EIT Food

Co-funded by the European Union

Win-Wins for Environmental, Economic, and Social Sustainability in Beef and Dairy

A working report by EIT Food with input from a cross-sectoral expert group

www.eitfood.eu

Executive Summary

Sustainable Solutions for Environmental, Economic, and Social Win-Wins

This working report was initiated by an industry-led group of EIT Food Delivery and Strategic Partners focused on supporting the sustainability of European beef and dairy production through a One Health lens – connecting animal, environmental, and human wellbeing. The report was further strengthened through collaboration with cross-sector organisations, whose combined expertise refined practical, pre-competitive opportunities to deliver value across the supply chain.

Why It Matters

Livestock sectors face growing pressure to reduce emissions while improving animal welfare and remaining profitable. Unclear and fluctuating sustainability policies and incentives make it critical to align on credible, scalable solutions. This report identifies tangible pathways to support farmers while advancing environmental and social goals.

Key Themes for Systemic Progress

1. **Farmer Value:** Clearer incentives are needed to deliver sustainable practices, but misaligned policies and markets leave farmers bearing the cost of transition for a limited reward.

2. **Animal Health and Welfare:** Animal health practices sit at the intersection of One Health as they can prevent disease, reduce emissions, and enhance economic performance on farms.

3. **Data Reporting:** Standardised, farmer-friendly tools are critical to support measuring, reporting, and verification of sustainability outcomes.

Collaborative Areas

The working group identified several priority projects, including:

1. **Animal feed testing for greenhouse gas reduction**

2. **Farmer incentive scheme testing**

3. **Farmer upskilling on sustainable practices**

4. **Establish a One Health best practice advocacy group**

Together, these priority projects reflect the salient need to strengthen disease prevention, optimise feed management, and promote farmer-led best practices if we are to see a transition to more sustainable systems on beef and dairy farms.

Current and Future Actions

EIT Food is exploring partnerships to support and scale these projects. Sustained collaboration is essential to drive change and deliver One Health benefits across the sector. Join EIT Food Delivery and Strategic Partners to build fairer, greener, and more resilient livestock systems – together.

Alicia Abendroth, Project Lead, alicia.abendroth@eitfood.eu

Introduction

A Challenging European Sector

The beef and dairy sectors across Europe are facing increasing pressures to transition towards more sustainable systems. Climate change - driven largely by greenhouse gas (GHG) emissions - is intensifying extreme weather events such as droughts, floods, and heatwaves, which directly threaten food security and agricultural systems. Livestock farming is a major source of methane and nitrous oxide emissions, with enteric fermentation, fertiliser use, and manure management accounting for 96% of total agricultural GHG emissions.

At the same time, farms have the potential to act as a carbon sink, capable of capturing and storing carbon through sustainable practices such as improved soil management. As the European Union has committed to reaching net-zero emissions by 2050, the agricultural sector will need to play a pivotal role in achieving this goal. But while efficiency gains and low-emission livestock systems already exist in parts of Europe, implementation of these systems remains limited and uneven across regions and geographies.

Across Europe, livestock emissions and sustainability are already being tackled by a growing number of startups and initiatives. This includes carbon credits and feed additives designed to reduce emissions, and precision data systems on demonstrator farms that can assess sustainability interventions. However, adoption of programmes like these can be hindered by farmers facing reduced incentives or uncertain returns for sustainable practices. The transition to sustainable livestock systems is necessary and complex requiring aligned incentives, practical tools, and collaboration across the value chain.

Industry Opportunity

Animal proteins will remain essential for future diets, however, to achieve this we will need advancements in innovation and efficiency across the beef and dairy production value chain, all while supporting farmer livelihoods.

Using a One Health approach with the goal of recognising the interconnection between people, animals, and their shared environment, an industry working group supported EIT Food in identifying pre-competitive opportunities along the beef and dairy livestock value chains and ideated potential activities that prioritise both environmental and economic solutions.

In addition to a series of expert workshops, collaborative mapping, and desk research, this report builds on our previous work including Achieving Net Zero Targets in the Ruminant Livestock Industry in the UK and Ireland as well as A Net Zero Food System. This report sets out pan-European opportunities for delivering environmental, economic, and social win-wins in beef and dairy livestock, focusing on:

Farmer value and clear incentives to support sustainable transitions;

Animal health and welfare as the foundation for productivity and public trust; and

Data reporting to enable accountability, collaboration, and a path to farmer rewards

This report focuses on highlighting specific, actionable areas where pre-competitive collaboration can support systemic progress.

Methodology

Stakeholder Engagement

A series of sessions with the industry working group provided the foundation for the livestock value chain mapping as well as initial project ideation. A survey was used to prioritise key themes and activities. At an in-person workshop, participants from academia, research and advocacy groups expanded on the chosen prioritised topics to develop specific activities for the next steps in each project. The 22 expert organisations comprised of EIT Food Delivery and Strategic Partners from across the beef and dairy value chain who shaped this report are listed in Appendix A.

One Health Approach

There is a myriad of definitions of One Health, but all focus on the necessity of considering humans, animals, and the environment as interdependent. For example, the One Health Joint Action Plan, spearheaded by the Quadripartite Organisations (i.e., FAO, WHO, UNEP, WOAH), define One Health as:

"An integrated, unifying approach that aims to sustainably balance and optimize the health of humans, animals, plants and ecosystems. It recognizes the health of humans, domestic and wild animals, plants and the wider environment (including ecosystems) are closely linked and interdependent. The approach mobilizes multiple sectors, disciplines and communities at varying levels of society to work together to foster well-being and tackle threats to health and ecosystems, while addressing the collective need for clean water, energy and air, safe and nutritious food, taking action on climate change, and contributing to sustainable development."

In the beef and dairy sectors, this requires integration between livestock health, farm sustainability, nutritious food options for consumers, and economic resilience for farmers.

Framework: Value Chain Analysis

Framing and Rationale

Value chain analysis can be used to provide evidence of a food system's environmental impact and identify interventions to reduce this impact. For example, livestock value chain analysis can help quantify the environmental impact of beef and dairy production and illustrate the extent and nature of economic measures that may incentivise farmers to undertake additional sustainable actions. Furthermore, a value chain framework could support policy coherence in the EU, an outcome which is essential to engendering collaboration between different actors in the livestock supply chain as well as to encourage an intervention's long-term success. A beef and dairy value chain analysis would build on the contributions of the various players represented in the working group, serving as a valuable tool to guide continued collaboration and collective efforts.

This approach complements the One Health lens, which emphasises the interconnectedness of animal, environmental, and human health. By assessing sustainability within the structure of the value chain, the analysis highlights where coordinated action can produce the most impact.

MIRO Board Exercise

The value chain analysis framework was introduced to the working group to support the discussion and map stakeholder priorities. It provided a common language to connect farm-level interventions with value chain-wide incentives. Working group members used the framework to identify where One Health challenges and opportunities exist in relation to the beef and dairy livestock industry.

As part of the working group activities, "livestock buckets" in the value chain were created using a digital MIRO board. Five general value chain stages (i.e., inputs, production, processing, distribution, and retail) were populated when thinking about environmental sustainability, animal health and welfare, and social operations to ensure that a One Health lens was captured. Once this framework was in place, working group members mapped One Health interventions onto the various stages of the value chain. It also allowed participants to flag potential benefits and trade-offs of working across the supply chain, which laid the groundwork for developing initiatives that were integrated and collaborative. Initiatives were primarily clustered around inputs and production, as this is where the working group had the most expertise and thus saw the largest potential for impact. The identified value chain "buckets" are shown below as well as in Appendix B.

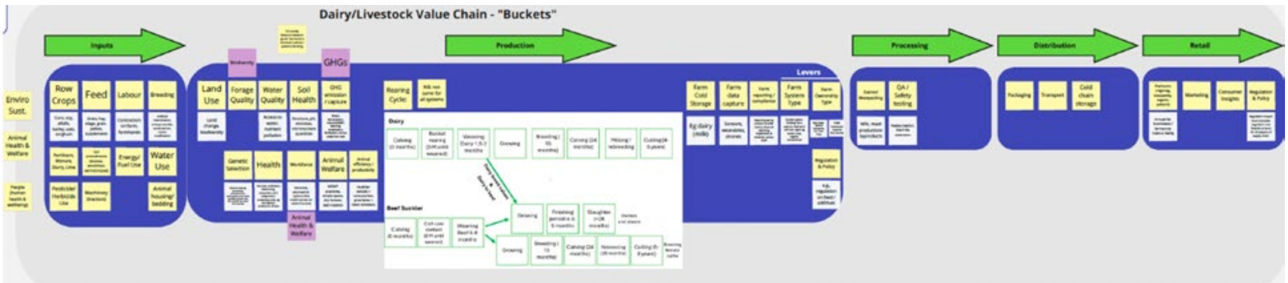

Image 1: A simplified model of beef and dairy livestock supply chain created in MIRO to identify points of impact.

By highlighting the interconnections between different stages of the value chain, this approach helped systematically identify pain points and opportunities for win-wins. This set the stage for the working group to identify cross-cutting themes and prioritise areas for collaboration.

One Health Across Regions

The application of a One Health approach within livestock value chains will differ between, and even within, countries. Tailoring initiatives to national and regional contexts is therefore essential. In many of our target countries, that is countries with numerous beef and dairy farms in Europe, substantial work is already underway. For example, the Sustainable Dairy Chain in the Netherlands demonstrates how using a regional lens can support the specific needs of local farms. While a regional lens is an imperfect heuristic, it offers a starting point in identifying where One Health opportunities can create impact.

One Health Themes

As a result of the industry working group sessions with EIT Food Delivery and Strategic Partners, three salient themes for achieving win-wins along the livestock value chain emerged:

1. Farmer Value,
2. Animal Health and Welfare, and
3. Data Reporting.

The themes demonstrated opportunities for both environmental and economic sustainability, in accordance with the One Health approach. For each theme, the specific barriers and potential opportunities were outlined.

Farmer Value

It is essential for projects to have a farmer-centric approach that creates solutions by farmers, for farmers. Ensuring farmer buy-in is vital for achieving long-term shifts in adopting sustainable practices that prioritise animal health.

Barriers

- Administrative burden of reporting required to access incentives is the responsibility of farmers
- Uncertainty around adopting new technologies to improve sustainability
- Limited understanding of political and economic drivers of current practices
- Lack of modelling to compare efficacy of different incentives
- Regional/country differences of incentives hinder scalability

Win-Wins

- Align incentive models to minimise data reporting burden on farmers
- Use results-based incentives to encourage accurate data collection
- Ensure data security and clarity on who uses farmer data
- Simplify data inputting with automated data integration and interoperability
- Illustrate how sustainable practices improve productivity, animal health, and economic resilience to foster farmer buy-in
- Map policy incentives/regulations to provide user-friendly resources for farmers
- Explore incentive payment programmes like New Zealand's Fonterra scheme which rewards higher prices for sustainably produced milk

Animal Health and Welfare

Advancing animal health through the prevention of diseases was identified as a major theme. This is pivotal for long-term sustainability in beef and dairy production and will have direct impacts on human and environmental health.

Barriers

- Insufficient emphasis on disease prevention and mitigation strategies across sectors, complementing traditional treatment-focused approaches
- Labour and skills shortages (e.g., loss of stockpersons able to spot sick animals)
- Insufficient investment in disease prevention strategies that deliver both productivity gains and improved animal welfare outcomes especially in low-margin production systems
- Difficulty linking animal health to sustainability benefits on an individual farm basis
- Low awareness of genetic tests and predictive tools for improving sustainability

Win-Wins

- Promote the economic and sustainability benefits of healthier animals through effective disease prevention that enhances productivity, animal welfare, and reduces emissions intensity and the need to use antibiotics
- Identify priority diseases and associated genetic traits to support breeding strategies for resistance and greater herd resilience, including through enhanced genetic diversity
- Precision livestock farming to monitor animal health and carbon footprint
- Identify key drivers that encourage the adoption of sustainable practices, while understanding and addressing the root causes of low uptake where they exist
- Emphasise prediction and prevention in animal health, not just treatment
- Explore genetic basis to improve productivity (e.g., growth rate/feed conversion rate, resilience, disease, susceptibility, fertility, lower methane emissions)
- Improve integration within beef and dairy supply chains
- Better understanding of One Health threats (e.g., zoonotic diseases and their impact on farmers and beyond)

Data Reporting

Accurate and accessible data reporting is crucial for driving sustainability in the livestock sector. However, solutions must strike a balance between avoiding overcomplicated data collection which can deter adoption and ensuring that the data gathered provides meaningful insights that can drive impact.

Barriers

- Lack of data access and portability
- Extreme focus on carbon emissions, with less focus on other metrics (e.g., other greenhouse gases, water, biodiversity, soil health)
- Poorly defined metrics for data reporting
- Burden on farmers to collect and submit data, and lack of trust in data protection
- Potential of carbon credits double-counting across sectors
- Low market price for carbon credits makes them irrelevant to small farmers

Win-Wins

- Adopt holistic perspective on emissions (e.g., not just carbon) and consider emissions from both food production and imports
- Capture comprehensive farm data (e.g., silvopasture, water sources)
- Model national feed constituents for enhanced supply chain security
- Use AI and external data (e.g., water stress, biodiversity surveys) to streamline data gathering, modelling and reporting, which in turn can support farmer incentives
- Develop tools to automate data collection

Collaborative Areas

After the identification of the three themes of farmer value, animal health and welfare, and data reporting, potential One Health activities were proposed. Before the in-person workshop, a survey was sent out to Delivery and Strategic Partners to collect feedback on which of these activities should be prioritised.

The prioritised activities include:

- Animal Feed Testing for Greenhouse Gas Reduction
- Farmer Incentive Scheme Testing
- Farmer Upskilling on Sustainable Practices
- One Health Best Practice Advocacy Group

The following section details the top four activities and includes the additional information that came out of the workshop itself.

Animal Feed Testing for Greenhouse Gas Reduction

Background

This project focuses on reducing greenhouse gas emissions from animal feed, while simultaneously enhancing livestock health and productivity. Barriers include labour shortages, cost pressures, and the complexity of linking individual farm practices to sustainability outcomes. Solutions such as genetic improvements targeting feed conversion rates and methane reduction can improve farm efficiency while incentivizing the adoption of low-emission feed strategies.

Key Activities

- Research alternative feed sources (e.g., willow, seaweed, grass-fed, additives)
- Assess quality of feed inputs and optimise pasture types
- Promote incentives with high ROI to help adoption of low-emission feed strategies
- Measure long-term impacts on animal health and the environment
- Research genetic improvements targeting feed conversion rates and methane reduction to enhance farm efficiency

Target Outputs

- Holistic best practice guide for improving animal health
- Assessment for dairy/cattle farmers focused on sustainability
- Diverse income opportunities for farmers

Farmer Incentive Scheme Testing

Background

This initiative aims to identify, test, and refine farmer incentive models that encourage sustainable practices while supporting farmers' economic resilience. Challenges include administrative burdens, uncertainty about new technologies, and difficulties scaling incentives across regions. This project seeks to implement results-based rewards and digital tools to help farmers with decision-making and reporting when it comes to incentive schemes.

Key Activities

- Map existing incentive schemes for feasibility across farm types
- Develop financial risk management tools and insurance mechanisms
- Link sustainability measurements to economic incentives (e.g., premium prices for sustainable production and better nutritional content)

Target Outputs

- Tested incentive model that supports farmer income and sustainability
- Insights into scalability across different regions and farm types
- Demonstration of premium prices from sustainably produced beef or dairy

Farmer Upskilling on Sustainable Practices

Background

Effective upskilling programmes are essential for helping farmers stay up to date with sustainable practices, as well as understanding the connection between sustainability and economic resilience. Barriers include time shortages and a limited awareness of the economic benefits of sustainability initiatives. Upskilling initiatives can focus on practices that offer economic returns, such as feed efficiency or regenerative grazing.

Key Activities

- Develop upskilling programmes for regenerative practices, and GHG reduction
- Support peer-to-peer learning and knowledge sharing both online and in-person
- Integrate One Health modules into agricultural schools through micro-credentials

Target Outputs

- Farmers trained in One Health practices
- Increased adoption of sustainable practices by farmers
- Enhanced farm resilience and productivity as a result of upskilling

One Health Best Practice Advocacy Group

Background

A key barrier to adopting sustainable practices is the complexity of the regulatory environment and the lack of accessible and up-to-date information. To address this challenge, an official think tank could advocate for best practices in the beef and dairy sectors. As advocacy and best practices can be applied to any topic, the following activities provide a starting point for how advocacy can complement and strengthen One Health projects.

Key Activities

- Create a Think & Do Tank to advocate for best practices and policy alignment
- Develop resources to simplify compliance with sustainability standards
- Engage stakeholders in scaling up successful implementation of best practices

Target Outputs

- Policy recommendations to incentivise sustainable practices
- Streamlined resources to support farmers in adopting best practices
- Offer leading reference point for evidence-based policy making, farmer advice, and advocacy

Projects for Future Consideration

In addition to the four priority activities, several other project ideas were discussed. While these projects did not receive enough support for immediate project development, they remain valuable ideas that could be developed further in the future. Below are some of the initiatives in which our partners expressed interest:

- **Disease Prevention:** Use animal health enablers for disease prediction and prevention to improve animal wellbeing and animal gut health.
- **Prevention Partnership:** Partnership between farms, research institutions, and industry to improve sustainability through the development and validation of new technologies (e.g., genomics for prediction and prevention).
- **Genetic Disease Prevention:** Genetic improvement to decrease illness and increase immunocompetence, production, and sustainability. Research to provide a link between the use of vaccines and animal efficiency.
- **Nutritional Assessment Project:** Focus on data-driven assessments to determine the nutritional benefits of regeneratively produced milk and beef.
- **Data Reporting and Eco-Scoring:** Benchmarking system to categorise and eco-score beef and dairy products to provide consumers with clear sustainability information while incentivising farmers to adopt sustainable practices.
- **Landscape Mapping:** Map animal protein value chain, including animal feed value chain.
- **Farm Management:** Practices to prevent disease incidence and reduce antibiotic use (e.g., vaccines, immunostimulants, nutritional additives).
- **Cost Measurement:** Quantify the cost of transition and viability of regenerative dairy, as well as how to fairly compensate regenerative dairy farmers.
- **Holistic Data Trial:** Use digital twin models to replicate farm conditions and generate key real-time performance indicators and inform data-based decisions. Assess end-use of data (e.g., for retail premiums, proof of compliance).
- **Soil Health:** Integrate soil health into One Health practices, such as the relationship between soil microbiomes and food nutrition.

Recommendations & Next Steps

The beef and dairy livestock sector is at a pivotal turning point in its journey towards sustainability, with the opportunity to drive systemic change through innovative, integrated solutions. Central to this transformation is the active engagement of farmers, whose participation and buy-in are crucial to ensuring lasting impact. Through using a One Health approach, we can create projects that address environmental, economic, and social sustainability. From the three themes of farmer value, animal health and welfare, and data reporting, we developed four prioritised projects, each of which already have formed consortia to continue advancing activities. Through these projects, we aim to support the adoption of One Health practices across Europe through demonstrating the technical and economic feasibility of shifting from conventional to sustainable beef and dairy farming systems.

Recommendations

Our report has identified the following recommendations to support holistic sustainability solutions in the beef and dairy livestock industry:

- Strengthen Disease Prevention: Investing in preventative veterinary care, early disease detection, and disease mitigation can significantly improve animal health, reduce the use of antibiotics, and lower greenhouse gas emissions as healthier and more productive animals produce fewer emissions.
- Optimise Feed Management: Implementing feed strategies that improve digestibility and reduce methane emissions and support animal health while enhancing farm efficiency. This includes the responsible use of feed additives, improved pasture management, and precision feeding technology.
- Promote Farmer-Led Best Practices: Sustainable and regenerative beef and dairy best practices must build on the knowledge and leadership of farmers. Regenerative approaches are important tools, but their success depends on adapting to local contexts and learning directly from farmer experience.

Next Steps

Following the workshops, EIT Food Delivery and Strategic Partners created consortia around the four prioritised projects and are currently planning the next steps to create impact through these projects. If you are interested in joining one of the prioritised activities, or wish to lead a different initiative, please don't hesitate to reach out.

Alicia Abendroth, Project Lead
alicia.abendroth@eitfood.eu

Regine Roncucci, Project Co-Lead
regine.roncucci@eitfood.eu

Vivien Bodereau, Net Zero Mission Lead
vivien.bodereau@eitfood.eu


2611
2611
2686
2615

Appendices

Appendix A: Working Group Members

The Working Group is comprised of EIT Food Delivery and Strategic Partners.

Core Contributors

abp, Carbery, Queen's University Belfast *, zoetis, Cargill

Additional Contributors

Agricultural University of Athens, BGI, Ceva, Food4Sustainability, Institute of Animal Reproduction and Food Research, NEIKER, Rikolto, StMELF, UK Agri-Tech Centre, University of Helsinki, University of Novi Sad, Wageningen University, Yasar University

Appendix B: Value Chain Buckets

Inputs: Resources or components going into the beef and dairy farm systems

Environmental Sustainability

Row crops (corn, soy, alfalfa, barley, oats, sorghum), feed (grass, hay, silage, grain, pellets, supplements), water use, fertilisers/manure/slurry/lime, pesticide use, soil amendments (biochar, woodchips, vermicompost)

Animal Health & Welfare

Animal bedding/housing, genetic selection (genomic screening for productivity/health/growth rate/feed conversion rate, resilience, disease susceptibility, fertility, lower methane emissions), breeding (artificial insemination, embryo transfer, sexed semen, rumen modification)

Operations

Labour (contractors on farm, farmhands), machinery (tractors), energy/fuel use

Production: Processes to raise productive and efficient livestock on farms

Environmental Sustainability

Land use (land change, biodiversity, circularity), forage quality, water quality (access to water, nutrient pollution), soil health (structure, pH, microbes, micronutrient quantities), GHG emissions/capture (enteric fermentation, manure management, leaching, volatilisation, fertilisation, nitrous oxide from soils)

Animal Health & Welfare

Tools for preventative health (potentiation of specific and non-specific immune responses through vaccines or other immunostimulants, colostrum feeding as crucial factor for calf rearing to guarantee passive immunity transfer (PIT) of antibodies), tools for disease detection and treatment (diagnostics/screening tools, antibiotics, antiparasitics), animal efficiency/productivity (healthier animals consume less, grow faster, and lead to lower emissions), workforce (vet access, education/systems that enable access), welfare (welfare management practices, ample space, dry hooves, stall rotation)

Operations

Cold storage (e.g., milk storage), data capture (e.g., sensors, wearables, drones), reporting/compliance (e.g., reporting per kg product, financial reporting, scheme inspections, carbon auditing)

* Special appreciation is extended to Shannon Maguire McLaughlin from Queen's University Belfast for their outstanding input throughout the drafting process of the report.

Rearing system interlinked between dairy and beef farms

- Farm systems: suckler, finishing, pasture, feed yard, calf-cow, regenerative agriculture (e.g., cover crop), organic, conventional
- Farm ownership: sole ownership, general partnership, LLC, co-op

Upstream Support

Regulation/policy (e.g., regulation on feed/additives), investment (e.g., provided vs initial investment required from farmer)

Processing: Actions to process livestock into market-ready beef and dairy products

Operations

Dairies/meatpacking (e.g., milk and meat production/byproducts), quality assurance & safety testing (e.g., pasteurisation, shelf-life extension)

Distribution: Logistics, storage, and transportation to move beef and dairy products through the supply chain to buyers

Operations

Cold chain storage, packaging, transport

Retail: Beef and dairy products made available for purchase in various markets

Operations

Marketing, premiums (organic, regenerative agriculture, pasture – premiums a must for businesses to make sustainable practices a reality, but retail prices already at highest)

Upstream Support

Consumer insights, policy/regulation (translate regulation into feasible actions for all stakeholders in supply chain)

Co-funded by the European Union

About EIT Food

EIT Food is the world's largest and most dynamic food innovation community. We accelerate innovation to build a future-fit food system that produces healthy and sustainable food for all.

Supported by the European Institute of Innovation and Technology (EIT), a body of the European Union, we invest in projects, organisations and individuals that share our goals for a healthy and sustainable food system. We unlock innovation potential in businesses and universities, and create and scale agrifood startups to bring new technologies and products to market. We equip entrepreneurs and professionals with the skills needed to transform the food system and put consumers at the heart of our work, helping build trust by reconnecting them to the origins of their food.

We are one of nine innovation communities established by the European Institute for Innovation & Technology (EIT), an independent EU body set up in 2008 to drive innovation and entrepreneurship across Europe.

Find out more at www.eitfood.eu

Follow us via social media

Design: FisherPaul