

EU CAP Network Focus Group

'Alternative solutions for livestock product differentiation'

Mini Paper 3

Evidence-based environmental benefits for the differentiation of specific livestock products

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Abstract

The differentiation of livestock products based on environmental sustainability is a crucial aspect of modern agriculture. This mini paper explores evidence-based environmental benefits associated with pasture-based livestock farming systems, emphasizing their role in mitigating climate change, enhancing biodiversity, and promoting soil health. While intensive livestock farming has been widely criticized for its environmental impact, alternative models such as extensive grazing, silvopastoral systems, and regenerative livestock farming offer viable solutions. These approaches contribute to carbon sequestration, erosion control, and improved nutrient cycles, making them key to sustainable food production.

Despite these benefits, public perception often fails to distinguish between sustainable and unsustainable livestock practices, leading to broad critiques of animal agriculture. This paper argues for the differentiation of livestock systems based on measurable ecological contributions, supporting informed consumer choices and policy incentives that promote sustainability. Furthermore, it discusses the economic sustainability of these systems, highlighting how ecosystem services can be monetized through certification schemes, carbon markets, and policy support under the EU's Common Agricultural Policy (CAP).

By integrating scientific research with practical case studies, this mini paper underscores the need for a holistic approach to livestock products' differentiation. It advocates for enhanced consumer awareness, market incentives, and policy frameworks that recognize the positive environmental impact of well-managed livestock systems. This differentiation is essential for ensuring that livestock farming is viewed not only as a contributor to environmental challenges but also as a fundamental part of their solution.

1. Introduction

1.1 What's the Mini Paper about? Problem definition

The global environmental crisis demands urgent, practical solutions based on science. Exacerbated by insufficient and often incoherent political action, these challenges require solutions that go beyond ideological debates and instead focus on actionable, evidence-based strategies. Agriculture, particularly livestock farming, plays a dual role in the context of global climate change: on the one hand, it can significantly contribute to environmental degradation, but on the other, it has the potential to mitigate these problems when managed sustainably.

Livestock farming uses over 80% of the European Union's agricultural territory¹. This vast landscape is often polarized: some areas support intensive, land-detached systems where animals are confined without access to pasture, while others are

¹ EUROSTAT, 2023



completely devoid of livestock despite their potential for grazing. This mismatch - having animals without land and **land without animals** - has far-reaching consequences, including soil erosion, loss of soil fertility, and disrupted nutrient cycles².

However, alternative models of livestock farming exist, by integrating landscape design and operating in harmony with the environment. These pasture-based livestock systems (PLFS), often based on extensive grazing or silvopastoral practices, have demonstrably positive impacts on the ecological balance. For example, well-managed grazing systems can prevent overgrazing and undergrazing, promote soil carbon sequestration, and enhance biodiversity through habitat creation and maintenance³. Additionally, agrosilvopastoral systems have been shown to contribute to water retention, erosion control, and the regulation of microclimates, further illustrating the potential for **livestock farming to act as a tool for ecological restoration**⁴.

However, public perception often fails to distinguish between sustainable and unsustainable livestock practices. The environmental critique of livestock farming has largely centered on its greenhouse gas emissions, particularly methane, and its association with deforestation and water pollution. This negative message appears to have gained popularity, leading to increased advocacy for vegan diets, alternative protein sources (e.g., lab-grown meat or insect-based diets), and a general push toward eliminating animal products. While these approaches are part of the broader conversation on sustainable food systems, they risk oversimplifying the complexity of agricultural landscapes and overlooking the contributions of well-managed livestock systems to ecosystem services.

For these reasons, it is crucial to **differentiate specific livestock farming systems based on their environmental, economic, and social impacts**. PLFS such as rotational grazing, silvopastoralism, and regenerative livestock farming are examples where evidence supports their role in promoting soil health, sequestering carbon, and supporting biodiversity⁵. Beyond their environmental benefits, these systems offer significant opportunities for farmers by enhancing the market value of their products through differentiation strategies that highlight their sustainability credentials. By positioning pasture-based and regenerative livestock products as premium, environmentally responsible choices, farmers can access higher-value markets, improve consumer trust, and secure better economic returns.

Furthermore, differentiation based on evidence-backed sustainability metrics creates a positive feedback loop: as consumer demand for sustainably produced meat and dairy grows, farmers who adopt these systems can achieve greater market recognition,

² Teague & Kreuter, 2020

³ Teague & Kreuter, 2020; Mosquera-Losada et al., 2018

⁴ Jose et al., 2019

⁵ Teague et al., 2016



financial stability, and policy support. This, in turn, incentivizes the expansion of such practices, reinforcing their economic viability and environmental impact. In conclusion, the focus must shift toward evidence-based promotion of livestock systems that are integrated with the land, regenerating ecosystems, and providing essential ecosystem services. This differentiation is crucial to foster informed consumer choices and to ensure that livestock farming becomes an acknowledged part of the solution rather than the problem in addressing the global environmental crisis.

1.2 Diverse farming systems in the EU

The European Union (EU) is home to approximately 10 million farms, of which around 4 million involve some form of livestock farming⁶. Among these, a wide diversity of livestock systems exists, ranging from intensive, industrial-scale operations to small-scale extensive practices. While about 25% of EU livestock farms operate under extensive or semi-extensive systems, focusing on grazing and integrated land use, the majority are associated with intensive systems that rely on concentrated feed and confined animal operations⁷. This diversity reflects the varying ecological, cultural, and economic contexts across the EU's 27 Member States.

PLFS systems represent around 35% of the EU's total agricultural land use and are vital for maintaining High Nature Value (HNV) farmlands, which cover nearly 30% of the EU's utilized agricultural area⁸. These HNV systems are critical for preserving biodiversity and ecosystem services. For instance, grazing livestock plays an essential role in managing semi-natural grasslands, preventing scrub encroachment, and supporting species-rich habitats⁹. Conversely, intensive livestock farming systems contribute disproportionately to environmental pressures, including 78% of EU greenhouse gas emissions from agriculture¹⁰. These systems are highly dependent on external inputs such as imported feed, leading to environmental challenges such as deforestation in supplier countries and nutrient imbalances in European landscapes¹¹.

The future of EU livestock farming depends on balancing productivity with ecological resilience. By leveraging its diversity, fostering sustainable practices, and scaling up systems that deliver measurable environmental benefits, the EU can lead the way in developing livestock systems that align with its ambitious climate and biodiversity goals.

⁶ EUROSTAT, 2022

⁷ EUROSTAT, 2022; Garnett et al., 2013

⁸ European Commission, 2014

⁹ Pereira et al., 2018

¹⁰ European Environment Agency, 2021

¹¹ Gerber et al., 2013



1.3 Current trends

There is a shift in consumer and policy interest toward livestock systems that **combine environmental stewardship with the production of nutrient-dense food**. This trend aligns with the broader objectives of sustainable agriculture, emphasizing resilience to climate change and biodiversity conservation. PLFS using Nature-based Solutions (NbS), Holistic Management (HM), Mob Grazing, HNV farming, and low-input systems are gaining momentum as they aim to align agricultural productivity with ecological sustainability¹². These approaches prioritize minimizing external inputs (low-input systems), enhancing ecosystem services, and promoting adaptive management practices.

Integration of livestock into **diversified farming systems** is also gaining recognition as a key strategy. For instance, **silvopastoral systems**, where livestock graze under tree canopies, not only improve animal welfare but also enhance carbon sequestration and nutrient cycling compared to conventional grazing systems¹³. These systems contribute to climate mitigation by offsetting greenhouse gas emissions and improving soil carbon stocks.

From a policy perspective, these livestock systems align closely with the EU's Green Deal, which aims to create a sustainable and fair food system. Investments in these systems, coupled with robust metrics for environmental performance, can provide transparency and ensure that livestock production contributes to ecological restoration rather than degradation¹⁴.

1.4 Pillars of economic sustainability of different farming systems

Modern markets increasingly reward farming systems that align with sustainability goals, offering opportunities for producers who integrate practices such as biodiversity promotion, soil regeneration, and carbon footprint reduction into their operations. These practices not only address environmental challenges but also provide a competitive advantage in an era of growing consumer and policy focus on sustainability¹⁵. However, there is still much work to be done to ensure that such rewards are equitably distributed across the sector. In many cases, market incentives fail to adequately recognize the efforts of smaller and more sustainable farming operations, with benefits often disproportionately favoring larger actors who can more easily comply with certification schemes or invest in sustainability branding. Moreover, greenwashing remains a pervasive issue, where sustainability claims may be misleading or fail to reflect actual environmental performance. To truly drive transformation, economic and policy mechanisms must be refined to ensure that

¹² Teague et al., 2016; Jose et al., 2019

¹³ Mosquera-Losada et al., 2018

¹⁴ European Commission, 2023

¹⁵ Meemken & Qaim, 2018; Teague & Kreuter, 2020



differentiation strategies genuinely reward those livestock systems that deliver measurable environmental benefits, rather than just those with stronger marketing power or regulatory compliance capacity.

One of the key pillars of economic sustainability lies in **valuing and paying for ecosystem services** provided by sustainable livestock systems. For example, in 2022, agriculture accounted for approximately 12% of total greenhouse gas emissions in the EU, amounting to about 380 million tons of CO₂ equivalent¹⁶. This highlights the potential for farmers to engage in carbon markets by adopting sustainable practices that sequester carbon or reduce emissions. While the EU's specific share of the voluntary carbon market remains unclear, nature-based solutions, including agriculture and forestry, represent a substantial and growing segment of the global voluntary carbon market, which was valued at approximately €1.8 billion in 2022¹⁷. EU farmers who adopt carbon-friendly systems such as agroforestry do not only contribute to climate goals but could also generate additional income through carbon credit schemes, providing a dual benefit of economic and environmental sustainability.

Another example is HNV farming systems, which account for 30% of the EU's agricultural land and are essential to biodiversity conservation and the provision of ecosystem services. **However, these systems often face economic challenges due to low productivity and higher labor demands.** More targeted support under the EU's CAP and initiatives such as the Green Deal could provide vital financial incentives for sustainable practices in HNV farmlands¹⁸. Agroforestry systems, another cornerstone of sustainable livestock farming, are supported under CAP Pillar II programs. These systems, which cover approximately 9% of the EU's agricultural land, have been shown to generate additional revenue through diverse outputs, including wood, forage, and carbon credits, while reducing input costs by 20-30%¹⁹.

Economic sustainability also hinges on consumer trust and market differentiation. Ambiguous certification criteria can undermine confidence in sustainable livestock products. Studies show that 65% of EU consumers are willing to pay a premium for sustainably produced meat and dairy, provided that environmental claims are clear and backed by evidence²⁰. Robust certification schemes and eco-labels that transparently communicate measurable outcomes, such as reductions in greenhouse gas emissions or improvements in animal welfare, can enhance market access and incentivize sustainable practices. However, certification schemes can be too costly for individual farmers with small herds, so any step in this direction should be taken in a way that these farmers are not economically penalised.

¹⁶ Diab, 2024

¹⁷ Forest Trends, 2023

¹⁸ European Commission, 2023

¹⁹ European Commission, 2014

²⁰ Meemken & Qaim, 2018



Economic sustainability in livestock farming must go beyond immediate productivity metrics and include externalities or external costs related to measurable environmental benefits and societal value. By recognizing and paying for ecosystem services, fostering institutional support, and ensuring transparency for consumers, the EU can lead a global transformation toward resilient, sustainable, and economically viable farming systems. Scaling up systems like silvopastoralism, rotational grazing, and HNV farming is essential to meet the EU's ambitious targets for climate neutrality and biodiversity conservation by 2050.

2 Why is this Mini Paper needed?

This mini paper aims to emphasize the scientific evidence supporting the environmental benefits of livestock farming systems that are not only productive and economically viable, but also promote animal health and welfare and the regeneration of ecological functions. It highlights their role in carbon sequestration, biodiversity conservation, and ecosystem resilience. Recognizing these contributions is essential for fostering market differentiation, ensuring that environmentally beneficial livestock products are properly valued and distinguished from conventional alternatives. Additionally, the paper discusses how public administrations can implement effective economic incentives to encourage farmers to adopt and maintain sustainable practices, ensuring that environmental gains translate into tangible benefits for both producers and consumers.

3.0 Key issues

The environmental benefits of pasture-based livestock farming systems (PLFS) can be explained using the concept of Ecosystem Services (ES), which are defined as the direct and indirect contributions of ecosystems to human well-being. This concept is especially relevant in multifunctional agroecosystems such as PLFS, which provide a diversified set of economic, environmental, cultural, and social goods and services. The ES framework has gained increasing recognition within academic and policy domains and is gradually influencing technical and consumer-oriented approaches. By explicitly linking natural capital with social welfare, it holds great potential for bridging ecosystem conservation, sustainable resource use, and consumer choices.

However, a critical challenge in making ES actionable at the consumer level is that many of these services do not have direct market value, as they constitute public goods. Their benefits often manifest at larger spatial and temporal scales, complicating their measurement and integration into decision-making processes. Moreover, the limited funding and resources allocated to ES implementation hinder their inclusion in public policies and private schemes for product differentiation. This gap is further exacerbated by the presence of externalities, which can be understood as unintended side effects not reflected in market prices. For instance, in the context of ecosystem services, externalities often refer to environmental impacts, positive or negative, that



are not reflected in market prices. These include unpriced environmental and social costs or benefits generated by PLFS. While negative externalities (e.g., pollution from intensive systems) are often discussed, positive externalities, such as biodiversity conservation, carbon sequestration, and cultural heritage preservation, remain underappreciated in economic transactions. Addressing these externalities through policy incentives, market-based mechanisms, and consumer awareness initiatives could enhance the integration of ES into both public and private sectors, making them more tangible and actionable for end-users. Environmental benefits delivered by PLFS are multiple and their importance can vary across European socio-economic and biophysical contexts. Here we provide a short explanation of the most important ones, according to scientific literature.

Productions from PLFS (referred to as **Provisioning ES**)²¹ are the primary outputs generated, such as meat and milk. However, these systems also provide additional valuable products such as fibers (e.g., wool), timber, cork, fruits, nuts, as well as hunting and game meat.

Regulating ES are biophysical processes providing benefits such as climate regulation, flood prevention, water purification, etc. The more prevalent regulating ES for PLFS are: i) prevention of natural hazards, particularly **forest fires**, especially in Mediterranean conditions; ii) **avoidance of soil erosion** and maintenance of **soil fertility**; and iii) **carbon sequestration** in grasslands, which contributes to climate regulation.

Cultural ES are recreational, aesthetic and spiritual benefits provided by agroecosystems. Among the cultural ES that are more prevalent for PLFS we can mention: i) the aesthetic quality of the **agricultural landscape**, which depends on vegetation dynamics and landscape diversity; and ii) **recreation and tourism attraction** (including cultural heritage such as differentiated food products) derived from these landscapes.

Supporting ES includes primary processes of the biosphere, such as the nutrient cycle, the water cycle, soil formation and biodiversity. Relationships between PLFS and **biodiversity** have been widely described. Biodiversity-related conflicts in Europe are caused by two main processes: **intensification of agriculture** entailing operations at a large scale, and **abandonment of High Nature Value (HNV)** farmlands, mostly located in mountains, semi-arid areas, steppes and *dehesas/montados*. The main driver is the encroachment of vegetation because of a reduction in traditional extensive grazing. Grasslands agroecosystems are key to preserving endangered species of insects (notably butterflies and bees) and birds (farmland birds and scavengers).

Other **environmental aspects** that differ from industrial livestock systems refer to soil, water and air **pollution**, mostly related to **N and P emissions**, which are significantly

²¹ Rodriguez et al., 2014



lower in extensive conditions. In addition, PLFS based on natural resources have **lower consumption of fossil fuels**, e.g. the higher the use of pastures for feeding the animals, the higher the use of solar energy and lower dependency of fossil energy. The ES framework integrates the capacity of certain agroecosystems to supply diverse environmental benefits, and the perspectives and interests of different stakeholders regarding its uses. It highlights that sustainable food production emerges from the interplay of multiple interacting ES rather than being solely reliant on a single service. Using the ES framework as a measure for trade-offs and management of costs and benefits in a particular area can support efficient management decisions. Managing these trade-offs and synergies among ES at multiple scales is essential for reinforcing the contribution of PLFS to landscape multifunctionality and to achieve the differentiation of specific livestock products.

Essentially, there are two ways to integrate ES into differentiation schemes for PLFS products.

1. Formulate public policies that incorporate ES in their design, for example, establishing schemes for **Payments of Ecosystem Services (PES)** based on agricultural practices and/or results within the EU's common agricultural policy (CAP). This principle behind PES consists in creating economic incentives that align individuals' interests with the environmental and social wellbeing of society. Research has shown that there is a large underestimation of the socio-cultural and economic values of ecosystem services of grassland agroecosystems, and the welfare loss linked to further abandonment. PES schemes should be regionalized and, if possible, individualized by farmers or farmer groups. To do so, it is necessary to establish objective, easy-to-understand, measurable and responsive indicators to monitor the effects of compensation schemes on ES delivery and the well-being of farmers. By monitoring these objective indicators and/or targeting particular agricultural practices, these eco-schemes may truly become efficient for the delivery of public goods to society while differentiating PLFS products.
2. Private initiatives of producers and producer associations that further develop products that relate to ethical concerns of consumers. **Novel quality schemes** based on **extrinsic attributes** (e.g. not related to physical characteristics of the product itself but to the way it is produced), could be developed to further differentiate animal products. A well-known example is "pasture meat" that refers to the animal feeding system. Other aspects such as conservation of biodiversity or of emblematic species, landscape maintenance, energy and/or carbon footprint, animal welfare, etc. should be explored. A key issue here is how to measure those extrinsic attributes, as well as how to certify and inform the consumers.



3.0 Existing best practices and tools

3.1 Overview of best practices, tools, and frameworks for differentiating products by practices and results

The [Regenerative Organic Certified® framework](#) (ROC)²² is an initiative responsible for setting rigorous criteria surpassing conventional organic certifications, with a focus on the restoration of ecosystems and the promotion of truly sustainable practices. This pioneering standard revolves around the integration of soil health, animal welfare, and social fairness. Producers that adhere to the ROC offer to the consumer products that are environmentally sustainable, socially responsible, and of superior quality, improving the market positioning of this niche as well as the consumer trust.

ROC also strives to avoid duplicative audits and aims at bringing together already existing certifications: the applying producers can already demonstrate compliance with ROC by leveraging on previously earned certifications, including Animal Welfare Approved or Demeter Biodynamic. Otherwise, the standard application process includes a review, the validation of a Regenerative Organic System Plan, and the assignment to an approved certifying body, which will conduct an on-site audit and review the compliance with ROC standards. As of 2024, the ROC program has certified 331 farms and ranches across various geographical areas, including North America, Europe, and Asia. The producers are listed in a publicly accessible [directory](#)²³.

Type of ES	Description
Provisioning ES	ROC™ certifies high-quality food, products, fibre, and personal care , ensuring they come from sustainable, regenerative farming systems. This guarantees nutrient-dense, ethically produced products with reduced environmental impact.
Regulating ES	ROC™ practices enhance soil carbon sequestration, improve water retention, and reduce soil erosion, making landscapes more resilient to climate change and extreme weather events.
Cultural ES	ROC™ supports small-scale farmers and indigenous agricultural knowledge, preserving traditional farming

²² <https://regenorganic.org/wp-content/uploads/2023/03/Regenerative-Organic-Certified-Framework.pdf>

²³ https://regenorganic.org/certified-farm-ranch-directory/?utm_source=chatgpt.com



	landscapes and strengthening community ties through ethical consumer choices.
Supporting ES	Regenerative Organic Certified® framework's practices improve biodiversity (e.g. crop rotation, cover crops, agroforestry), as well as regenerate soils and maintain ecosystem balance.

[Ramats de foc](#)²⁴. The Mediterranean basin is characterized by unmanaged forests that are increasingly vulnerable to wildfires, often affecting large areas exceeding the response capacity of the emergency services, posing a risk to society as a whole. Experts point out that “suppression is the answer, but not the solution”, and that the latter involves the sustainable management of forests and landscapes. In this sense, the Ramats de Foc initiative considers herds as a tool for sustainable forest management. From “Ramats de Foc (Fire Flocks), the branding name” they work to make it easier for shepherds to graze in strategic fire risk management areas and that the ecosystem services they provide are adequately remunerated.

Shepherds working under the brand “Fire Flocks” manage their herds to graze in strategic areas defined by the GRAF (Firefighters of the Generalitat of Catalonia) and mapped and recognized by the Administration as in need of sustainable forest management actions to change the structure of the vegetation. The long-term and sustainable maintenance of these areas contributes to reducing the potential of wildfires and providing spaces where emergency services can smoothly operate control maneuvers. The contributing shepherds are recognized through the distinctive “Ramats de Foc” on their products.

The label aims to **make their work visible**, valuing and differentiating their products, involving end-consumers, and compensating for their effort and added value. The project seeks to achieve a forest landscape that is more resistant to fire and favors the continuity of livestock activity in the territory, due to its double task of food production and landscape conservation. It also involves and strengthens the link between fire management bodies, livestock farmers and shepherds, forest owners, local establishments and consumers. In the website, they show the **46 shepherds** participating in the initiative, all of them from different regions of Catalonia, and they provide a tool to filter information according to region, actor or product. This strategy is managed by the [Pau Costa Foundation](#)²⁵, a non-profit organization focused on wildfire management and prevention from the perspective of fire ecology, created by [Pau Costa](#)²⁶.

²⁴ <https://www.ramatsdefoc.org/els-productes/>

²⁵ <https://www.paucostafoundation.org/>

²⁶ <https://www.paucostafoundation.org/en/organization>



Type of ES	Description
Provisioning ES	Shepherds in the program produce meat and dairy products, which are labeled under “Ramats de Foc” for market recognition.
Regulating ES	Grazing reduces vegetation density, lowering fire risk in strategic areas. It also prevents soil erosion and maintains grassland carbon storage.
Cultural ES	The branding increases consumer awareness, supports traditional shepherding, and fosters local food culture.
Supporting ES	Managed grazing prevents landscape abandonment, supports biodiversity (e.g., pasture-dependent species), and promotes sustainable land use.

[Elige Ganadería Extensiva](#)²⁷ is a successful initiative designed to highlight the unique aspects of extensive livestock farming in Spain. Developed by the [Fundación Entretantos](#)²⁸ and their [Plataforma por la Ganadería Extensiva y el Pastoralismo](#)²⁹ (Platform for Extensive Livestock Farming and Pastoralism - PGEP), the initiative features the Extensive Livestock [Map](#)³⁰, which aims to differentiate the practices of extensive farming from those of intensive, industrial livestock farming.

Its primary goal is to **increase awareness among policymakers and consumers** about the environmental and ecosystem benefits of extensive livestock farming, as well as its **positive impact** on the economy and rural areas. The initiative seeks to promote this farming model by influencing both consumers purchasing choices and public policies. All farms on the map have **passed a thorough certification process** by the Platform, which includes on-site verification of the information provided by farmers. The map ensures that the **animals’ main food sources are grass and forage** from local areas and that they are allowed to graze outdoors as much as possible, with stabling kept to a minimum. Animal **welfare and health** are central to these farms, which also play a role in preventing wildfires, supporting biodiversity, and sustaining rural economies.

The map shows the locations of PGEP-certified farms, and clicking on each location leads to a dedicated farm page with contact details, key information (such as species, breeds, grazing methods, and supplemental feeding), and links

²⁷ <https://elige.ganaderiaextensiva.org/>

²⁸ <https://www.entretantos.org/>

²⁹ <https://www.ganaderiaextensiva.org/>

³⁰ <https://elige.ganaderiaextensiva.org/mapa/>



to the farm's website, online store, or social media accounts. Each farm also receives a QR code linking to its page on the map. Furthermore, farms are regularly featured on the Platform's social media channels, including [Facebook](#)³¹, [Instagram](#)³², and [X](#)³³.

Type of ES	Description
Provisioning ES	The platform showcases farms producing high-quality, nutritious products like meats, cheeses, and dairy, emphasizing the nutritional value of extensive livestock products.
Regulating ES	Extensive livestock farming contributes to increased soil organic matter and maintains vegetation cover on poor soils, aiding in soil conservation and carbon sequestration.
Cultural ES	Elige Ganadería Extensiva supports the maintenance of emblematic landscapes and preserves cultural heritage, such as traditional livestock breeds and practices, strengthening cultural identity and tourism appeal.
Supporting ES	By using native breeds and adapting to local resources, extensive livestock farming maintains biodiversity and supports ecosystem balance.

Food traceability is essential for ensuring safety, quality, and transparency throughout the supply chain. It allows consumers to know the origin of their food, the production methods used, and the sustainability practices adopted. A great example of effective traceability is provided by the [Sociedade Agrícola do Freixo do Meio](#)³⁴, an agroecological farming community in Portugal. Since 1997, they have embraced **organic farming**, respecting natural soil fertility cycles, avoiding chemicals and GMOs, and promoting forest regeneration. Their [Community Supported Agriculture \(CSA\) program](#)³⁵, called "Food Sharing" operates through the independent project [Freixo Alimento](#)³⁶ and connects consumers directly with producers. Members subscribe to a **fixed-price share** and receive a weekly or bi-weekly basket of fresh, locally grown products. This **short supply chain model** ensures full transparency and direct engagement with the farm. Traceability is reinforced through organic certification (**Certiplanet PT-BIO-04**) and open access for members to visit and participate in farm activities. This strengthens trust and allows consumers to verify production practices firsthand. Traceability tools like CSA at Montado do Freixo do Meio provide a

³¹ <https://www.facebook.com/ganaderiaextensiva/>

³² https://www.instagram.com/plataforma_ganaderia_extensiva/

³³ https://twitter.com/ganad_extensiva

³⁴ <https://freixodomeio.pt/en/who-we-are/>

³⁵ <https://freixoalimento.com/programa-csa>

³⁶ <https://freixoalimento.com/>



sustainable model that supports local economies, enhances consumer awareness, and ensures food quality. These initiatives promote responsible production and consumption while fostering environmental and social sustainability.

Type of ES	Description
Provisioning ES	The CSA "Food Sharing" program offers fresh, organic food directly from the farm (vegetables, meat, dairy, and processed products). The farm also integrates silvopastoral systems, providing cork, honey, and traditional Montado products.
Regulating ES	The farm's agroecological model focuses on soil regeneration, organic farming, and forest restoration. This improves carbon sequestration, enhances soil fertility, and reduces erosion.
Cultural ES	Community involvement is central: members can visit the farm, take part in activities, and learn about sustainable farming. The farm also preserves Montado landscapes and traditional food heritage through its direct-to-consumer model.
Supporting ES	By avoiding chemicals and GMOs, the farm supports pollinators, native forests, and sustainable livestock integration, enhancing biodiversity and ecosystem resilience.

The [Pasture for Life](https://www.pastureforlife.org/where-to-buy/)³⁷ Certification [Mark](https://www.pastureforlife.org/trace-your-meat/)³⁸ ensures that meat and dairy products come from animals raised exclusively on pasture, without any grain or manufactured feeds. This certification promotes high animal welfare standards, environmental sustainability, and offers consumers products rich in nutrients. To enhance transparency, Pasture for Life provides a '[Trace Your Meat](https://www.pastureforlife.org/trace-your-meat/)' feature. By **scanning a QR code** on the product packaging, customers can access detailed information about the animal's origin, the farmer, and the farming practices employed. This tool fosters trust and allows consumers to make informed choices about their food sources. For those interested in purchasing certified 100% grass-fed meat, Pasture for Life offers a [directory of producers and retailers](#). This resource **connects consumers with suppliers** who adhere to strict pasture-fed standards, ensuring the integrity and quality of the products available. Incorporating these traceability tools, Pasture for Life not only guarantees product authenticity but also strengthens the relationship between consumers and producers, promoting a more sustainable and transparent food system.

³⁷ <https://www.pastureforlife.org/where-to-buy/>

³⁸ <https://www.pastureforlife.org/trace-your-meat/>



Type of ES	Description
Provisioning ES	Ensures high-quality, nutrient-dense meat and dairy from animals raised exclusively on pasture. The Trace Your Meat feature provides full transparency on the product's origin.
Regulating ES	Pasture-based farming enhances soil health, promotes carbon sequestration, and reduces soil erosion. Eliminating grain feed also lowers greenhouse gas emissions associated with feed production.
Cultural ES	Strengthens consumer-producer relationships through the Trace Your Meat tool and producer directory. The focus on grass-fed farming aligns with traditional, sustainable livestock practices.
Supporting ES	Grazing systems enhance biodiversity by maintaining species-rich pastures, supporting pollinators, and improving soil microbial activity. Eliminating grain feed reduces monoculture reliance, benefiting ecosystems.

The [Nahgenuss](https://www.nahgenuss.at/warum_nahgenuss/)³⁹ platform is an online infrastructure that connects consumers directly with certified organic farmers in Austria, facilitating the purchase of high-quality, ethically produced meat and fish. This direct-to-consumer approach not only ensures transparency and traceability but also supports sustainable agricultural practices. The platform allows for **direct purchasing**: Consumers select and order products directly from their chosen organic farmers, allowing them to know precisely where and how their food is produced. They ensure **animal welfare** with high standards often exceeding basic organic requirements. This includes the promotion of slow-growing and rare breeds, ensuring ethical treatment throughout the animals' lives. **Economic fairness** is another key principle: by eliminating intermediaries, Nahgenuss offers consumers competitive prices while ensuring that farmers receive a fair share of the profits, promoting economic sustainability within local communities. Moreover, products are delivered in kitchen-ready portions, often vacuum-sealed and labeled, making it convenient for consumers to store and prepare their purchases.

Nahgenuss's model aligns with several sustainability protocols:

1. **Short Supply Chains**: By connecting consumers directly with producers, the platform reduces the carbon footprint associated with transportation and storage, contributing to environmental sustainability;
2. **Support for Organic Farming**: All participating farmers are certified organic, adhering to practices that promote soil health, biodiversity, and ecological balance;

³⁹ https://www.nahgenuss.at/warum_nahgenuss/



3. **Promotion of Traditional Breeds:** By supporting the rearing of rare and slow-growing breeds, Nahgenuss contributes to the preservation of genetic diversity and cultural heritage.

Type of ES	Description
Provisioning ES	Connects consumers with certified organic meat and fish from local Austrian farmers, ensuring high-quality, ethically sourced food. The short supply chain model maintains freshness and reduces food waste.
Regulating ES	Supports organic farming practices that reduce chemical inputs, promote soil health, and enhance carbon sequestration. The short supply chain model minimizes emissions from transportation and storage.
Cultural ES	Encourages the preservation of traditional, slow-growing and rare breeds, which are part of Austria's culinary and agricultural heritage. The platform also strengthens local farming communities and consumer awareness of ethical meat production.
Supporting ES	Certified organic farms foster biodiversity, support nutrient cycling through regenerative grazing, and help maintain healthy soil ecosystems. Promoting rare breeds preserves genetic diversity.

3.2 Selected case studies: analysis and insights

3.1 Case study 1: White Oak Pastures (Will Harris) Savory Institute node in the USA

White Oak Pastures, a 3000-acre farm in Bluffton, Georgia, has been operated by the Harris family for five generations. Committed to **land stewardship and animal welfare**, the farm transitioned from industrialized agriculture back to **regenerative, holistic farming** in 1995 under Will Harris III. Rejecting conventional commodity-based production, they reinstated **multi-species rotational grazing**, built **on-farm USDA-inspected abattoirs**, and eliminated grain, hormone implants, and antibiotics. By 2000, they stopped using chemical fertilizers and pesticides, and in 2002, they sold their first pound of **American grass-fed beef**. Over time, they expanded to raise **10 species of livestock** and added **organic vegetable production**. Their commitment to sustainability led to **zero-waste farming**, where every part of the animal is utilized. They also developed **direct-to-consumer marketing**, avoiding commodity markets to sell high-quality, artisanal products under their own label.



White Oak Pastures is a recognized **Savory Hub**, employing **regenerative grazing techniques** that improve soil health, biodiversity, and carbon sequestration. Through the **Ecological Outcome Verification (EOV) program**, they collect data proving that holistic management benefits the environment, economy, and rural communities. With **120 employees**, the farm is the largest private employer in its county. White Oak Pastures serves as a model of sustainable agriculture, demonstrating that ethical farming can thrive while restoring ecosystems and supporting local economies.



Source: <https://blog.whiteoakpastures.com/blog/what-breed-cattle-herd>

3.2 Case study 2: Multi-species regenerative grazing at Polyface Farm (Joel Salatin)

Polyface Farm, a 200-hectare farm in Swoope, Virginia, is managed by Joel Salatin and his family. Since 1961, they have embraced an innovative, nature-based approach to farming, transforming degraded land into a thriving, regenerative agricultural system. Their methods include **direct marketing** (selling directly to consumers at the farm), **pasture-raised poultry**, and **grass-fed beef** using **holistic grazing techniques** inspired by Allan Savory. Livestock - including cows, pigs, chickens, turkeys, and rabbits - are raised outdoors in rotational grazing systems that enhance soil fertility, break pathogen cycles, and optimize grass utilization.

Polyface Farm **mimics natural ecosystems**, integrating different species and production systems to maximize efficiency and sustainability. Rather than simply copying nature, they design a self-sustaining model where each species expresses its natural behavior, contributing to the farm's overall health. Rejecting industrial food systems, Polyface **does not supply supermarkets or ship long distances**, instead selling to local restaurants and food vendors within a half-day's drive. Considered a



pioneer of regenerative agriculture in the U.S., Polyface Farm promotes a model that is emotionally, economically, and environmentally sustainable. The Salatin family invites others to adopt and refine these practices, expanding the impact of nature-based farming worldwide.



Source: Elizabeth Furgurson

3.3 Case Study 3: A public herd in Vilamòs

Vilamòs, a small village in the Valle de Arán, Catalonia, faces challenges common to many mountain areas: **rural depopulation, loss of traditional livestock practices, and increased wildfire risk due to poor land management.** The **Ovihuec.dat project** aims to address these issues through a **pilot initiative** that can be replicated in similar regions. The project, involving over **60 researchers from four research institutes**, focuses on **establishing a public herd of sheep and goats.** Unlike traditional livestock operations, this herd's primary role is not productivity but **environmental management**, helping to maintain landscapes, prevent forest encroachment, and reduce wildfire risks. Key objectives include:

- **Innovative herd management:** Using new technologies to improve animal welfare, assist shepherds, and attract younger generations to the profession.
- **Training a new generation of shepherds,** integrating modern tools with traditional knowledge.
- **Enhancing consumer connection:** Developing new ways to market meat and cheese while emphasizing the ecosystem benefits of these herds.
- **Measuring environmental impact:** Quantifying how grazing influences vegetation structure, wildfire prevention, and biodiversity.



Vilamòs will serve as a **"living lab"**, testing innovative methods to make mountain livestock farming **economically viable, environmentally sustainable, and socially valued**. By redefining the role of pastoralism, the project seeks to **revitalize rural communities and ensure the long-term health of mountain ecosystems**.



Source: <https://irtapirineu.cat/es/ovihuec-dat/>

4.0 Conclusions

4.1 Summary: lessons learnt on the key issue

- Differentiation is essential: not all livestock systems are equal; evidence-based distinguishing allows truly sustainable systems to stand out. This paper explored the different environmental benefits associated with specific livestock farming systems.
- Pastoral systems provide multiple ecosystem services (ES), including carbon sequestration, biodiversity conservation, and landscape maintenance. Yet, they are not fully acknowledged, as public perception is misaligned: negative views on livestock. Moreover, many benefits are not priced or recognized by markets.
- This calls for policy and market tools, like Payments for Ecosystem Services (PES), certification schemes, and traceability to enhance the value and visibility of sustainable livestock products.

4.2 Reflections on the level of maturity of solutions

Having integrated scientific research with practical case studies, some points emerged:

- Technically proven but unevenly implemented: practices like silvopastoralism and rotational grazing are **mature but not widespread**.
- Emerging certification tools: frameworks like ROC and "Pasture for Life" show strong potential but require **scaling and simplification for smallholders**.
- Policy mechanisms are evolving: the CAP and Green Deal support exists but **lacks fine-tuning for regional PLFS diversity**.
- Consumer engagement tools are growing (e.g., QR traceability, maps, storytelling), yet **consumer education remains a weak point**.
- Integration of ES into decision-making is conceptually mature but still lacks **standardized indicators and widespread application**.



5.0 Research needs from practice

5.1 Knowledge gaps

The gap between research and practical application needs to be bridged, especially regarding the differentiation of livestock products based on their environmental sustainability. While there is growing recognition of the ecological and economic importance of sustainable farming, **further research is needed to align scientific advancements with real-world agricultural practices.** The lack of clear differentiation between sustainable and unsustainable livestock systems contributes to public misperceptions, limiting consumer awareness and market incentives for environmentally responsible farming practices. To effectively address these knowledge gaps and provide evidence-based differentiation of livestock products, **research efforts** should focus on the following key areas:

- › **Consumer and market dynamics:** investigate the evolving preferences of consumers and market segments for environmentally friendly livestock products. Understanding ethical concerns and sustainability awareness can drive demand for products from regenerative and extensive livestock systems.
- › **Sustainability benchmarking:** develop a standardized EU-wide system for sustainability benchmarking on farms and food products, incorporating measurable indicators for biodiversity enhancement, soil regeneration, and carbon sequestration.
- › **Agroecology and circular economy:** assess the potential of agroecological principles and circular economy approaches in reducing the environmental footprint of livestock production, including the role of silvopastoral systems in ecosystem service provision.
- › **Trade-offs and synergies:** examine the trade-offs and synergies between farm profitability and environmental performance. This includes balancing carbon footprint reduction per kilogram of product with broader ecological benefits, such as habitat conservation and water quality improvement.
- › **Energy use in agriculture:** compare the use of fossil versus renewable energy in livestock farming, highlighting pathways to increase reliance on renewable energy sources while improving farm efficiency.
- › **SMART environmental indicators:** develop and implement SMART (Specific, Measurable, Achievable, Relevant, and Time-bound) indicators for environmental performance and control, ensuring they are easy to measure and understand by both farmers and consumers.
- › **Payments for Ecosystem Services (PES):** explore practical implementation strategies and upscaling methods for PES, facilitating financial incentives for farmers who contribute to ecosystem preservation and enhancement.
- › **Certification and Carbon markets:** assess the potential of certification schemes, carbon credits, and other financial mechanisms to support the economic sustainability of environmentally friendly livestock systems, linking them to CAP incentives and market-driven rewards.



5.2 Results from the Task Forces

The establishment of dedicated Task Forces focusing on regenerative and extensive livestock practices can provide valuable insights into the practical application of sustainable farming innovations. These groups can serve as knowledge hubs, where farmers, researchers, and policymakers collaborate to:

- › Develop practical tools and frameworks for farmers to adopt holistic management practices effectively.
- › Test and refine innovative techniques to enhance environmental and economic sustainability in livestock farming.
- › Promote knowledge exchange between scientific research and field experience, ensuring that innovations are both applicable and beneficial at the farm level.

5.3 Addressing advice gaps and effectively supporting livestock farmers' transition

A significant challenge in transitioning to more sustainable farming practices is the lack of accessible, practical advice tailored to farmers' needs. To bridge this gap, structured support mechanisms must be developed and strengthened.

Enhancing public support mechanisms

Public support mechanisms play a crucial role in facilitating the transition to sustainable livestock systems. Ensuring adequate funding through subsidies, grants, and technical assistance programs can lower the financial barriers to adopting new management practices. Additionally, aligning policy frameworks with sustainability goals by integrating environmental incentives into CAP measures and national agricultural policies can provide long-term security for farmers. Strengthening partnerships between research institutions, policymakers, and farmers can further streamline the adoption of best practices, making sustainability transitions more accessible and effective.

Ensuring economic viability of sustainable livestock

For sustainable livestock farming to be successful, it must also be economically viable. Research and promotion of business models that link ecosystem service provision to financial rewards - such as carbon markets, biodiversity credits, and sustainability certification schemes - can ensure that farmers are fairly compensated for their contributions to environmental sustainability. Market incentives must also be developed to differentiate sustainable livestock products, increasing their competitiveness among consumers. Engaging retailers and food processors in supply chain initiatives that prioritize sustainably produced livestock products can further strengthen the economic case for adopting environmentally responsible farming methods.



6.0 Ideas for OGs, innovative projects and bridging research, advice and practice

Research gap	Ideas for innovations/projects	Ideas for Operational Groups	(Desirable) outcomes expected
<p>Consumer and Market Dynamics: evolving preferences, and predominant ethical concerns</p>	<p>Consumer awareness campaigns: A project to educate consumers about the nutritional and environmental benefits of regenerative livestock products</p> <p>A platform to inform consumers about the environmental benefits of regeneratively raised meat, with traceable data on carbon sequestration, animal welfare and land restoration.</p>	<p>OG <i>"Enhancing consumer awareness of regenerative livestock farming"</i></p>	<p>Produce a detailed report based on data collected at EU level</p> <p>Steer demand for products from regenerative and extensive livestock systems</p>
<p>Sustainability Benchmarking: Develop a standardized EU-wide system for sustainability benchmarking on farms and food products, incorporating measurable indicators for biodiversity enhancement, soil regeneration, and carbon sequestration.</p>	<p>A Carbon Sequestration Certification Programme, on the blueprint of the Savory Institute's protocol to scientifically assess the environmental improvement that good grazing produces.</p> <p>It verifies the carbon sequestration achieved through regenerative grazing practices, providing ranchers with a tangible way to market their environmental benefits through voluntary carbon markets.</p>	<p>OG <i>"Harmonisation of indicators to measure biodiversity enhancement, soil regeneration, and carbon sequestration at EU-level"</i></p>	<p>A universal and comprehensive way to measure environmental benefits from extensive livestock product</p> <p>Provision of a fair and appropriate acknowledgment also through a correct allocation of value and price</p>



<p>Evaluate the potential of agroecological principles and circular economy approaches in reducing the environmental footprint of livestock production</p>	<p>Knowledge exchange platform on regenerative livestock farming</p>	<p>OG <i>“Evaluating agroecology & circular economy for sustainable European livestock”</i></p>	<p>Creating a reference data repository at EU level</p> <p>Acknowledgment of the role of silvopastoral systems in ecosystem service provision.</p>
<p>Trade-offs and synergies between farm profitability and environmental performance</p>	<p>A multi-actor project to assess and co-design livestock systems that optimize farm profitability and environmental performance by reducing fossil energy use, integrating renewables, and enhancing circular resource flows.</p> <p>Outputs include energy benchmarks, farmer guidelines, and policy recommendations for sustainable agri-energy transitions.</p>	<p>OG <i>“Agri-energy balance: comparing fossil vs. renewable energy in livestock farming”</i></p>	<p>Comprehensive energy use comparison in livestock farming.</p> <p>Practical guidelines for farmers to transition to renewable energy.</p> <p>Policy and funding recommendations to support energy sustainability in agriculture.</p>
<p>Energy use in agriculture compare the use of fossil versus renewable energy in livestock farming</p>	<p>Develop pilot models comparing fossil and renewable energy use in diverse livestock systems. Identify best practices and technologies to boost energy efficiency and integrate renewables.</p> <p>Deliver scalable strategies, cost-benefit analyses, and transition roadmaps to guide farmers toward low-carbon, energy-smart livestock farming.</p>	<p>OG <i>“RenewLivestock: operational strategies for energy-efficient and low-carbon livestock arming”</i></p>	<p>Spotlight on pathways to increase reliance on renewable energy sources while improving farm efficiency.</p>



<p>SMART Environmental Indicators: for environmental performance and control</p>	<p>Regenerative grazing trials: trials measuring the environmental benefits of regenerative grazing systems and their impact on soil health and carbon storage could be funded by the Task Forces</p>	<p><i>OG "Measuring the Environmental Benefits of Regenerative Grazing"</i></p>	<p>Possibility to carry out and compare the results of a large number of different regenerative grazing experiments</p> <p>Creation of indicators that are finally easy to measure and understand by both farmers and consumers.</p>
<p>Practical strategies and methods to implement and upscale Payments for Ecosystem Services (PES)</p>	<p>A website identifying local procedures in different areas of Europe with common features in the use of extensive herds to improve biodiversity, land use, and reduce risk of fires.</p>	<p><i>OG "Identification, valorisation and monetisation of Ecosystem Services provided by extensive grazing system"</i></p>	<p>Map and connect different initiatives at a similar scale in Europe that use herds for similar purposes</p> <p>Direct more financial incentives for farmers who contribute to ecosystem preservation and enhancement</p>
<p>Access to practical, science-based guidance on adopting sustainable livestock management systems.</p> <p>Beyond formal training, fostering farmer-to-farmer mentoring and regional knowledge-sharing initiatives to create valuable learning networks where experiences and best practices are exchanged</p>	<p>Living Labs serve as collaborative spaces where farmers, researchers, and industry stakeholders co-develop and test innovative farming approaches.</p> <p>These initiatives foster peer-to-peer learning, allowing farmers to exchange experiences and best practices directly.</p>	<p><i>OG "Creation of living labs on regenerative agriculture, soil regeneration, and holistic livestock management"</i></p>	<p>Living Labs promote collaboration between researchers, policymakers, and farmers to achieve sustainability goals and strengthen rural-urban ties, while AKIS (Agricultural Knowledge and Innovation Systems) supports the ongoing transfer and improvement of pasture-based agricultural practices.</p>



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