" (1999, p. 11).

This article acknowledges the multifaceted impacts of current global animal food production and consumption systems on environmental, health, and social inequalities[4]. However, provided its specific research scope, it will exclusively focus on their implications for climate change.

It is challenging to determine a definitive estimate of the global contribution of livestock to climate change. The 2006 report by the Food and Agriculture Organization (FAO), *Livestock's Long Shadow*, was the first major international document to highlight the sector's environmental impact, estimating that livestock was responsible for 18 percent of global GHG emissions (FAO, 2006). However, subsequent reports have revised this estimate. In the 2013 *Tackling Climate Change Through Livestock*, the FAO adjusted the figure to 14.5 percent, esteem which was reaffirmed in the 2022 report *Methane Emissions in Livestock and Rice Systems* (FAO, 2013; FAO, 2022). Independent studies have yielded slightly differing estimates. Twine, in 2020, suggested that emissions from animal agriculture account for at least 16.5 percent of total anthropogenic GHG emissions, while Xu *et al*., in 2021, estimated this contribution to be as high as 19.6 percent (Twine, 2021; Xu *et al*., 2021). The variability in these figures can be attributed to differences in methodologies, as well as potential political and economic pressures that may influence the portrayal of the livestock sector's role in GHG emissions (Twine, 2021). Despite these variations, it is clear that the sector is a significant contributor to climate change, with estimates consistently indicating that its contribution lies between 14.5 and 19.6 percent of total human-induced GHG emissions.

The identification of a precise figure expressing livestock contribution to EU wide GHG emissions is also problematic. In 2010, the report *Evaluation of the livestock sector's contribution to the EU greenhouse gas emissions* published by the Joint Research Centre of the European Commission highlights the complexities involved in this estimation. The report notes that while livestock emissions from the agricultural sector account for 85 percent of the sector's total emissions, this figure rises to 175 percent when including indirect, related emissions from energy use, industries, and land use, land-use change, and forestry (LULUCF) (Adrian *et al*., 2010). Accordingly, the report states that, if "the livestock sector (land use and land use change excluded) accounts for 9.1 percent of total emissions (all sectors) according to the inventories, considering land use change, the share increases to 12.8 percent" (2010, p. 28).

This nuanced approach was not echoed in the more recent European Commission report, *Future of EU Livestock: How to Contribute to a Sustainable Agricultural Sector?*, published ten years later. The latter report does not account for indirect, related emissions and simplistically notes that while the EU-28 agricultural sector generated 10 percent of the region's total GHG emissions, the livestock sector was responsible for 81-86 percent of these emissions (European Commission *et al*., 2020). Yet another accounting method was employed in an independent study by Bellarby et al, which estimates that GHG emissions from all livestock products range from 12 to 17 percent of total EU-27 emissions (Bellarby *et al*., 2013). It follows that, esteems for livestock contribution at the EU level present even wider margins of uncertainty than global ones, as they range from a minimum of 8.1 to a maximum of 17 percent of total EU emissions.

At this point, it is crucial to underscore that, provided the substantial contribution of livestock activities to climate change, existing livestock emissions trend might contrast, *inter alia*, with

[4] The current animal food production and consumption system negatively affects, *inter alia*, water consumption and contamination, land use, deforestation, and habitat and biodiversity loss. Intensive animal farming is a main driver of antibiotic resistance, while animal food consumption contributes to cancer outbreak and cardiovascular diseases. Importantly, the existing animal food production chain also exacerbates inequalities in terms of distribution of food resources, and it is a main diver of land grabbing (Mekonnen *et al*., 2012; Machovina *et al*., 2015; Leip *et al*., 2015; Davis *et al*., 2016; Shepon *et al*., 2018; Ritchie, 2019; Hickman *et al*., 2021; World Health Organization, 2023).

the achievement of EU's climate change mitigation obligations. Indeed, the EU is internationally obliged, by the Paris Agreements, to contribute to holding "the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C" (2015, Art.2(1)(a)). Moreover, the European Climate Law establishes that "GHG emissions and removals regulated in Union law shall be balanced within the Union at the latest by 2050" (Regulation (EU) 2021/1119, Art.2(1)). Studies, including those by Westhoek et al. and Lee *et al*., beyond highlighting the significant potential for reducing EU GHG emissions through decreased animal food production, also emphasize the *necessity* of reducing livestock emissions for the EU to meet its commitments under the Paris Agreement (Westhoek *et al*., 2014; Lee *et al*., 2019).

It follows that mitigating livestock emissions will be crucial for the EU to achieve its climate change mitigation obligations. Consequently, there arises a necessity for clarity regarding the optimal approach to achieve this objective. Specifically, the EU must ascertain whether mitigating livestock emissions should be pursued through solely enhancing production efficiency or must encompass reductions in animal food production and consumption.

2.2. *The intrinsically high carbon footprint of livestock: debunking the decoupling myth*

The high carbon footprint of the livestock sector is directly linked to its inherent resource intensiveness. To illustrate this, it might be considered that, while it respectively bestows only 38 percent and 17 percent of global proteins and calories supply, animal food production occupies four fifths of global agricultural land, and is responsible for 57 percent of GHG emissions associated to global food production (Xu *et al*., 2021; Ritchie & Roser, 2024). As a comparison, the production of plant-based food destined to human consumption, while respectively providing 62 and 83 percent of proteins and calories supply, occupies 16 percent of global agricultural land, and it is responsible for 29 percent of global food emissions (Xu *et al*., 2021; Ritchie & Roser, 2024).

Notably, not all animal food types emit the same amount of GHG. Among animal food products, beef is by far the most GHG-intensive, followed by lamb, cheese, pork, poultry, and eggs (Poore & Nemecek, 2018).

Further, different animal farming practices can impact the amount of associated GHG emission. However, the claim that the intensification of animal farming would lead to a decrease in livestock-related GHG emissions, while having generated discussion, has been subject to substantial contestation. In fact, a productivist approach, which emphasizes efficiency gains, has traditionally advocated for intensifying livestock production[5]. In contrast, scholars adopting extensive-oriented approaches have typically highlighted the biodiversity and ecosystem losses associated with factory farming, as well as its negative impact on human health, and the associated risk of 'rebound effect' (Díaz *et al*., 2019; Benton & Bailey, 2019; European Court of Auditors, 2021)[6]. For sure, a reconversion of farmland currently used for intensive livestock activities into extensive farming, if

[5] The Productivist approach is upheld, *inter alia*, in both the study "Future of EU livestock: How to contribute to a sustainable agricultural sector?" commissioned by the European Commission in 2020, and in the FAO Global Roadmap launched at COP28 in 2023. To identify a solution to the sustainability challenge represented by livestock production, the EU Study goes in the direction of "maintaining (or increasing) commodity production while reducing the net environmental impact" (p. 5). Similarly, the FAO Roadmap identifies, as the first out of ten domains of action, the livestock sector. However, it posits that "the livestock sector requires intensified productivity via improved genetics and feeding practices, aiming to reduce resource usage" (p. 6).

[6] An eloquent definition of the rebound effect has been provided by the European Court of Auditors. According to the Court: "Efficiency gains do not translate directly into lower overall emissions. This is because technological change in the livestock sector has also lowered the production cost per litre of milk, leading to production expansion. This effect, known as the 'rebound effect', reduces the greenhouse gas savings from the technology that would occur without production expansion. The additional emissions caused by production expansion can be even larger than the savings achieved from greater efficiency, which means that the innovation causes overall emissions to increase" (2021, p. 23).

not compensated by an expansion in global farming area, while having positive ecological impact, would also reduce global animal food production and consumption.

In this context, however, it is important to distinguish between high- and low-income countries. Efforts to increase livestock production efficiency could still serve as a relatively accessible initial step for regions and communities which rely on inefficient production practices and have lower levels of animal food production and consumption. In this case, efficiency-oriented measures may be the only viable option, particularly when livestock activities are crucial for supporting rural livelihoods and preventing food insecurity (Herrero *et al*., 2012; Donahue, 2015; Parlasca & Qaim, 2022). Hence, there is some room of manoeuvre in these contexts to mitigate livestock related GHG emissions without curbing animal food supply. However, it will be crucial for these new practices to be introduced with the aim of meeting local communities' right to food, rather than serving profit-maximisation interests of food producers, and thus avoiding the occurrence of a 'rebound effect', where productivity gains are compensated by increased production and, thus, overall emissions (Houzer & Scoones, 2019).

Conversely, efforts to increase production efficiency will hardly allow to achieve any climate change mitigation target in those (mostly high-income) countries, where livestock production methods are already (as) efficient (as possible) (Ripple *et al*., 2013; Parlasca & Qaim, 2022). In fact, as the European Court of Auditors clearly pointed out in its 2021 *Special Report on the Common Agricultural Policy and Climate*: there are "no effective and approved practices that can significantly reduce livestock emissions from feed digestion without reducing production. […] Some of these practices [*i.e.*, animal breeding, feeding, health and fertility management] encourage production expansion, and may thus increase net emissions" (2021, p. 22).

This contributes to explaining why, according to scholars such as Harwatt *et al*., "to align with the Paris Agreement […] it is important that human diets shift from livestock-derived foods to livestock replacement foods" (2024, p. 7). Likewise, the 2024 report *Towards EU Climate Neutrality* by the European Scientific Advisory Board on Climate Change (ESABCC) asserts that achieving EU climate change mitigation targets requires, among other measures, "reduced livestock production and sustainable and healthy diets" (2024, p. 156).

It is also important to emphasize that reducing livestock production and consumption in high income countries, such as the EU, would not risk to result in food insecurity. Conversely, it would go in the direction of meeting national dietary guidelines, thus unleashing environmental and healthcare co-benefits including a decreased insurgency of colorectal cancer, cardiovascular diseases, and antibiotic resistance (Westhoek *et al*., 2014; Hickman *et al*., 2021; van der Veen *et al*., 2022).

Apparently, the notion that efficiency-oriented technological and organizational changes can decouple livestock production from its associated emissions is nothing but a convenient narrative. Increasing production efficiency is not a viable method for significantly reducing livestock emissions within the EU and other high-income countries. Consequently, while the previous subsection emphasized the necessity of reducing livestock emissions for the EU to meet its climate change mitigation obligations, this subsection clarifies that pathways for achieving such reductions require a shift towards decreased patterns of animal food production and consumption.

However, given the consistent upward trend in animal food production and consumption over recent decades[7], alongside projections of further increases, the European Union faces an escalating risk of non-compliance with its climate commitments (OECD & FAO, 2020; Komarek, 2021; Our World in Data, 2023). This troubling scenario points to notably deficient regulatory frameworks

[7] Between 1961 and 2021, European meat production passed from 29.5 to 60 million tonnes per year. Furthermore, between 2001 and 2020, EU animal food demand moved from 86 million tonnes to 95.3 million tonnes per year.

for mitigating livestock emissions. Therefore, it is imperative to delve into the legal literature on this matter to gain insights from relevant research, assess its alignment with scientific evidence, and identify eventual research gaps.

3. Livestock and climate change: reviewing the legal literature

3.1. *Method*

The systematic literature review provided in the current section will adopt a narrow thematic scope, while maintaining a wide geographical scope of analysis (look at Siddaway *et al*., 2019). On the one hand, a narrower thematic scope of analysis involves to exclusively consider those law articles which are entirely devoted to the mitigation of livestock emissions. Indeed, while there is an increasing body of legal literature addressing the mitigation of agricultural emissions (Verschuuren, 2018; Verschuuren, 2022; Van Hoof, 2023), as well as the broader ecological or ethical impacts of livestock activities (Nollkaemper, 2023; Stucki, 2023; Talenti, 2023; Verschuuren, 2024), the number of legal works entirely dedicated to the mitigation of livestock emissions remains relatively scarce. This scarcity creates a substantial research gap that warrants focused attention.

On the other hand, while this study aims to provide a particular focus on legal scholars' analysis of the EU level, the systematic review will also encompass works extending beyond the confines of the EU. This decision is justified by two main points. First, previous studies have highlighted that early legal research on livestock emissions originated outside the EU (Talenti, 2022). Therefore, to gain a more comprehensive understanding of legal scholars' initial approaches to these topics, an analysis of the non-EU context is deemed necessary. Second, although, as the first section of this work indicated, the mitigation of livestock emissions should follow different approaches in different regional contexts, it is important to recognize that the global (animal) food system is a complex and composite entity. The increasing demand for animal food and its detrimental climate, environmental, and social consequences are global phenomena. Thus, maintaining a broader view on how legal scholars have approached these issues is crucial.

Relevant works have been identified by inserting the keywords 'livestock', 'cattle', 'meat', 'animal farming', 'animal agriculture', 'diets' (*i.e.*, group one), as well as 'climate change', 'carbon emissions', 'methane emissions', 'climate law' (*i.e.*, group two) in the legal research databases *HeinOnline* and *Lexis*. References in the title to both group one and group two keywords was identified as precondition for the selection of works, as well as their focus on climate change *mitigation* (articles focusing on *adaptation* have not been considered). Moreover, as duly justified in the following lines, results were filtrated so to only account for law journals publications.

HeinOnline and Lexis were chosen as reference databases due to their access to a particularly wide range of international law journals (more than 2,800 and 15,000, respectively), which therefore allows this literature review to have a broad reach. It is important to recognize that US journals are overrepresented in both databases. Therefore, to counterbalance this US-bias, and considering this article's particular interest in the EU level, the same keywords criterion has been used to search for further works in top environmental law journals based in the largest European livestock producing countries (in this case, keywords have been inserted both in English and in the main language of the journal) *i.e.*, France (for which the journal *Revue juridique de l'environnement* has been selected), Germany (*Zeitschrift für Umweltrecht*), Italy (*Rivista Quadrimestrale di Diritto dell'Ambiente*), Spain (*Revista de Derecho Ambiental*) (Vinci & Killmayer, 2022). Furthermore, provided the UK long permanence in the EU, also one of its main environmental law journals (*Transnational Environmental Law*) has been addressed for analysis. This allows to grasp whether, and eventually to what extent and how, environmental law journals in EU larger livestock producing countries have addressed this crucial matter.

It is essential to highlight one feature and address two limitations of this method. Firstly,

as just explained, this literature review focuses exclusively on legal databases and journals, automatically excluding sources from related disciplines (such as public policy, governance, management, and economics) that could undoubtedly offer valuable insights into mitigating livestock emissions. This is done because, as outlined in the introductory section of this article, the primary aim of this review is not simply to explore methods for effectively regulating and reducing livestock emissions. Instead, it aims to evaluate the extent of legal scholars' engagement in research on livestock emissions mitigation, the comprehensiveness of their analysis, and how well their recommendations align with scientific findings on available mitigation pathways. Hence, while this literature review's only focus on law journal databases might be seen, at first, as a limitation of the method adopted in this literature review, it is actually an intended feature, that allows it to align with its purposed objectives. Indeed, while it is important to acknowledge that law journals may include contributions from non-legal scholars and that legal scholars may publish relevant works in non-legal journals, focusing on legal journals still serves as a reasonable proxy for assessing legal scholars' engagement with and general approach to this issue. Furthermore, as law journals are typically managed by legal scholars, it is reasonable to presume that even articles written by non-legal scholars in these journals have received their approval and, therefore, generally reflect the methods or approaches of legal scholarship.

The first limitation of this method lies in its reliance on the analysis of predominantly Western-based law journals. As a result, the ensuing literature review will primarily reflect the existing state of legal scholarship from Western perspectives. However, this limitation does not pose a significant problem. Indeed, this research seeks to understand the extent to which legal scholars have engaged in investigating the issue of livestock emissions, while giving particular consideration to the EU level. Given the need to distinguish between different regional contexts and the similarities among high-income countries, a predominant focus on the mitigation of livestock emissions in Western countries might be particularly relevant for legal scholarship focusing on the EU. In contrast, legal studies conducted in lower-income countries or regions might provide insights that are not equally applicable in EU contexts[8].

The second limitation concerns this method's neglection of those documents which, because of their format (*i.e.*, books, policy reports), title (*i.e.*, not containing the identified keywords), or journal of publication (*i.e.*, there can be relevant contributions in relevant journal not included in the *HeinOnline* and *Lexis* databases or in the five national journals taken in considerations) would be excluded from the literature review. However, on the one hand, this literature review does not pretend to be fully exhaustive. Instead, it aims to provide a thorough overview of the way in which legal scholars have generally addressed the issue at hand.

On the other hand, it is important to acknowledge the continued relevance of works such as *Climate Change, Cattle, and the International Legal Order* by Williams, as well as book chapters like Verschuuren's *Cultivated Meat and Dairy as a Game-Changing Technology in the Agricultural and Food Transition in the EU: What Role for Law?*, and reports such as Harwatt *et al.*'s *Options for a Paris-Compliant Livestock Sector*. Although these sources will be excluded from the systematic literature review due to their format, they warrant particular attention for their insights into how emerging legal instruments can be employed to mitigate emissions from the livestock sector.

Accordingly, this section will review legal works focused on the mitigation of livestock emissions, categorizing them by their geographical scope of analysis (i.e., national, sub-nation-

[8] High-income countries present similar situations, such as animal food production techniques already as efficient as possible, and animal food consumption levels above the global average. Therefore, legal insights gathered in western, non-EU contexts, can still provide valuable information for EU scholarship.

al, supra-national, or international). This classification is based on a geographical element, not only because it maintains a relatively high level of objectivity (i.e., it is possible to provide a straightforward distinction between the national, sub-national, supra-national, or international dimensions) but due to the structural similarities that can influence regulatory frameworks for mitigating livestock emissions at different geographical levels. Importantly, for each work, the review will assess whether it addresses production-based emissions, consumption-based emissions, or both. This distinction is relevant as it highlights the aspect of the animal food chain on which different scholars concentrate. Furthermore, studies that consider both production and consumption-based emissions will be positively evaluated, as they align with scientific recommendations to adopt a systemic approach when accounting for animal food emissions (Herrero *et al*., 2016; Clark & Tilman, 2017).

The literature review will also identify the types of measures proposed by legal scholars to curb livestock emissions. Given the inherent complexity of reducing livestock emissions, the adoption of a more comprehensive portfolio of measures will be viewed favourably. The review will also differentiate between studies that offer a general examination of the livestock governance framework (i.e., considering multiple legal domains or linking existing frameworks to broader political and economic contexts) and those focusing on specific issue analyses, such as addressing particular problems within the livestock governance system (e.g., public subsidies for animal food, public land grazing programmes) or proposing targeted measures (e.g., the introduction of a carbon tax, or the substitution of traditional meat with cultured meat). General examinations of the livestock governance framework often correlate with studies addressing both production and consumption-side emissions, and they tend to suggest a wider array of instruments for tackling emissions. It is important to note that studies providing a broad analysis of the livestock governance framework have the advantage of offering a holistic perspective, seeking structural solutions to the systemic inefficiencies within the livestock governance system.

After synthesising the main findings of the analysed studies, the characteristics of each group will be examined, the alignment of the legal literature with scientific evidence will be evaluated, and existing research gaps will be identified.

3.2. *Analysis*

Studies at the national level represent the broadest group of legal works dedicated to mitigating livestock emissions. Most focus on the United States, with the exception of Johnson's work, which examines the issue in Australia. Among these studies, the distribution between those focusing on production-side emissions (Walters, 2019; Janicek, 2021), consumption-side emissions (Johnson, 2015; Luetkemeyer, 2017; Chenyang, 2019; Sforza, 2020), and both production and consumption-side emissions (Donahue, 2008; Donahue, 2015; McCormack, 2021; Rutinel & Quaade, 2022) is quite balanced. Four out of ten studies focus solely on reducing livestock emissions through market measures (Luetkemeyer, 2017; McCormack, 2021; Janicek, 2021; Rutinel & Quaade, 2022). One study focuses on reducing animal food consumption, and related emissions, by providing information through food labels (Sforza, 2020), while another explores the possibility of relying on litigation (Walters, 2019). Four studies consider a combination of instruments, emphasizing market measures but also including strategies such as school education, information dissemination, public procurement, and institutional changes (Donahue, 2008; Donahue, 2015; Johnson, 2015; Chenyang, 2019). The study by Johnson in particular stresses the need for greater collaboration between environmental, agricultural, and health ministries.

Only three national-level studies attempt to provide a broad examination of the livestock governance framework, (Donahue, 2008; Donahue, 2015; Johnson, 2015). In contrast, the remaining national-level studies focus on targeted issues, such as public land grazing, meat subsidies, meat taxes, and carbon offset measures. All the analysed studies acknowledge the need to reduce GHG emissions through lower

animal food production and/or consumption levels. Indeed, with the partial exception of Sforza's work, which looks at cultured meat[9], no study advocates for reducing emissions by increasing production efficiency.

At the sub-national level, only two studies focusing on the mitigation of livestock emissions were identified, both from the US. Hoffmann (2016) focuses on consumption-side emissions, while Karimi (2018) considers both production and consumption-based emissions. Both studies identify a range of measures to curb livestock emissions, from market measures to command-and-control approaches, as well as information and education. Hoffmann's study addresses public livestock grazing in the Great Basin, while Karimi's work provides a general overview of the livestock governance framework, as it also considers the role of political actors, such as Non-Governmental Organizations, and research in lab-grown meat. Importantly, both studies agree that reducing livestock numbers is essential to mitigating GHG emissions.

At the EU level, three studies were identified. One focuses on consumption-side emissions (Bahr, 2015), while two address production-side emissions (Talenti, 2023; Williams, 2024). None of these studies examine both production and consumption-side emissions comprehensively. Bahr's work exclusively advocates for market instruments to address livestock emissions, specifically, a meat tax, while Talenti calls for moderate institutional changes, particularly regarding the structure of the EU's Effort Sharing and Land Use, Land-Use Change, and Forestry (LULUCF) Regulations, proposing changes to targets, flexibility mechanisms, and margins for inter-sectoral compensation. Meanwhile, Williams' work, though not identifying any specific measures to address livestock emissions, provides a non-exhaustive analysis of the EU livestock governance framework, which nonetheless extends beyond a single targeted issue. The remaining studies focus on analyses of specific issues: Bahr considers a meat tax, and Talenti assesses climate targets for livestock emissions. Like the national and subnational-level studies, all EU studies focus on reducing emissions through decreased animal food production and consumption.

The final category includes studies examining the interaction between domestic and international legal systems (Winebarger, 2012; Benitez, 2022) and those focused on the international legal system (Torrez, 2014; Talenti, 2022; Campos Lima, 2024; Campos Lima, 2025). Three of these works address both production and consumption-based emissions (Benitez, 2022; Campos Lima, 2024; Campos Lima, 2025), two more focus on production-based emissions (Winebarger, 2012; Talenti, 2022), and one deals only with consumption (Torrez, 2014). While two of the studies (Winebarger, 2012; Torrez, 2014) focus primarily on market-based measures, two others incorporate proposals for institutional changes. Talenti, for instance, combines amendments to the Paris Agreement with educational initiatives, while Campos Lima (2025) advocates for a reconceptualization of the principle of Common but Differentiated Responsibilities and Respective Capabilities to include responsibility for consumption, accompanied by information dissemination strategies aimed at influencing consumer behaviour. Information-based measures also feature prominently in Campos Lima's 2024 contribution, which further suggests the use of market mechanisms to reduce livestock emissions. In contrast, Benitez offers a critical assessment of the existing legal framework but refrains from proposing specific reforms.

Notably, this is the only group where studies that take a broad governance approach outnumber those that focus on specific issues, such as stopping public subsidies for livestock production (Winebarger, 2012) or imposing a tax on animal

[9] Whether focusing on cultured meat is seen as a way to reduce animal food production or simply make it more efficient depends on how cultured meat is categorized. If cultured meat is viewed as belonging to the animal food category, increasing its production to reduce livestock emissions could be seen as a strategy for improving efficiency. However, if cultured meat is considered distinct from traditional animal products and separate from livestock, substituting traditional meat with cultured meat can still be viewed as an effort to reduce animal food emissions by lowering livestock production and consumption.

Geographical scope of analysis	*Research author*	*Increasing efficiency (E), reducing production/ consumption (R), or both (E&R)*	*Accounting for Emissions from Consumption (C), Production (P), or both (C&P)*	*Type of identified measure: market (M), education (E), information (I), public procurement (PP), command and control (CC), litigation (L), institutional change (IC)*	*General Examination of Livestock Governance Framework (GEGF) or Targeted Issue Analysis (TIA)*
Subnational	1. Hoffmann (Great Basin, 2016); 2. Karimi (California, 2018).	1. R 2. R	1. C 2. P & C	1. M, I, CC 2. M, E, CC	1. TIA (land grazing) 2. GEGF
National	1. Donahue (US, 2008); 2. Donahue (US, 2015); 3. Johnson (Australia, 2015); 4. Luetkemeyer (US, 2017); 5. Chenyang (US, 2019); 6. Walters (US, 2019); 7. Sforza (US, 2020); 8. McCormack (US, 2021); 9. Janicek (US, 2021); 10. Rutinel & Quaade (US, 2022).	1. R 2. R 3. R 4. R 5. R 6. R 7. R (cultured meat) 8. R 9. R 10. R	1. P & C 2. P & C 3. C 4. C 5. C 6. P 7. C 8. P & C 9. P 10. P & C	1. M, E 2. M, E 3. M, PP, I, IC 4. M 5. M, I 6. L 7. I 8. M 9. M 10. M	1. GEGF 2. GEGF 3. GEGF 4. TIA (meat tax) 5. TIA (land grazing) 6. TIA (law of public nuisance) 7. TIA (cultured meat) 8. TIA (stop subsidies) 9. TIA (land grazing) 10. TIA (carbon offset protocol)
Supranational (EU)	1. Bahr (2015); 2. Talenti (2023); 3. Williams (2024).	1. R 2. R 3. R	1. C 2. P 3. P	1. M 2. IC 3. -	1. TIA (meat tax) 2. TIA (mitigation targets) 3. GEGF
International	1. Winebarger (2012); 2. Torrez (2014); 3. Benitez (2022); 4. Talenti (2022); 5. Campos Lima (2024); 6. Campos Lima (2025).	1. R 2. R 3. R 4. R 5. R 6. R	1. P 2. C 3. P & C 4. P 5. P & C 6. P & C	1. M 2. M 3. - 4. IC, E 5. M 6. I, IC	1. TIA (stop subsidies) 2. TIA (meat tax) 3. GEGF 4. GEGF 5. GEGF 6. GEGF

food products (Torrez, 2014). As in the other categories, all proposed measures to reduce livestock emissions involve lowering production and consumption levels.

4. Discussion

The systematic literature review identified twenty-one law research articles entirely devoted to the mitigation of livestock emissions. These works have been inserted in Table 1. Notably, there has been a surge in this area of research, with more than half of the identified works published between 2019 and 2025.

A fair balance has been found between the number of works focusing on either production or consumption-side emissions, and those focusing on both. Similarly, a balanced situation characterises the distribution between studies providing a general examination of the livestock governance framework and those concerned with targeted issue analysis.

4.1. *Overall observations*

Studies conducted at the national level, beyond indicating a relatively strong engagement by US legal scholars with livestock emissions mitigation, do not seem to rely on particularly comprehensive approaches. Indeed, while they almost all rely on market measures as instruments for the mitigation of livestock emissions, they generally focus on specific issues such as land use and subsidies, while rarely offering a comprehensive analysis of the livestock governance framework.

Sub-national studies, while very limited in number, offer comprehensive analyses of local livestock systems, and generally advocate for a broad range of measures, including information, education and, importantly, command and control. The adoption of this comprehensive approach in this category of studies seems to suggest that, when the scope of analysis is focused on the local dimension, proposed action usually goes beyond market mechanisms. Citizens are not merely seen as consumers, but as informed individuals who must be educated about the environmental and health impacts of their dietary choices. This approach also highlights the necessity of imposing safety limits on local animal food production. Indeed, to avoid detrimental practices, such as the creation of intensive farming centres which could negatively affect local communities, and which would not be *ipso facto* prevented by the establishment of market measures, local actions require constraining animal food production within certain non-negotiable safety limits (*i.e.*, command and control).

The literature on the supra-national level is also quite limited. This is the only group of studies missing any work simultaneously focusing on both livestock production and consumption-side emissions. Moreover, only one study at the EU level has provided an examination of the livestock governance framework going beyond single, targeted issue analysis. The measures most commonly discussed remain focused on market mechanisms, reflecting the EU's traditional economic role. However, over the last two decades, and even more after the launch of the European Green Deal, the EU seems to be turning into something broader than a mere economic actor (Chiti, 2022). Studies on livestock emissions mitigation could benefit from adopting a more comprehensive analytical perspective and proposing measures beyond market mechanisms. This would be justified, *inter alia*, in light of the EU's relatively high climate change mitigation obligations (Regulation (EU) 2021/1119, Art.2(1)). Moreover, it would be required provided the crucial role, discussed in the second section of this article, for the EU to mitigate livestock emissions in order to comply with these obligations (IPCC, 2023; Richardson *et al.*, 2023).

Finally, studies on the international level exhibit quite diverse analytical approaches, addressing either production, consumption, or both. Notably, this is the cluster identifying the highest number of studies advocating for changes in the structure of international institutional arrangements. Moreover, this is the only group in which the number of studies adopting a broader perspective on the livestock governance framework outnumbers those focusing on targeted issue analyses.

4.2. *Insights at the EU level*

From the revised literature, it emerges that legal research on both the sub-national and international level is generally characterised by bolder and more drastic responses to the problem of livestock emissions. This might be due to the fact that the impact of livestock activities on climate change is particularly evident both in specific regional contexts, where local communities are clearly affected by the consequences of a changing climate, and at the global level. Indeed, given the intrinsically global nature of the phenomenon under scrutiny, a plethora of studies have been conducted and aggregated data on the general consequences of climate change on global ecosystems[10]. However, both local and international

[10] Reports produced at the UN level are particularly important on this regard. See, inter alia, IPCC, *Sixth Assessment Report – Synthesis Report* (2023).

approaches to addressing livestock governance present notable limitations. A localized perspective often leads to the identification of downstream solutions which, while hardly accepting to compromise on the health of directly affected communities and ecosystems, may fall short in addressing the upstream structural causes embedded in the global livestock production system. Conversely, adopting a global perspective enables the pursuit of upstream changes that could potentially reshape the foundations of global economic and political systems. Yet, a significant challenge for international action lies in the limitations of international law itself, particularly its relatively weak enforcement capacity.

Upstream solutions could be envisioned at the domestic level, particularly by most powerful states. In these cases, enforcement capacities are notably robust. Domestic action, however, also implies limits which are, mostly, of political nature. Indeed, the establishment of strong regulatory frameworks for the reduction of livestock emissions at the domestic level risk being unpopular. This is so because it might be costly in the short run, and may affect national population, whose general sensitivity to the detrimental impact of livestock activities could be relatively lower than in specific local contexts which are particularly affected by it. Furthermore, it is important to recognize that states differ significantly in their enforcement capacities, with some struggling to resist the pressures exerted by the growth-oriented global economic system as well as the interests of both private and state actors that it serves[11].

While the tension between establishing scientifically sound climate policies and the traditional functioning of representative democracies warrants further exploration, the role of the European Union (EU) in this context is particularly intriguing given its unique institutional nature and political mandate (Eckersley, 2020; Pickering *et al*., 2020; Mittiga, 2022; Lysaker, 2024). Indeed, while it is endowed with relatively strong enforcement powers[12], the EU is tasked to treat particularly technical dossiers. This obliges it, at least de jure, to adopt scientifically sound policies, with the consistency of its climate measures evaluated, inter alia, by the ESABCC.

Therefore, given its jurisdiction over a region that plays a crucial role in animal food systems, combined with its specific institutional nature, ambitious climate change mitigation obligations and robust enforcement mechanisms, the EU appears well-positioned to undertake a structural rethinking of livestock governance systems. This could enable the EU to drive a reduction in livestock emissions both within and beyond its borders by promoting the required transition in animal food systems. This transition would contrast sharply with the typically profit-driven and growth-oriented global economic system, aligning instead with scientific evidence, examined in the second section, that advocates for achieving mitigation of livestock emissions through reduced levels of animal food production and consumption.

Against the significant potential for the EU to mitigate livestock emissions, the scarce level of legal scholars' engagement on this issue results particularly glaring. The scarcity of legal research on the EU's mitigation of livestock emissions has been well noted, with only one of the identified works offering a general examination of the livestock governance framework. Even that analysis, however, remains incomplete, underscoring significant research gaps that require urgent attention. It is therefore essential for environmental legal scholars to explore the EU's potential to

[11] The global economic system is grounded in the paradigm of perpetual growth, with dominant environmental protection frameworks often resting on the scientifically unfunded assumption of green growth (Ward *et al*., 2016; Bookchin, 2017; Hickel & Kallis, 2019; Haberl *et al*., 2020; FreireGonzález *et al*., 2024). As a result, it may be particularly challenging, especially for relatively weaker states, whether low-income or high-income, to formulate and implement livestock emissions mitigation policies that are based on reducing livestock production and consumption.

[12] Both the European Commission and EU Member States (passing through the Commission), when they have considered that a Member State has failed to fulfil an obligation, may initiate an infringement procedure against the latter, and ultimately bring the case before the European Court of Justice (Treaty on the Functioning of the European Union, 1992, Arts. 258-260).

contribute to climate action by addressing emissions from the livestock sector.

5. Conclusion: launching a legal research agenda on the EU mitigation of livestock GHG emissions

Having observed that livestock emissions are on the rise at the global level, and that a distinction shall be made between high- and low-income countries when it comes to the identification of strategies for the mitigation of emissions, this article has firstly outlined the peculiarities of livestock contribution to climate change, both at the global and EU level. Afterwards, it endeavoured in a review of law scholarly literature entirely dedicated to the mitigation of livestock emissions.

First, this process highlighted the crucial role that the mitigation of livestock emissions must play in addressing climate change. As outlined in the second section, achieving both international and EU climate change mitigation obligations will require a significant reduction in livestock emissions. Second, the article synthesises the main features of legal research on the mitigation of livestock emissions, distinguishing among different geographical levels of analysis (*i.e.*, sub-national, national, regional, and international).

Third, the study has noted and expressed appreciation for legal scholars' adherence to scientific findings when proposing measures for the mitigation of livestock emissions. The second section of the article outlined that, according to scientific literature, it is not feasible to achieve absolute decoupling of livestock production and consumption from emissions. Correspondingly, all the proposed measures identified in the reviewed legal literature aim to reduce livestock emissions through a reduction in livestock consumption, production, or both.

Fourth, section §4 reflects upon the comprehensiveness of the approach adopted by legal scholars in addressing the mitigation of livestock emissions at different levels. As noticed, proposed actions are particularly bold both at the local and international level, with the problem of local actions being mainly downstream, and the problem of the international level lacking strong enforcement powers. While strong enforcement power exists at the national level, problems arise from the general unpopularity of policies aimed at reducing livestock, the varying enforcement capacities of different states, and the difficulty for smaller economies to oppose the growth-oriented pressures coming from the global economic system.

Importantly, section §4 also observed that the EU could be in a particularly privileged position to promote the required transition in animal food systems due to its unique institutional nature, strong enforcement capacities, and central role as a global player in animal food systems. Despite this, this research found that the potential for the EU to drive a transition in animal food systems, thereby promoting a reduction in animal food production and consumption levels and effectively mitigating livestock emissions, is not adequately reflected in scholarly literature. Research at the EU level is particularly limited, with no studies addressing both production- and consumption-side emissions, and very limited work providing a general examination of the livestock governance framework.

This article has therefore identified a significant gap concerning the scarcity of legal research conducted on the mitigation of livestock emissions at the EU level. While the very existence of this gap might prompt reflections on the reasons behind legal scholars' general disinterest in this crucial issue, addressing it is particularly important. This is the reason why this article finally proposes the establishment of a legal research agenda on the EU mitigation of livestock emissions. This agenda should not only aim to provide a comprehensive evaluation of the effectiveness of existing regulatory frameworks for the mitigation of livestock emissions but also explore pathways towards the sustainable transition of animal food systems. Such a transition should align with best available scientific knowledge, encompass both production and consumption side emissions, and consider a broad examination of the livestock governance framework. The legal research agenda on EU mitigation of livestock emissions could be grounded in four preliminary observations raised throughout this work, which provide both justification and guidance for its establishment.

Specifically, the first two observations highlight transitory issues (i.e., research and policy gaps) that need to be addressed. The latter two observations identify structural challenges that must not be overlooked by policymakers and legislators. Together, these insights form the foundation for a comprehensive research framework aimed at bridging existing gaps and addressing long-term structural needs.

The *first preliminary observation* is that the livestock sector has traditionally been neglected in climate change law and policy documents. Indeed, this insight, already raised in works which pre-existed this article, was underscored in the introductory section, and could constitute a point of departure for this new research agenda. Afterwards, the *second preliminary observation*, stands in the identification of a research gap in legal scholarship on the mitigation of livestock emissions at the EU level. Specifically, the systematic literature review has shed light on the complete lack of works focusing on both animal food production and consumption at the EU level, and shortage of works adopting a general examination of the livestock governance framework.

The *third preliminary observation* links a legal objective with relevant scientific findings, as it underscores that curbing livestock related GHG emissions will have a major role to play for the EU to meet international and regional climate change mitigation obligations. This observation basically constitutes the legal rationale justifying the establishment of this new research agenda, with evidence supporting it having been identified in the second section of this work. Lastly, the *fourth preliminary observation* highlights that, at the EU level, there is no possibility to decouple livestock production and consumption from GHG emissions. It follows that, while the third observation clarifies that reducing livestock emissions is crucial for the EU to meet its GHG mitigation commitments, the fourth observation indicates that curbing animal food production and consumption is essential to achieve this reduction. This last preliminary observation is based on purely scientific considerations. Importantly, as this study points out, the impossibility to reduce, in high-income countries, livestock GHG emissions without tackling production and consumption levels has already been acknowledged in all scrutinized legal works. Accordingly, this insight should be explicitly recognized in the research agenda on the EU mitigation of livestock emissions, and it should constitute the underlying ontology of any regulatory framework aimed at mitigating livestock emissions.

In conclusion, developing a robust research agenda based on these preliminary observations can address the existing research gap on EU mitigation of livestock emissions. This will facilitate more focused engagement from scholars, policymakers, and the public on this critical issue, offering valuable insights for establishing regulatory frameworks that effectively contribute to achieving climate change mitigation obligations.

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The use of blockchain technology in the food traceability system

CECILIA RASETTO*

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Abstract

This paper aims to address the exploration of blockchain technology comprehensive and sequential applications in e-agriculture by discussing how the integration can (i) enhance both backward and forward linkages in agricultural value chains, (ii) provide benefits to value chain actors (consumers and producers), (iii) improve the performance of the innovative technologies. Integrating blockchain technology into the agri-food sector has become increasingly useful for traceability systems, guaranteeing transparency and trust in the trade process, protecting consumers' right to information, and guaranteeing food quality and safety. The coupling of this technology in e-agriculture can generate positive externalities, including shared benefits, improved coordination among value chain actors, and real-time decision-making for optimal resource allocation and sustainable utilization in the context of e-agriculture. To enhance clarity, the paper examines a use case related to agricultural inputs, commodities, and products in the cereals sector to illustrate the application of data collection devices and the role of blockchain technology in data validation, storage, security, and transmission. However, blockchain applications have faced several limitations in practice, so many legal questions related to the actual success of the interaction are still open. To make just a few examples, the more relevant legal issues are related to data validation, storage, cyber security, and privacy. It is not easy to organically and comprehensively represent every critical and problematic aspect. However, this contribution will attempt to review, albeit briefly, the most relevant legal issues arising from the interaction.

Keywords*: Digital transition, Blockchain technology, Agri-food supply chain, Traceability, Food quality and food safety, Producers, Consumers, Wheat supply chain.*

1. The digital transformation of the agri-food system

The phenomenon of digitalization is part of the completion of the long process of globalization that has hit our planet in recent decades, and which has found its realization through the new immaterial and delocalized dimension, without borders, generated by digital commercial platforms conveyed through electronic communication networks.

In the context of an increasing functionality of technologies, which have affected both the market economy and social life, the agri-food sector has also been affected by technological innovation.

In the process of learning and knowledge of the interaction between innovative technologies and the agri-food sector, we should first consider an overview of the role attributed to the digitalization of food traceability in the geographical scope presented by European and internal legislation.

* University of Pisa, Italy.
Corresponding author: cecilia.rasetto@phd.unipi.it

The core of the latest European Union Policies corresponds to the need to achieve the UN Sustainable Development Goals (SDGs), which thrived from the urgent action required to address biodiversity loss, and the related triggering causes (food waste and losses, pollution) of global health threats such as climate change and worldwide hunger, with a systematic sustainable approach.

Thus, in 2019, the recently established European Commission communicated its renewed commitment to fight climate change and environmental degradation by introducing the European Green Deal (EU Green Deal) for the European Union and its citizens. The EU Green Deal is part of the EU's overall strategy to achieve the UN SDGs, providing a roadmap of policies and measures.

The Communication indicates needed policies and measures to contribute to the EU Green Deal, among which the crosscutting key element is digitalization, intended as the "socio-technical process of applying digital innovations".

Digital innovations include Internet of Things (IoT), Artificial intelligence (AI), Machine learning, Blockchains, Digital twins, and other technologies utilized through digital tools, contributing to the creation of cyber-physical systems and producing both positive and negative impacts at the socio and economic level.

We can highlight that within the EU institutions, the phenomenon has been studied and deepened in the European Digital Agenda for the decade 2020-2030 specifically dedicated to these issues. The Digital Agenda also deals with the creation of secure digital spaces and services, but also a level playing field in digital markets with large platforms, and also aims to reduce the technological lag between the United States of America and China, as there is a strong awareness that it cannot fully express Europe's potential in terms of digital leadership.

As a direct consequence of digitalization, there has been a real need for states to regulate the use and management of data.

How a State regulates and exercises the governance of technology and services used in various ways within the national perimeter is defined as "Digital Sovereignty".

This means managing and ensuring the protection of sensitive data, allowing companies, organizations, and individuals to take advantage of all the opportunities related to the digitization of information while maintaining control of where data resides, where it flows, and who has control over it. When it comes to digital sovereignty, therefore, the social and regulatory implications are broad and diverse.

In this direction, a further objective pursued by the European Union (hereinafter also "EU"), is to raise the level of attention to cybersecurity and control and determine the implementation of data with technology.

It is precisely the spread of digitalization in so many fields and economic sectors, and the consequent phenomenon of digital sovereignty, that has placed sociologists, economists, and jurists – albeit in different ways – in front of a dilemma if technology could be put at the service of all economic and social sectors.

The food sector is pursuing the challenge of incorporating the use of technological tools into production chains. It can be innovated through digital services and systems that make it possible to preserve the environment, increasing the productive capacity of the land but at the same time reducing the use of those resources and parts that then have difficulty regenerating.

The technological development and the spread of digitalization have fostered the evolution of an integrated and increasingly evolved agricultural management model, whose applications can be considered tools for the traceability system and allow the most appropriate decisions to be made in terms of sustainability, efficiency, and respect for the territory.

Of course, the use of technologies in the agri-food sector involves a wide range of legal areas that require the attention of the legislator of the individual Member States as well as the European Union. For example, the use of drones, GPS, driverless driving and worker safety, civil liability, legislation on water, nitrates, plant protection, animal welfare, soil degradation, environmental exploitation, and measures to incentivize agricultural activities, but above all the protection of data transfers.

This leads to a new vision of the agricultural supply chain according to which, thanks to the

implementation of digital technologies in all the individual segments of the supply chain, the entire sector can support resilient and sustainable models, to respect the environment more and – last but not least – to increase its competitiveness on the market. Going back to what was explained at the beginning, about the active role of the bodies of the European Union, also in this area, the European Commission is the bearer of the needs felt at the Community level, and has pursued in recent years numerous projects and actions aimed at this purpose.

On the one hand, digitalization promises an increase in the effectiveness and efficiency of value chains and production processes (e.g. Smart agriculture), a greater ability to adapt and forecast (e.g. Big data and business intelligence), and interaction with end consumers (web technologies and market intelligence).

By improving processes across the entire supply chain and leveraging the data generated in each area of the value chain, digital promises to reduce the industry's carbon footprint. On the other hand, the "green" transition appears urgent for at least three reasons: the non-postponement of the reduction of the effects of human activities on the climate, including those related to agriculture and the processing of its products; consumers' growing attention to the environmental and social sustainability of the companies they turn to meet their needs; the strong orientation of the financial system (public and private) to combine accessibility and sustainability, considering the most advanced company profiles in ESG criteria as less risky.

2. Blockchain technology to foster transparency, traceability, and trust

In this context, the question arises as to whether and how technologies can make a positive contribution to the achievement of the objectives of sustainability and protection of the right to food.

The role of digital technologies is primary because technologies become enablers of a new agri-food model, oriented towards the use of data, the collaboration of the players in the supply chain, and the attention and centrality of the end consumer.

The topic of digital transition in the agri-food sector mainly involves digital tools that have been developed in other sectors, such as finance. Among the innovative technological systems, those that seem most adaptable to the agri-food reality are distributed ledgers, and in particular blockchain technology, which makes concepts such as disintermediation and decentralization its essence, and that seem to be able to offer satisfactory answers to the transformation needs of sustainable food systems (Von Braun *et al*., 2023).

Due to its characteristics, the blockchain can represent a system for storing and exchanging data - referring to a product, including food - to prevent counterfeiting, fraud and food waste, and at the same time guarantee the consumer the certainty of the origin of that product as well as information on its organoleptic characteristics (Winkler *et al*., 2022).

As is well known, blockchain technology, or rather applications that use the blockchain protocol, has become increasingly widespread over the past few years. The world of finance, cryptocurrencies, and Bitcoin is still the hegemonic application sector.

Blockchain is part of Distributed Ledger Technology (DLT). It is based on the so-called chain of custody and guarantees complete traceability (present and past) of the actions and behaviors of the different operators in a network of exchanges and relationships. The term blockchain derives from the union of the words block and chain. It is a decentralized distributed database structured as a chain of blocks containing transactions that are related to each other according to a chronological principle and whose integrity is ensured by a system of algorithms and cryptographic rules.

Blockchain technology in the agri-food sector holds significant promise for managing global production, marketing, and consumption chains of agri-food products, as well as for developing and consolidating knowledge and skills (Sirsi, 2022; Fu Li, 2019; Remotti, 2021). On a blockchain platform, each participant in the supply chain can record traceability information related to their operations, ensuring it is immutable and visible to all other nodes in the network.

Consumer information is a fundamental part of the agri-food legislation, especially about the

Community origin, which over time has been enriched by an elaborate system of rules aimed not only at protecting the health of the consumer, but also at certifying the product in such a way as to allow the consumer to direct his choices towards products with certain characteristics, concerning, for example, origin or environmental sustainability. In the examination of the applications of blockchain technology to the agri-food sector, two profiles emerge that arouse interest and deserve to be analyzed in more depth: its objectives and the main fields of use.

The main objectives of blockchain technology applied to the agri-food sector range from promoting sustainability to protecting and guaranteeing food safety and consumer health. It is about ensuring sustainable food production and food security, promoting a sustainable food supply chain from start to finish: from processing to sale (both wholesale and retail), and also ancillary services, such as hospitality and catering, promoting sustainable food consumption and supporting the transition to healthy eating habits, fighting food fraud along the supply chain and reducing waste grocery.

As far as the main fields of use are concerned, it is worth mentioning the possibility of archiving and making immutable the certification processes of a product.

This is done through a platform that makes it possible to collect data, make it immutable and at the same time available to certifiers and consumers, who would thus have the opportunity to know the entire path taken by the product along the supply chain.

At the national level, the research carried out by the CREA research center and the Blockchain Observatory of the Politecnico di Milano, a center of excellence in Italy, is also moving in this direction.

The analysis of the data collected in the last two years has verified that the projects applying blockchain to traceability and certifications have made it possible to monitor compliance with quality standards in the fishing sector to guarantee nature reserves but also to verify the presence of allergens and the withdrawal of compromised batches with a view to food safety.

To implement the control and conservation measures of the path taken by the food product, the use of blockchain is of particular importance, for example in the event of the emergence of a danger to human or animal health, in the case of activation of the rapid alert system developed within the European Union (RASFF). In this case, risk communication to the consumer plays a central role to limit potential and actual adverse effects on human and animal health and welfare, and at the same time limiting the permanence of dangerous products on the market. In essence, the relationship between science and law, consumer awareness, and the strengthening of the relationship with the producer also passes through the application of innovative systems suitable for promoting greater awareness during the intake of food products through knowledge of the life cycle and chemical composition of the product, empirical and tangible not only entrusted to mere probabilistic evaluations.

In this context, trust, traceability, and transparency became critical factors in designing circular blockchain platforms in supply chains.

The bridge from the three circular supply chain reverse processes (i.e., recycle, redistribute, remanufacture) and the three factors (i.e., trust, traceability, transparency) the blockchain platforms in a supply chain, including manufacturer, reverse logistics service provider, selection center, recycling center, and landfill, could be the answer.

The results highlight blockchain's role as a technological capability for improving control in the movement of wastes and product return management activities.

For real transparency in the agri-food sector, the communication tool par excellence is the label and labeling, so it too, like traceability, represents a territory of choice for the application of blockchain technology. Consumers increasingly require a range of nutritional information and, concerning this right to information, blockchain seems to offer the best answer, since it is a tool that promotes the knowability of information related to traceability. With the introduction of the mandatory nutrition declaration on the label, it has been possible to respond to the emerging needs for greater transparency for health prevention, greater identifiability of data relating to the

nutritional aspects of the product and greater environmental sustainability.

Manufacturers are obliged to report all the information regarding: the identity, composition, properties and other characteristics of the food, shelf life, methods of use and harmful effects.

To quickly convey information, the so-called smart labels have also been introduced, capable of automatically identifying and tracking goods by detecting alterations or health risks, related to alterations in the correct storage temperature or contamination of the environment, and reporting optional information but with increasing value since it contains information relating to the life cycle of the product in light of the choices made within the of the European Union to create an environmentally-friendly, resilient and sustainable system.

Blockchain can make a positive contribution to verifying the veracity of labels, in particular, smart *labels* (characterized by barcodes or QR codes or equipped with more sophisticated systems such as RFDI or NFC tags).

The spread of smart labels as a useful tool for greater transparency and communication of information has made it possible to strengthen the relationship between operator and consumer. On the other hand, it has proved to be particularly useful in ensuring greater traceability of the agri-food product throughout the supply chain, combating counterfeiting phenomena, and promoting the conveyance of information relating to ethical choices.

However, the scope in which the blockchain can make several improvements to the food sector is the traceability system.

Traceability has been defined by Regulation (EC) No 178/2002 (Prete, 2024).

In fact, among the many definitions found in legal literature, in the aforementioned Regulation in Article 3, paragraph 15, there is the definition of traceability as "the possibility of reconstructing and following the path of a food, feed, animal or substance intended or likely to become part of a food or feed through all stages of production, Transformation and Distribution".

Article 18 of Regulation (EC) No. 178/2002 then deepens the definition in terms of objective and expected results and establishes the obligation for all operators in the sector to provide information on the origin of products and all the subjects involved in the individual stages of production along the entire supply chain. Article 18(2) and (3) provide: "2. Food and feed business operators must be able to identify who has supplied them with food, feed, food-producing animals or any substance intended for or likely to be incorporated into a food or feed. To that end, those operators must have systems and procedures in place to provide information to competent authorities upon request".

In summary, the agri-food system outlined by Regulation (EC) No. 178/2002 – which still represents the reference legislation for the traceability institution – highlights that traceability does not make a product safe in itself, but represents a means of limiting a real food safety problem.

The institution of food traceability has been the subject of intervention of the new Common Agricultural Policy adopted by the European Council for the period 2023 – 2027, for a more sustainable system. This includes Regulation (EU) 2021/2115 establishing rules on support for strategic plans to be drawn up by Member States under the common agricultural policy ('CAP Strategic Plans') and financed by the European Agricultural Guarantee Fund (EAGF) and the European Agricultural Fund for Rural Development (EAFRD), as well as the repeal of Regulations (EU) No 1305/2013 and (EU) No 1307/2013. Article 47(1) of the Regulation provides that for each objective of the CAP Strategic Plans, Member States may choose a type of intervention, including "the implementation of traceability and certification systems, in particular with regard to the quality control of products sold to final consumers".

Article 84 of the Regulation, on the other hand, provides for a specific delegation of powers to the European Commission to establish additional requirements regarding the types of rural development interventions, including support for traceability. Finally, Article 100 of the Regulation empowers the European Commission to assess the contribution of policy to the achievement of climate change objectives through a simple and common methodology: the traceability of climate-related spending.

Traceability has also been a strategic objective of the main international organizations and associations carrying out activities in the agri-food sector. Thanks to the ISO ("International Standardization Organisation") standard UNI EN 22005:2008, the main actors involved in the agri-food supply chain system – such as the Codex Alimentarius Commission, the International Association of Hotels and Restaurants, the Global Food Safety Initiative (GFSI) and the Confederation of Agri-Food Industries of the European Union (CIAA). It is able to identify and track every aspect of the activity of the operators involved in the process, from the farm to the consumer's table. In such a structured context, in which transparency and knowability of the phases of the food production process constitute the *vulnerability* of the agri-food sector, it is physiological that operators are looking for tools capable of making this process fast, simple, functional, effective, and efficient; but, above all, tools that are able to contain, store and manage a huge amount of information related to the entire food supply chain.

Traceability allows the product to be identified with regard to details related to weight, allergens, type of packaging, specifications, expiration dates and dates of manufacture which are all recorded and transferred together with the product to facilitate identification.

The same benefits can also be found on the consumer side. In fact, knowing the path taken by the product (from its birth to the marketing of the finished product) allows consumers to keep track of the time, the conditions of conservation and storage, the controls carried out and the path taken by the product along the supply chain throughout the supply chain throughout the supply chain life cycle, so that you can guide your choices in a conscious way.

Ultimately, blockchain technology would act as a tool that makes it possible to ensure the effectiveness of the right, meaning the quality of the latter to produce effects that conform to the interests of consumers concerning the reality that exists today. In this scenario, the blockchain – by its advantageous properties – allows precision monitoring and a means of incentivizing and encouraging virtuous behavior and denouncing and sanctioning illegitimate behavior. It is also able to create a transparent traceability and communication system aimed at combating civil and criminal offenses.

By leveraging the characteristic of disintermediation, or decentralization of control, the sharing, reuse, and recycling of materials are encouraged, therefore environmental sustainability and the circular economy are favored in a related way so as to facilitate industrial symbiosis with the establishment of a promoted communication and certification system.

3. The case study of the wheat sector

The wheat supply chain belongs to the cereals, referred to as herbaceous plants belonging to the botanical family of grasses.

For a company that has already established contracts with farmers for the raw material, this involves aligning the batches of wheat production, with the batches of semolina production, and the batches of pasta.

It allows for the certification of the entire supply chain, starting from the finished pasta product and going back to the wheat field where the raw material was grown.

Then, the wheat supply chain belongs to the cereals, referred to as herbaceous plants belonging to the botanical family of grasses. In the big family of cereals, we can find: grain and wheat (which are equivalent), and other raw materials, commonly used to make pasta, bread, and cookies, as wheat or corn, corn or maize, barley, rice, spelled, rye, oats, millet. Among gluten-free cereals, we find buckwheat, amaranth, quinoa and chia.

Over the years, the European Union has developed a composite toolbox of rules to give definitions of these products and to guarantee the traceability of raw wheat, rice, and dairy products at agricultural sites.

As it is known, the supply chain traceability rules are divided into mandatory (horizontal and vertical) and voluntary. In detail, the horizontal regulations are applied to all supply chain traceability while the vertical ones refer to the traceability of specific products traceability is addressed by specific vertical regulations at the European (EU) and national levels.

The company is Pastificio dei Campi.

Pastificio Dei Campi is an Italian company known for crafting high-quality pasta with a strong commitment to tradition and product excellence. Founded in 2004 by Giuseppe Di Martino and his wife Giovanna Di Martino, who are partners in the historic Di Martino pasta factory (1912) located in Gragnano, in the province of Naples, Italy. The Di Martino Group also includes other renowned Italian brands like "Grandi Pastai Italiani" and "Pastificio Antonio Amato".

The primary goal of Pastificio dei Campi is to preserve and enhance the tradition of Italian pasta production while ensuring the utmost quality in their products.

For Pastificio dei Campi, the traceability of the supply chain means the ability to track and certify the entire journey of the product, from its origin in the fields to the consumer's plate. Traceability, therefore, serves as a tool that can assist the producer in certifying the quality of the final product. Regarding quality, there are three key stages in the pasta supply chain:

- The production process (wheat production),
- The mill that processes the wheat into semolina,
- The pasta factory that produces and packages the pasta.

In the case of Pastificio dei Campi, the traceability system, understood as the ability to trace and track all product movements throughout the entire supply chain, represents a kind of reinforced certification of the chain. This is because it enhances transparency and provides greater quality control, both internally within the company and externally, in the management of all subcontractors.

Traceability is an integral part of the company's business model, serving as a competitive and mostly voluntary tool to establish an advantage through product differentiation (high quality pasta vs the standard industrial pasta). Its inception is driven by a market-oriented goal, namely, to facilitate the creation and promotion of pasta with a fully Italian supply chain (100% Made in Italy), generating trust in the consumer and facilitating the purchasing process.

Above all, it offers more information about the authenticity and safety of the product to the end consumer compared to standards related to the origin.

Traceability, thus, acts as a competitive advantage for corporate differentiation strategies centered around Gragnano's pasta-making tradition, its favorable terroir, and the quality of the Made in Italy product.

In these terms, traceability is integrated into the company's mission and becomes a value through which management develops its actions and marketing narratives.

The most innovative aspect of the traceability system implemented by the pasta factory is undoubtedly the development of external traceability.

This external traceability encompasses the agricultural companies with which supply chain contracts have been established, as well as the mill responsible for wheat processing. It caters to the need for increased transparency and control in these phases.

For the farmers, or more specifically, the technical staff like agronomists and consultants, they input the wheat harvesting date and the quantity of wheat batches delivered to the mill (i.e., the transport document certifying the transaction) into Authentico's blockchain. Additional information related to the transaction, such as the field log, the documentation on the varieties, the location of the fields via GPS, and all other product certifications (e.g., organic), can be added.

The mill, on the other hand, adds another block of information indicating the quantity of wheat stored based on orders received from the pasta factory. Consequently, it is possible to trace the amounts of wheat processed to produce semolina and the respective processing date. These details are supplemented with any technical specifications and analyses of key parameters (humidity, etc.).

Internal traceability involves the pasta factory with its two departments, namely the pasta production and packaging departments in Gragnano. In detail, the warehouse records in the blockchain the quantities of semolina loaded into the warehouse and the quantity of semolina processed. Additionally, the packaging department enters into the blockchain the amount of pasta produced and the packaging date of the respective batch of pasta.

Blockchain supports the digital certification process of product and raw material traceability, addressing the agri-food sector's growing demand in Italy. The traceability trend over Blocklchain is driven by the necessity to safeguard Italian excellence from fraud and the heightened awareness of consumers. Blockchain's advantages include data inviolability, tamper resistance, data security, and immutability, making it especially valuable for companies like Pastificio Dei Campi, which aim to transparently share transaction results throughout the supply chain.

This approach guarantees certainty regarding the handling of raw materials and processed products.

Since its inception, the company has chosen to improve the transparency of its processes and at the same time increase control over external operations. However, at the beginning, in 2004, the costs and available blockchain solutions were far from competitive and affordable. The costs were prohibitive.

The company had to wait several years before finally discovering a tailor-made solution in Authentico that aligned perfectly with its needs.

With Authentico, they improved corporate transparency and digitised its supply chain by leveraging blockchain technology developed by Quadrans. The technology developed by Quadrans, first of all, had a cost (especially in terms of energy) that was extremely competitive in the market and, most importantly, it did not rely on cryptocurrencies, significantly reducing the cost for the company.

The presence of affordable costs and mature technologies allowed all participants in the Pastificio Dei Campi supply chain to access the same platform, a crucial requirement for the digitisation process. The primary fixed cost (setup) is distributed between the pasta factory and the mill, the main actors in the supply chain. Subsequently, each participant, including farmers, incurs a fixed fee comparable to other certification costs, along with a variable fee in the form of a monthly subscription invoiced semi-annually or annually. This variable fee is determined by the number of batches uploaded. The platform offers a tiered pricing structure with five levels, starting with the smallest level for micro-enterprises producing up to 50 batches of products per year.

Authentico goes beyond a voluntary digital registry. It provides a cloud platform that facilitates mandatory traceability for food companies, offering several advantages, such as reducing response times for non-compliance issues, controlling over production efficiency, processing, monitoring and quality control.

Blockchain supports the digital certification process of product and raw material traceability, addressing the agri-food sector's growing demand in Italy. The traceability trend over blockchain is driven by the necessity to safeguard Italian excellence from fraud and the heightened awareness of consumers. Blockchain's advantages include data inviolability, tamper resistance, data security, and immutability, making it especially valuable for companies like Pastificio dei Campi, where they can finally transparently share transaction results throughout the supply chain.

Ultimately, the main challenge sometimes lies in uniting the entire supply chain within a system like the one developed by Pastificio dei Campi, where alignment between all actors is crucial. The desire to trace raw materials can become an obstacle, which may be more cultural in nature. The key element, perhaps the most significant obstacle, is that it is not within everyone's reach. Achieving transparency for companies today is essentially a challenge, as not everyone is inclined to do so.

To date, the resistance encountered in adopting this technology is the commitment of companies to embrace true transparency. Technology can only really provide added value and market recognition for those companies that prioritize trust and transparency as core values.

4. Conclusion

Regarding the use of technology, many doubts are still fighting against the favorable prospects for the planet in the name of a more sustainable supply chain.

At the end of the digression made, it seems fair to infer that blockchain traceability can foster several elements, as the immutability and

non-alteration of the product and to avoid food fraud, the certification of product quality, the capacity to give choice of consumption about quality, the composition of the product, and the route taken from raw material to sale, and the risk mitigation related to food safety and food security.

However, when it deals with technologies, the implications and critical aspects concern at least three factors: human factor, environment, cyber security, data acquisition and management.

Digital technologies have an undeniable environmental impact.

Of course, the effects of digital technologies on the environment are certainly less severe than those caused by larger sectors such as transport and industry.

However, recent developments aimed at making the ICT sector increasingly efficient do not guarantee that its emissions will remain relatively low in the future.

Among the side effects of this process, we can find the ongoing climate and environmental change on our planet caused mainly by the increase in the concentration of carbon dioxide in the air and the dispersion of plastic in the oceans and seas.

By its conformation, the system involves interaction between individuals, humans and digital tools, so ad hoc procedures are needed to ensure that all actors have the appropriate skills to avoid errors in the process.

It is not just a matter of technological, regulatory or organizational barriers capable of evolving, over time, to keep pace with progress. But it is about being able to understand, on the one hand, how blockchain can be adapted to the complexities of the food sector and, on the other hand, whether it is possible to incorporate it into the relationship of trust between producer and the final consumer.

In order to achieve a functional and stable system, it is necessary to create a defense and security structure against cyber attacks resulting in data loss and theft. In addition, it is necessary to identify who is in charge of such control to avoid data control being managed outside the Union, to the detriment of European agriculture as a whole.

Making supply chain data immutable and transparent is a risk, in the absence of adequate data validation tools and the absence of a truly controlled and reliable supply chain.

It must be remembered that the fact that information entered into the blockchain is shared and immutable does not imply any guarantee that it is true, since the very nature of the blockchain rests on self-certification. It is therefore imperative to emphasise that, however innovative and effective it may be, this tool is not in itself sufficient to guarantee the actual origin of the products that are the subject of it, nor should it be understood as a means to replace traditional controls and activities carried out by third parties.

To prevent the adoption of a tool for innovation and competitiveness from becoming a boomerang for the company, effective teamwork is required between platform providers, IT programmers, the company's production units, suppliers and professionals working alongside the company as lawyer, accountant, food technologist, agronomist, marketing experts.

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