



THE DAIRY ROADMAP CLIMATE AMBITION: **SUPPORTING UK NET-ZERO**

Founded in 2008, The Dairy Roadmap acts as a cross-industry approach to the setting of targets and driving progress on the environmental ambitions and commitments made by the UK dairy sector.

Led jointly by AHDB, Dairy UK and the National Farmers Union and with the support of Defra and other industry stakeholders, its aim is simple - to improve the environmental sustainability of the UK dairy sector whilst ensuring the continued prosperity of the industry, and the provision of safe, affordable, nutritious and sustainable produce for years to come. To deliver this The Dairy Roadmap aims to establish a series of industry ambitions, goals and commitments spanning the full spectrum on environmental sustainability.

A recent materiality study concluded that reducing GHG emissions, minimising the sector's impact on climate change and identifying the UK dairy sectors contribution towards Net Zero is a key priority of The Dairy Roadmap. This paper considers the contribution dairy can make towards delivering this goal, through the development of a Climate Ambition within the Dairy Roadmap that delivers on the following key principles:

- To act as an umbrella initiative to the UK dairy sector
- To set the direction of travel and identify an ambitious future for the dairy sector.
- To set goals or targets following evidence / science-based methodologies.
- To identify pathways to reduce GHG emissions within the dairy sector
- To allow flexibility for individual companies/businesses to deliver this ambition on their timeframe or terms.
- To remain flexible to changes in policy and science

EXECUTIVE SUMMARY

The Dairy Roadmap Climate Ambition outlines our intent to support the globally recognised goal to limit global temperature rise to 1.5 °C, and the UK government's commitment to Net-Zero by setting a minimum standard for improvement across the industry. Whilst not every farm or company within the UK dairy sector will be able to deliver Net Zero, as a whole the UK dairy sector must play its role in supporting the delivery of Net Zero and all parts of the industry must work together to secure a sustainable and low-carbon future for the dairy sector.

A detailed delivery programme has been identified including the following key actions:

1. Set targets for reduction in total dairy sector emissions aligned with our ambition to limit global warming to below 1.5°C and to support UK Net Zero. These targets must be set in accordance with aligned science-based methodologies and guidance.
2. Confirm a robust GHG footprint for UK dairy and establish a framework for widespread measurement and collation of dairy farm environmental data including GHG footprint.
3. Develop a set of dairy sector KPI's linked to GHG emissions. These alongside accompanying guidance will be used to support wider measurement and improvement.
4. Conduct a modelling exercise on the dairy farm of the future, to better understand the changes required by UK dairy farms to move towards a low-carbon future.

BACKGROUND

Dairy & Climate Change

In the United Kingdom agricultural emissions are placed at 10% of the nation's GHG footprint, with the dairy farming emissions estimated to account for less than 3% of the total footprint, a small fraction compared to other sectors such as Transport (27%), Energy (21%), Business (17%) and Residential (15%)^{1,2}.

Globally speaking, dairy contributes around 3.4% of the total global emissions³, however, the UK dairy sector is rightly recognised as a global leader in low carbon dairying with the carbon footprint of UK milk placed at 1.25 kg CO₂e per litre only 43% of the global average⁴.

The latest available data shows that the largest proportion of UK dairy emissions, have been attributed to emissions from enteric fermentation (45%) and from feed (28%). Beyond this 11% of emissions are linked to fertilisers, 10% to manure handling, 4% to energy production and the remaining 2% to other sources⁵.

It is clear that dairy-related emissions are attributed to a variety of sources and greenhouse gases, and it is important to bear in mind that the relative life cycles and warming potential of these gases differ when considering options to address the climate impact of dairy.

Reducing Dairy Emissions

Although some would wrongly claim reducing dairy production is the only way to address the sector's greenhouse gas footprint, in reality, there are many options available to drive further reductions in dairy related emissions that do not compromise the inclusion of nutritious dairy products within UK diets.

On-farm, improvements in productivity and resource efficiency have the potential to deliver sizeable reductions in emissions. In many cases, these improvements can be delivered through the uptake of known technology and shift towards industry best practices in animal health and welfare, feeding, fertiliser application and wider on-farm management practices.

Beyond productivity gains, more far-reaching emissions reductions will likely rely on the introduction of new technologies and novel management practices that would see dairy farmers take further steps towards farmers for low-carbon outcomes. Frequently cited opportunities include those in feed additives and genetic selection; however, wider reductions could be possible through more wholesale shifts towards circular and resource-efficient farming practices.

In processing, improvements in energy efficiency, decarbonisation of fuel sources, improved management of heating and cooling networks, and shifts towards lower carbon transports can help to deliver a reduction in post farm gate emissions. Additional improvements in resource efficiency and waste management including the reductions in food waste, and a shift towards more sustainable packaging will also help to lower the footprint of the overall product.

Finally, where emissions cannot be reduced options such as offsetting, insetting (investment in GHG emissions-reducing activities within the direct sphere of influence of the business) and carbon removals can help to deliver a low carbon future for dairy.

¹ Defra, 2019 UK greenhouse gas emissions: summary

² National Atmospheric Emissions Inventory

³ FAO & GDP, Climate Change and the Global Dairy Cattle Sector

⁴ NFU: <https://www.nfuonline.com/nfu-online/sectors/dairy/mythbuster-final/>

⁵ AHDB, Farm Excellence Platform

NET ZERO & DAIRY

The 2015 Paris agreement commits countries to limit rises in global temperature to well below 2°C, and preferably below 1.5°C. In support of this goal, the United Kingdom has set a target to deliver Net Zero GHG emissions by 2050.

This commitment by the UK government has contributed to growing pressure to define the role that each sector can make towards delivering Net-Zero. Whilst several sectors and companies have set ambitions to deliver Net Zero emissions by 2050 or sooner, it is important to recognise that the journey to Net Zero will not be the same for all sectors and that contributions and speed may vary in the delivery of the UK's overall ambition for Net Zero. In particular, nuance is required when considering the contribution of agricultural sectors, such as dairy. The varied life cycles, sources and solutions associated with the different greenhouse produced by the dairy sector, pose challenges for the delivery of a sector-wide Net Zero commitment.

Whilst the term Net Zero is frequently applied to all GHG's, the distinction of different GHG's is increasingly recognised by IPCC. In July 2021, in its contributions to the IPCC 6th Assessment Report, IPCC Working Group I concluded: *"limiting human-induced global warming to a specific level requires limiting cumulative CO₂ emissions, reaching at least net zero CO₂ emissions, along with strong reductions in other greenhouse gas emissions."* For methane they note that *"Strong, rapid and sustained reductions in CH₄ emissions would also limit the warming effect resulting from declining aerosol pollution and would improve air quality"* with net zero emissions recognised as a distinct goal⁶

With this in mind, the Dairy Roadmap Ambition Group considered a range of options for its future Climate Ambition, each of which presents its benefits and challenges to the sector.

- I. **Net Zero Carbon:** A strategy focused only on CO₂ emissions, whereby these would be brought to zero through emissions reduction or otherwise offset through CO₂ removals.
- II. **Net Zero Emissions:** A strategy considering all greenhouse gas emissions (CO₂e), whereby these are brought to zero through emissions reduction or otherwise offset by GHG removals.
- III. **Net Zero Warming:** A strategy focused on the impact of GHG emissions, this would aim to limit or halt the sector's contribution to temperature increase.

Existing Commitments

Many within the UK sector ranging from the National Farmers Union to individual dairy companies have already demonstrated clear commitments towards climate action and delivering Net-Zero. The formation of a Dairy Roadmap Climate Ambition is not intended to replace or disrupt these commitments, but rather provide overarching commitment to support these ambitions, and spur further commitment and action within the dairy sector. Outside the UK, the Dairy Roadmap also recognises commitments and actions taken on a global level and aims to consider how global perspectives and commitments can inform our ambitions.

As an overarching umbrella strategy for the UK dairy sector, the Dairy Roadmap Climate Ambition must represent a vision for all dairy stakeholders both today and in the future. As such we recognise that the scope and priorities of individual stakeholders can vary, however, this does not detract from the overall ambition to deliver a more sustainable and low-carbon future for the UK dairy sector.

Outstanding Questions & Dual Accounting

Beyond existing commitments, several outstanding questions continue to influence the scope and approach to climate action taken by different dairy stakeholders. Key debates include the consideration of carbon sequestration and soil carbon, the use of offsets, and differences in the emissions factors and other methodologies used for accounting such as the distinction between GWP* and GWP¹⁰⁰.

The Dairy Roadmap Climate Ambition recognises these perspectives and will adopt dual accounting as a central principle. This will enable us to meet the demands of current emissions accounting, whilst remaining flexible to changes in policy and science. This approach will provide the dairy industry with the ability to adjust or accelerate its ambition in accordance with changing perspectives.

⁶ IPCC, Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change

Wider Sustainability

The Dairy Roadmap Climate Ambition forms a central pillar of The Dairy Roadmap's wider strategy which considers the full spectrum of environmental sustainability. Whilst the Climate Ambition focuses specifically on the steps dairy can take to address its climate impact, The Dairy Roadmap recognise that sustainability does not exist in silos and that there are numerous interconnection and trade-offs between climate action and wider environmental sustainability topics including:

- **Soil & Nutrient Management**
- **Biodiversity**
- **Air Pollution**
- **Resource Management**
- **Animal Health & Welfare**

The Dairy Roadmap plans to expand on each of these, through the review of existing commitments and where necessary the adoption of new ambitions or goals.

PROPOSAL: THE DAIRY ROADMAP CLIMATE AMBITION

Through the Dairy Roadmap Climate Ambition the dairy sector aims to support the delivery of Net Zero within the United Kingdom, whilst recognising the challenges faced by the dairy sector and acknowledging the need for flexibility in the approach for livestock agriculture.

Our ambition aligns with the globally recognised goal to limit global temperature rise to 1.5 °C, setting a minimum standard for improvement across the industry. It recognises that whilst not every farm or company within the UK dairy sector may be able to deliver Net Zero, as a whole the UK dairy sector must play its role in supporting the delivery of Net Zero and all corners of the industry must work together to secure a sustainable and low-carbon future for the dairy sector.

By focusing our ambition on temperature rise and in line with the latest evidence from the IPCC, we aim to deliver a strategy that can deliver ambitious commitments whilst accounting for the varied emissions profile of the dairy sector.

- **For carbon dioxide (CO₂):** to achieve at least net-zero emission by at latest 2050. This approach must be evidence-led and driven by emissions reduction.
- **For methane (CH₄) and nitrous oxide (N₂O):** to maintain sustained reduction in emissions and to maintain a positive and improving contribution to tackling climate change from 2025 to 2050, with an ambitious target and time plan determined by data and evidence.
- **For F-gases:** to eliminate where feasible the use of fluorinated gases within the dairy supply chain, shifting towards natural refrigerants with lower global warming potential (GWP).

Carbon Sequestration and Offsets:

Although the focus of the Dairy Roadmap Climate Ambition is placed firmly on driving emissions reductions within the sector, it also recognises that carbon sequestration, insetting and offsetting will be essential to the delivery of overall net-zero emissions.

Both carbon sequestration and carbon insetting provide valuable tools to balance emissions by taking advantage of the innate potential of soil and the wider farm landscape. These present a unique opportunity to provide holistic benefits through sustainable farm management and farmers and processors must be able to reap the reward of their actions and account for emissions made on their land or under their influence.

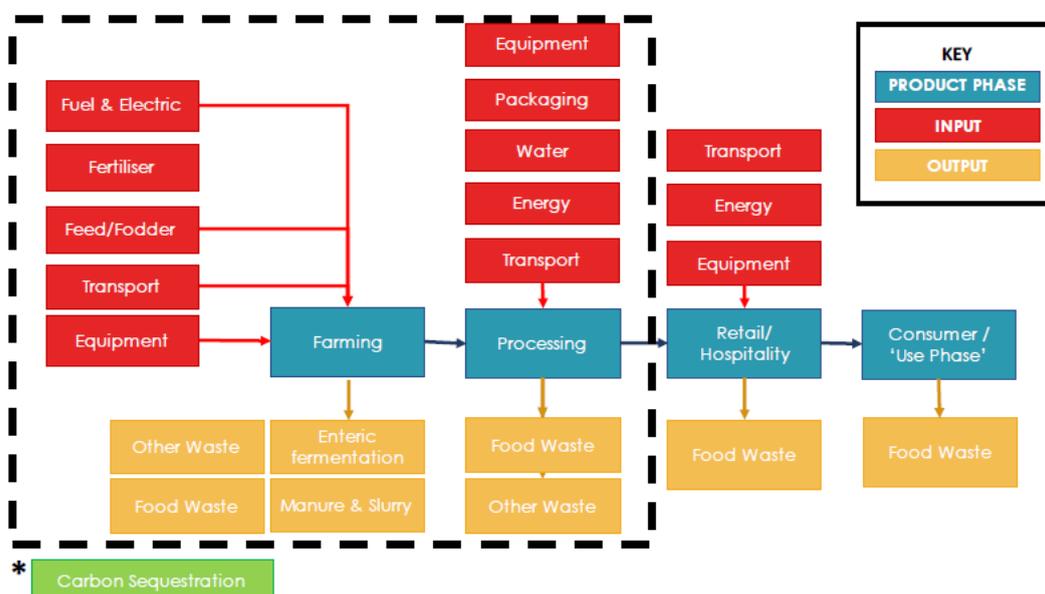
Alternately caution is needed with carbon offsets, which should not be viewed as a license to emit and should be used as an opportunity to balance emissions which the sector is otherwise unable to eliminate through improvements in productivity, technology and wider emissions reductions strategies.

Scope & Boundaries

The Dairy Roadmap proposes to establish clear scope and boundaries to the planned Climate Ambition, built on the following key principles:

- **UK wide:** To encompass the entire United Kingdom and with this the large variety of farm systems and types, dairy processing plants, and dairy categories.
- **Farm to Factory Gate:** To encompass emissions attributed to dairy farming and dairy processing (see figure 1). Important sources of dairy-related emissions driven by consumer behaviour (e.g. food waste) are to be considered under separate industry ambitions.
- **Direct & Indirect Emissions:** To include full scope 1,2 and 3 emissions, that is to say, direct emissions from owned and controlled sources, indirect emissions from the generation of purchased energy and also all other indirect emissions occurring within the value chain including but not limited to emissions linked to ingredients, animal feed and fertiliser.

Figure 1. The proposed scope and boundaries for the Dairy Roadmap Climate Ambition.



Data Measurement & Assurance

To ensure the Dairy Roadmap Climate Ambition reflects industry best practices, it is proposed to align this initiative with existing tools and frameworks used within the dairy sector to measure and account for environmental impact. Key examples include:

- Dairy Product Environment Footprint Category Rules (PEFCR)
- ISO 14001
- GHG Protocol

In addition, the Dairy Roadmap Climate Ambition would encourage the assurance of collected and report data to ensure validity and reliability.

CLIMATE AMBITION DELIVERY PROGRAMME

The Dairy Roadmap proposes a detailed delivery programme of projects and initiatives to supports the delivery of the Dairy Roadmap Climate Ambition. This programme would include projects to identify specific industry targets and goals, update industry baselines, and promote data collection and best practices.

- **Targets for reductions in total dairy sector emissions.**
The Dairy Roadmap will set targets for reduction in total dairy sector emissions aligned with our wider ambition to limit global warming to below 1.5°C and to support the delivery of UK Net Zero.

To ensure confidence in the sectors commitments these must be guided by science and based on robust data and baselines. To deliver this we will:

- Identify appropriate science-based methodologies and guidance for setting emissions reductions targets for the dairy sector in line with our ambitions (e.g. the SBTi approach).
- Set targets against a revised industry-wide baseline
- Set targets in line with an agreed scope and boundaries for the dairy sector
- Include the development of an industry emission reduction pathway, including targets.

➤ **GHG Footprinting & Data Collection**

The Dairy Roadmap will confirm a robust GHG footprint for UK dairy, and establish a framework for the widespread measurement and collation of dairy farm environmental data including GHG footprint.

As part of this ambition, the Dairy Roadmap would seek to update existing figures for the GHG footprint of milk drawing on existing data and assessments currently conducted within the UK dairy sector. We would aim to repeat this at regular intervals

Beyond this, The Dairy Roadmap would establish a longer-term framework for the measurement and collation of dairy environmental data. This data could be used to inform and report against long terms targets for the reduction in GHG emission and improvement in the wider environmental footprint.

This work would be led through a designated Dairy Roadmap working group and would aim to align with existing industry guidance (e.g. Dairy Sustainability Framework). Key target areas for data collection include:

- GHG Footprint
- Animal Health
- Manure and Fertilizer
- Biodiversity & Soil
- Water
- Feed

➤ **Dairy Key Performance Indicators (KPI)**

The Dairy Roadmap will support the development of a series of dairy sector KPI's linked to GHG emissions. These alongside accompany guidance will be used to support wider measurement and improvement.

The development of KPIs and proxies for dairy farming (e.g. *Fuel, Fertiliser, Feed, Fertility*) and dairy processing (e.g. *renewable energy, packaging, food waste*) will provide farmers and processors with an opportunity to understand, measure and benchmark a wide range of factors linked to their environmental and carbon footprint

Through the development of supporting guidance on the implementation of best practices, farmers and processors will be provided tools to support a reduction in dairy emissions.

The Dairy Roadmap would also aim to monitor and report trends on KPI uptake, implementation and performance.

➤ **Dairy Farms of the Future**

To conduct a modelling exercise to understand future scenarios in the dairy sector and what changes will be required by UK dairy farms to move towards a low-carbon future.

By modelling the changes required across a range of dairy systems and farm types of the dairy sector, we would aim to identify the key drivers and barriers to delivering greenhouse gas emissions reduction within the sector and how different farms will be affected. In addition, this would aim to identify practices, strategies and other innovations that could support the reduction in farm GHG emissions long term transition.

This work would aim to provide insights to support guidance and wider farm communication and the actions required to deliver The Dairy Roadmap Climate Ambition.