



THE UK DAIRY ROADMAP

SHOWCASING 10 YEARS OF
ENVIRONMENTAL COMMITMENT



SUMMARY OF ACHIEVEMENTS AND TARGETS

DAIRY PROCESSORS

CLIMATE CHANGE & ENERGY

Key Achievements & Commitments since 2008:

- 18% improvement in industrial energy efficiency.
- Commitment to the UK Industrial Decarbonisation & Energy Efficiency Action Plan.
- Widespread elimination of HCFC refrigerants.
- Action to increase fuel efficiency, and phase out inefficient engines across dairy transport and freight networks.

Future Targets:

- 2020 - 15% improvement in energy efficiency.
- 2025 - 30% relative reduction in carbon related to energy use at processing sites.

WATER

Key Achievements & Commitments since 2008:

- 23.4% improvement in industrial water efficiency.
- 56% reduction in the relative COD load of discharged effluent.
- 17.5% improvement in effluent efficiency.

Future Targets:

- 2020 - 20% relative reduction in water bought onto site.
- 2020 - 20% reduction in Chemical Oxygen Demand (COD) in pre-primary treatment effluent.
- 2025 - 30% relative reduction in net water brought onto site.

LANDFILL

Key Achievements & Commitments since 2008:

- 95% of ex-factory waste sent to recovery or recycling.
- Only 4% of ex-factory waste is sent to landfill.

Future Targets:

- 2020 - Zero ex-factory waste sent to landfill.

PLASTIC & PACKAGING

Key Achievements & Commitments since 2008:

- 85% of HDPE milk bottles are currently recycled.
- 31% peak recycled content in HDPE milk bottles.
- >95% tertiary packaging is reused or recycled.
- 80% FSC assured carton board.

Future Targets:

- 2020 - 50% recycled material in HDPE milk bottles, or its carbon equivalent reduction.
- 2020 - All tertiary packaging to be reusable or recyclable.
- 2020 - 100% of paper based cartons to be FSC labeled.
- 2025 - Improve the design of dairy packaging to eliminate unnecessary single use plastic, maximize recycled content and improve the recyclability as appropriate, while minimising carbon impact.

FOOD WASTE

Key Achievements & Commitments since 2008:

- Under the Courtauld Commitment Dairy UK has pledged to reduce the waste associated with food by 20% between 2015 and 2025.
- 2/3 of the food not destined for the final consumer is used via alternative valorisation pathways.
- 14% of the food not destined for the final consumer is sent to landfill or down the drain.

Future Targets:

- 2020 - 20% relative reduction in Chemical Oxygen Demand (COD) in pre-primary treatment effluent.
- 2025 - 30% reduction in food waste from site in line with the EU Fusions food waste definition.
- 2025 - Increase in product and packaging design features that help prevent consumer food waste.

BIODIVERSITY

Key Achievements & Commitments since 2008:

- Dairy UK Biodiversity Strategy for Dairy Processors.

Future Targets:

- 2025 - Dairy processors to enhance and promote action to improve biodiversity.

DAIRY FARMERS

CLIMATE CHANGE & ENERGY

Key Achievements & Commitments since 2008:

- 24% decline in GHG emissions associated with the production of milk between 1990 and 2015.
- 70% of dairy farmers currently take action to reduce GHG emissions.
- 43% of dairy farmers currently produce or use renewable energy.

Future Targets:

- 2020 - 30% reduction in GHG (including carbon dioxide, methane and nitrous oxide) emissions from dairy farms between 1990 and 2020.
- 2020 - 40% of energy used on dairy farms is from renewable resources.
- 2025 - 90% of dairy farmers implementing technologies/practices to reduce emissions from agriculture.
- 2025 - 85% of farmers using expert advice to optimise feed plans, which is directly linked to reduced emissions.

WATER

Key Achievements & Commitments since 2008:

- 2012, 78% of farmers implemented water efficiency methods (58% in 2010).
- Nutrient and Manure management plans are held by 73% and 89% of dairy holdings respectively, helping to minimise water pollution.

Future Targets:

- 2020 - 100% uptake of water use efficiency measures.

WASTE

Key Achievements & Commitments since 2008:

- 85% of dairy holdings currently taking action to reduce GHG emissions are recycling waste material from farm.
- Farmers are required to use registered waste carriers under the Red Tractor Assurance Scheme.

Future Targets:

- 2020 - 70% of non-natural waste is recycled or recovered as standard practice.

BIODIVERSITY

Key Achievements & Commitments since 2008:

- At its peak 70% of agricultural land was in agri-environmental schemes.
- Under the Campaign for the Farmed Environment 30,000km of hedgerows and 37,000 km of grass margins have been planted.
- 2025 - Dairy farmers to enhance and promote action being taken to improve biodiversity

SOIL

Key Achievements & Commitments since 2008:

- 85% of dairy farmers regularly test soil for nutrient content and 88% for pH level.
- Nutrient and Manure management plans are held by 73% and 89% of dairy holding respectively.
- 81% of dairy farmers take action to reduce stocking rates when fields are excessively wet.

AIR QUALITY

Key Achievements & Future Aspirations:

- Ammonia emissions from agriculture decreased by 19% between 1990 and 2015 and with the exception of ammonia and PM2.5, emissions of all pollutants continued to decrease in 2015.
- The UK met its target set under the National Emission Ceilings Directive to reduce ammonia emissions from 2005 levels by 2010 and has committed to reduce ammonia emissions from 2005 levels by 8% by 2020 and 16% by 2030.

FOREWORD

Over the past decade, the Dairy Roadmap has demonstrated the commitment of the entire British dairy sector towards environmental sustainability and has provided a template replicated around the world to improve the environmental impacts associated with the production of milk and dairy products.

This, the 10th anniversary report highlights the vast strides that have been taken both on farms and in dairies since the Dairy Roadmap was founded. Together, the British dairy sector has reported a marked improvement in its environmental footprint, not only reducing the emission of greenhouse gases, waste, and other pollutants but also improving the efficiency at which it consumes water, energy, and other resources.

Crucially the Dairy Roadmap recognises that there is no endpoint to environmental sustainability, and led by Dairy UK, the NFU, and AHDB the entire supply chain continues to set ambitious targets for improvement that draw from the ever-changing sustainability agenda.

In addition to celebrating the success of the past 10 years, this edition of the Dairy Roadmap looks to the future and considers the role of the Dairy Roadmap in delivering broader environmental commitments both in the United Kingdom and globally.

In 2017 the Dairy Roadmap signed the Dairy Declaration of Rotterdam, and in doing so recognised the role that the dairy industry can play in the delivery of the UN Sustainable Development Goals.

Domestically, we work closely with a number of stakeholders such as Red Tractor and WRAP to maintain and develop environmental standards, and through the ambitious targets of the Dairy Roadmap have set strong foundations to help deliver the government's 25 Year Environment Plan.

The progress we have made over the last decade has been immense, but we will continue to challenge ourselves and evolve to ensure that the British dairy supply chain remains world leading in environmental sustainability.

Paul Vernon
Chairman of Dairy UK
Chairman of the Dairy Roadmap

“The Dairy Roadmap aims to improve the environmental footprint of the UK dairy sector whilst ensuring the continued prosperity of the industry, and the provision of safe, nutritious, and sustainable produce for years to come.”

DR JUDITH BRYANS
CEO of Dairy UK
President of the International Dairy Federation

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THE DAIRY
ROADMAP

AIMS

The Dairy Roadmap prides itself on the longstanding commitment it has made to delivering environmental improvement across the entire dairy supply chain. To help achieve this, three strategic aims have been developed as a means to verify the ambition and the progress of The Dairy Roadmap.

- 1 To improve the environmental footprint of the entire dairy supply chain.
- 2 To strive for environmental best practice, innovation, and compliance.
- 3 To maximise the social and economic benefits for the UK dairy sector from these improvements.

The Dairy Roadmap is a cross-industry initiative that brings together participants from the entire dairy supply chain including farmers, dairy manufacturers, and industry partners. Together, the British dairy industry has made a commitment to set targets and produce regular reports on the progress it is making to reduce its environmental footprint.

Evolution and change have been a part of The Dairy Roadmap since its inception. First published in 2008, the then Milk Roadmap was developed as a way to monitor, improve and report the environmental impacts of producing liquid milk. Over the past decade, and the publication of further reports in 2009, 2011, 2013 and 2015, The Dairy Roadmap has expanded to include all dairy products, setting new and ambitious targets that reflect the evolving environmental challenges faced by the entire dairy supply chain.

This 2018 report celebrates the 10th anniversary of The Dairy Roadmap, and the extraordinary progress made by the industry over the last ten years. Whilst this report recognises the environmental credentials of the UK dairy industry, it also acknowledges that there is always room to improve. We have therefore reviewed and where necessary amended the targets for 2020 and 2025, to reflect the growth in our ambitions.

This report also looks to the future. It will explore the next steps in The Dairy Roadmap's evolution, and consider how it aligns with national commitments and global sustainability initiatives such as the Dairy Sustainability Framework and the United Nations Sustainable Development Goals.

There is no end point, no finish line on sustainability and through The Dairy Roadmap, we remain committed to improvement at all stages of the dairy supply chain.

10 YEARS OF PROGRESS

Over the past decade, The Dairy Roadmap has reported environmental improvements across the entire dairy supply chain. These achievements have been driven by ambitious and wide-reaching targets set for five-yearly intervals.

As the Dairy Roadmap has evolved and developed each set of targets has pushed for further improvement, ensuring that success remains incentivised and that the Dairy Roadmap remains at the forefront of the sustainability agenda.

Whilst our work is far from complete, the achievements of the past ten years stand testament to the hard work and commitment taken across the entire supply chain to improve our environmental footprint. On farms and in dairies the industry has taken action to improve the way we use resources and to minimise the impacts that the production of milk and other dairy products has on the environment.

AREAS OF FOCUS

The Dairy Roadmap focuses on a broad range of environmental themes including:

CLIMATE CHANGE & ENERGY

WATER

WASTE & RECYCLING

SOIL

BIODIVERSITY

AIR QUALITY

The performance of the supply chain against targets set for these topics is explored in the following chapter. Unless otherwise specified, a base year of 2008 is used to measure improvement against these targets.

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DAIRY
PROCESSORS

Since 2008 UK dairy processors have monitored their environmental performance on an annual basis through The Dairy UK Environmental Benchmarking Report. To date, processors have made substantial improvements against the targets of the Dairy Roadmap, with notable success in the areas of energy efficiency, effluent and waste management. In recent years The Dairy Roadmap has introduced targets to help combat emerging issues such as food and packaging wastes.

2015 DAIRY PROCESSOR TARGETS

- 1. Every large processing site will have in place an Environmental Management System (EMS) covering carbon, energy, waste, effluent, waste and packaging, with all permitted sites progressing to an externally verified EMS by 2015.
- 2. Small sites to be investigating EMS.
- 3. All major processing companies to be implementing a carbon management programme.
- 4. A 20% relative reduction of water brought onto site.
- 5. To achieve a 20% relative reduction in Chemical Oxygen Demand (COD) load in discharge effluent.
- 6. Zero ex-factory waste to landfill, where environmentally advantageous, for all large processing sites.
- 7. Three Anaerobic Digestion (AD) plants at Dairy Roadmap sites.
- 8. 30% recycled material in high density Polyethylene (HDPE) milk bottle.
- 9. Remove all hydrofluorocarbons (HCFC'S) at all large processing sites.
- 10. 80% of paper based cartons to be Forest Stewardship Council (FSC) labelled.
- 11. A biodiversity strategy for processors to be written and to be in the process of implementation.
- 12. All major processing companies to be part of the Freight Transport Association's (FTA) Logistics Carbon Reduction Scheme or to commit to equivalent fuel efficiency targets.
- 13. All major Dairy Companies to have phased Euro4 engines.

2020 DAIRY PROCESSOR TARGETS

- 1. 15% improvement in energy efficiency.
- 2. 20% relative reduction in water brought onto site.
- 3. 20% relative reduction in Chemical Oxygen Demand (COD) in pre-primary treatment effluent.
- 4. Zero ex-factory waste sent to landfill.
- 5. 50% recycled material in HDPE milk bottles, or its carbon equivalent reduction.
- 6. All tertiary packaging to be reusable or recyclable.
- 7. 100% of paper based cartons to be FSC labeled.

2025 DAIRY PROCESSOR TARGETS

- 1. 30% relative reduction in carbon related to energy use at processing sites.
- 2. 30% relative reduction in net water brought onto site.
- 3. 30% reduction in food waste from site in line with the EU Fusions food waste definition.
- 4. Dairy processors to enhance and promote action to improve biodiversity.
- 5. Dairy industry to develop and implement an industry standard for Environmental Sustainability training.
- 6. Improve the design of dairy packaging to eliminate unnecessary single use plastic, maximise recycled content, and improve the recyclability as appropriate, while minimising carbon impact.
- 7. Increase in product and packaging design features that help prevent consumer food waste.

- Target Met
- On Track
- Further Work Required

CLIMATE CHANGE & ENERGY

Key Achievements & Commitments since 2008

- 18% improvement in industrial energy efficiency.
- Commitment to the UK Industrial Decarbonisation & Energy Efficiency Action Plan.
- Widespread elimination of HCFC refrigerants.
- Action to increase fuel efficiency, and phase out inefficient engines across dairy transport and freight networks.

Future Targets

- 2020 - 15% improvement in energy efficiency from the base year (2008)
- 2025 - 30% relative reduction in carbon related to energy use at processing sites

Improvement in energy efficiency is the primary area used by The Dairy Roadmap to monitor the reducing carbon footprint of dairy processors.

At present over 90 dairies across 60 companies have signed Climate Change Agreements (CCA) with the UK government, committing to improve their industrial energy efficiency. The results of the most recent reporting period (2015-2016) show that since 2008 the sector has achieved an 18% improvement in energy efficiency¹, exceeding both the 13.6% commitment negotiated with the government for Phase II of the CCA and also The Dairy Roadmaps target for 2020. This success has also translated into economic benefits with performance under the Climate Change Agreements estimated to have saved the industry in excess of £25 million since 2008.

Building upon their strong track record for energy efficiency improvements, dairy processors have pledged to go one step further, and by 2025 have committed to significantly reduce the carbon emissions (CO₂) associated with the production of milk and other dairy products.

Key to achieving this target will be improved research & development, innovation and the adoption of cleaner and greener fuels. The sector is already taking action to achieve this aim and has pledged its commitment to collaborate with government and the wider food and drink sector through the Industrial Decarbonisation and Energy Efficiency Roadmap project. The recently published Food & Drink Action Plan (2017) highlights a number of actions agreed by dairy processors. Future targets of the Dairy Roadmap will draw from this Action Plan as well wider commitments made by industry and government, and in doing so ensure that the UK dairy sector continues to aim for a low carbon future.

Industrial Decarbonisation & Energy Efficiency Action Plan: Food & Drink Sector²

- 1 Increase collaborative Research & Development undertaken by the Food & Drink sector.
- 2 Increase the adoption of state-of-the-art (SAT) technologies.
- 3 Improve the food and drink sector's awareness of existing funding and finance options for both mature energy efficiency and decarbonisation technologies.
- 4 Increase the supply of STEM (Science Technology, Engineering & Math's) graduates with the skills and knowledge needed to deliver a low-carbon future for the food and drink sector.
- 5 Identify additional opportunities for using bioenergy in the food and drink sector to lower carbon emissions and improve resource efficiency.
- 6 Identify and implement industrial heat recovery projects that realize benefits for the sector.

Our commitment is not limited to energy efficiency and decarbonisation, and dairy processors recognise the role they can play in reducing a variety of greenhouse gases and other air pollutants.

The Dairy Roadmap has pushed the industry to remove ozone-depleting hydrochlorofluorocarbon (HCFCs) refrigerants from use by the end of 2015, and at most sites, these have now been replaced by less damaging HCFs or natural ammonia based refrigerants. Similarly, the impacts of transport-related emissions have also been addressed with the 2015 targets challenging all major processing companies to commit to fuel efficiency targets, and phase out the use of Euro4 engines in their delivery fleets³.



Case Study:

ARLA AYLESBURY THE NET ZERO CARBON DAIRY

Arla is proud that from October 2017, the Aylesbury Dairy became net zero carbon, realising that original goal, and becoming the first large liquid milk dairy in the world, of its size, to achieve this astonishing result.

Delivery of this goal was not simple, and we were required to push new boundaries in the design and construction of the site. Energy-hungry processes were challenged and, for example, equipment normally requiring considerable quantities of compressed air was changed to electrical motor driven actuation. Likewise, the need for pumping was minimised, with pipework using swept curves to reduce back pressures and silos for milk being raised to take advantage of the free power of gravity.

Combined heat and power (CHP), has proven key to the delivery the zero carbon strategy. Powered in part by the anaerobic digestion of site effluent, the energy centre produces 4MW of electricity, which is used to partially power the factory and a further 4.2MW of heat.

Where possible, the site is optimised for efficiency making use of free cooling and heating. The heat generated from CHP is reused in the factory to minimise the carbon emissions of the process, whilst the plants large cooling load supplied by ammonia chillers produce up to 8 megawatts of waste heat. Similarly hot water is also supplied to the steam generator to minimise the need for additional energy to produce steam.

To mitigate the carbon used by the gas in the CHP plant and the additional electricity supplied from the grid, Arla worked with a third party to locate a food waste biogas plant close to the site, which produces the balance of the energy required by the dairy. In addition to supplying 90% of the energy used by the site, the anaerobic digestion plant also reduces waste disposal costs.

WATER

Key Achievements & Commitments since 2008

- 23.4% improvement in industrial water efficiency.
- 56% reduction in the relative COD load of discharged effluent.
- 17.5% improvement in effluent efficiency.

Future Targets

- 2020 – 20% relative reduction in water bought onto site
- 2020 – 20% reduction in Chemical Oxygen Demand (COD) in pre-primary treatment effluent

Within dairy processing, water is primarily used to clean equipment, however, other uses include heating and cooling as well as pasteurisation and homogenisation of milk. Although the upstream manufacturing process represents a comparably small proportion of the total 'water footprint' of dairy products⁴, it is not an insignificant amount, and dairy processors recognise the need for effective water management and efficiency to sustainably meet the water demands of the dairy industry.

WATER USE EFFICIENCY

Since 2008, processing sites have reduced their relative water consumption by 23.4%, improving from 1.37 litres of water per tonne of input to 1.05. Although the current results show a substantial improvement in water efficiency, it was initially anticipated that at this point further improvement would have been achieved. The slower rate of progress is explained by previously anticipated technological breakthroughs in water re-use and recycling failing to materialise or mature. Furthermore increases in the number of products produced at each site have resulted in an increased need for CIP and therefore water³.

Nonetheless, a broad range of measures have facilitated these improvements including reduced freshwater abstraction, water mapping projects, rainwater harvesting, reverse osmosis, optimised Cleaning in Place (CIP) systems, as well as improvements in on-site practices, employee engagement and leak repair.

WATER QUALITY

The processing of milk and dairy products produces waste and by-products that potentially pose a threat to water quality. Chemical Oxygen Demand (COD) is used by dairy processing sites to assess the level of organic compounds (principally milk) present in water, and therefore acts as an indicator of water quality. Since 2008 a number sites have installed onsite effluent treatment plants, optimised technology and reviewed management practices with the aim of minimising the impact of effluent. As a result of these actions, the relative COD load of the effluent discharged from site has fallen by 56% since 2008, whilst raw effluent efficiency (m³/tonne input) has improved by 17.5%⁵.

Looking to the future, the Dairy Roadmap now targets a reduction in the COD level before primary treatment. In doing this, the industry aims to reduce reliance on water treatment and prevent the problem at its source. This will also provide an indication of the food wastage at processing.



Case Study:

MULLER - WATER REUSE AT BRIDGWATER AND DROITWICH

As one of the most efficient dairy businesses in the UK, Müller Milk & Ingredients recycles wastewater at two of its largest processing facilities. There are two reasons for this. Firstly, we care about our impact on the environment and, secondly, we already feel the impact of climate change. Extreme weather patterns have put significant strain on the water supplies in a number of regions in England so we have seized the opportunity to improve the sustainability of the business.

Opened in 2008, our Bridgwater facility treats waste-water to better than bathing water standards, which allows discharge to a local river. In 2011, the addition of a Reverse Osmosis (RO) plant means the site can treat around 300,000L per day to drinking water standards for re-use. This reduces reliance on local water supplies and serves to enhance biodiversity in the local water-course.

The RO technology was first introduced in early 2011, allowing around 200,000 litres of water leaving Bridgwater's onsite effluent treatment plant to be recycled and reused. This installation has been expanded and is now providing over 50% of the water required by the dairy, which has an annual production of around 500 million litres.

The Reverse Osmosis technology uses a membrane to remove 99% of residual COD, dissolved salts and bacteria from the treated wastewater, producing water of quality at least equal to the mains supply. The low-pressure membranes and high-efficiency pumps make it one of the most energy-efficient plants on the market. Recycled water is used across the dairy for everything, from cleaning the filling lines to pasteurising the milk.

Not only is this super-efficient but it significantly reduces the need to draw water from the local water supplies. We have since commissioned a similar system in the Droitwich Spa facility, which recycles over 500,000L of water a day. These two facilities combined account for 60% of the group's total water consumption.

WASTE & RECYCLING

As with other manufacturing industries, the disposal of waste represents one of the greatest contributors to the overall environmental footprint of the dairy sector.

Considering this the targets of the Dairy Roadmap were set to promote a pathway towards the minimisation of waste, movement up the waste hierarchy⁶, and where possible the transition towards closed loop or circular production systems.

LANDFILL & RECYCLING

Key Achievements & Commitments since 2008

- 95% of ex-factory waste sent to recovery or recycling.
- Only 4% of ex-factory waste is sent to landfill.

Future Targets

- 2020 - Zero ex-factory waste sent to landfill.

The Dairy Roadmap has long advocated against the disposal of waste to landfill in favour of the re-use, recovery, and redistribution or recycling of waste and since its inception, there has been a marked change in the disposal of the waste generated from processing sites.

In 2016, a record 95% of all waste generated on site was either recovered or recycled, rising from 65% in 2008⁵. The proportion of waste to landfill has decreased by a similar margin from 35% to 4% since 2008.

PLASTIC & PACKAGING WASTE

Key Achievements & Commitments since 2008

- 85% of HDPE milk containers are currently recycled (58% average for plastic bottles).
- 31% peak recycled content in HDPE milk bottles achieved in 2014.
- >95% tertiary packaging is reused or recycled.

Future Targets

- 2020 - 50% recycled material in HDPE milk bottles, or its carbon equivalent reduction.
- 2020 - All tertiary packaging to be reusable or recyclable.
- 2020 - 100% of paper based cartons to be FSC labeled.
- 2025 - Improve the design of dairy packaging to eliminate unnecessary single use plastic, maximize recycled content, and improve the recyclability as appropriate, while minimising carbon impact.

In recent months, the impacts that packaging and in particular plastic have on the environment has drawn increased public interest, and both the UK and its devolved governments have announced legislation and policy with the aims to reduce litter, increase recycling and eliminate all avoidable plastic waste. Although this issue has only gained widespread attention relatively recently, The Dairy Roadmap has long held targets aimed at reducing the impact that packaging waste and single-use plastic has on the environment.

Dairy products and in particular milk, boast some of the most recycled and reused packaging of all consumer products, with 85% of HDPE milk bottles currently recycled compared to the 58% average for plastic bottles^{7,8}. As dairy products are typically consumed at home, they also do not significantly contribute to litter. On-site >95% of all tertiary packaging used (pallets, cardboard boxes and shrink wrap) is currently reused or recycled⁵.

Dairy processors have also demonstrated a commitment to maximising the recycled content and sustainability of the materials they use. As of 2015, at least 80% of all carton board was FSC assured^{9,10}, and the industry recently achieved a peak of 31% recycled content in HDPE milk bottles.

Recycled Content in HDPE Milk containers

In 2009, the first milk container to include up to 15% recycled High-Density Polyethylene (HDPE) was introduced. Off the back of this, The Dairy Roadmap set the ambitious target to achieve 30% by 2015, a feat that was achieved in 2014 with 31% recycled material in HDPE milk containers¹¹.

In the past few years, there has been a severe reduction in the capacity of food-grade recycled HDPE producers. As a result, the current level of recycled material in HDPE milk containers have regressed to around 25%^{5,7} and it will be a challenge to achieve the targeted 50% by 2020.

Despite this setback, the dairy sector remains committed to reducing the impact that packaging and in particular plastic has on the environment. Outside of increasing the recycled content of milk containers, as a result of updated container design, reductions in weight and a change in raw materials, we expect to achieve the carbon equivalent reduction.

Despite significant progress, The Dairy Roadmap recognises the profound impact that food and drink packaging and in particular plastic can have on the environment. In response, we have reviewed our existing targets calling on dairy processors and industry stakeholders to invest in packaging innovation and review the design of dairy packaging.

The new targets take a holistic approach to the role of packaging in dairy products, requiring processors to not only maximise recycled content and improve recyclability but to also where possible reduce or even eliminate unnecessary and problematic plastic packaging. The industry is also challenged to quantify the wider impact of packaging innovations (e.g. carbon, food waste) to ensure that these do not promote unintended and environmentally damaging consequences.

FOOD WASTE

Key Achievements & Commitments since 2008

- Under the Courtauld Commitment Dairy UK pledged in 2015 to reduce the waste associated with food and drink manufacture by 20% between 2015 and 2025.
- 2/3rd of the food not destined for the final consumer is used via alternative valorisation pathways.
- Only 14% of the food not destined for the final consumer is sent to landfill or down the drain.

Future Targets

- 2020 - 20% relative reduction in Chemical Oxygen Demand (COD) in pre-primary treatment effluent since 2008.
- 2025 - 30% reduction in food waste from site in line with the EU Fusions food waste definition since 2015.
- 2025 - Increase in product and packaging design features that help prevent consumer food waste.

Tackling food waste has emerged as a key aim of The Dairy Roadmap. In 2016, roughly 37% of the produce not destined for the final consumer met the EU Fusion definition of food waste, and of this, the vast majority was sent to anaerobic digestion or biogas production (23.2%), with only 14% sent to landfill or down the drain. The remaining 63% of 'waste' was recovered or recycled via alternative valorisation pathways namely; Animal feed (39%), redistribution (16%) and other by-products (8.5%)⁵.

Definition of Food Waste.

As defined by EU Fusions¹², "Food waste is any food, and inedible parts of food, removed from the food supply chain to be recovered or disposed (including composted, crops ploughed in/not harvested, anaerobic digestion, bio-energy production, co-generation, incineration, disposal to sewer, landfill or discarded to sea)".

Under this definition by-products including animal feed, or food sent for redistribution are not considered food waste. By basing targets on the EU Fusions food waste definition sites are challenged to recognise the full extent of waste and encouraged to divert surplus away from waste disposal. This also aligns with the definitions established by Courtauld 2025 and the SDG Champions 12.3¹³

The 2020 target draws from external initiatives such as The Courtauld Commitment 2025¹⁴ and challenges dairy processors to reduce the food waste produced on site by 30% from 2015 to 2025. This target also sets the foundations for the delivery of SDG Target 12.3 which aims for a 50% reduction by 2030¹⁵.

To help deliver our goals, the measurement and reporting of food waste is currently being reviewed with the aim to provide a consistent approach to track performance against targets. A key challenge moving forward will be to ensure that dairy companies are able to monitor this information.

Expanding these ambitions, we have developed a new target that aims to tackle the significant challenge of reducing food waste in the home – which is the point in the value chain where the biggest wastage of dairy products occurs. Householders discard around 370,000 tonnes of milk, cheese & yogurt annually (7-9% of purchases)¹⁶. The reasons for this range from not using products in time, to serving too much.

Reducing food waste in the home is a complex challenge and one that needs action from many different stakeholders. Dairy processors have an important role to play by making it as easy as possible for householders to make the most of their purchases. The industry have recently published guidance¹⁷ on the top actions to help reduce food waste in the home through changes to products, packaging, date labels and storage advice and will work with WRAP to track the uptake of good practice and to estimate the food waste savings from taking these actions.

BIODIVERSITY

Key Achievements & Commitments since 2008

- Dairy UK Biodiversity Strategy for Dairy Processors.

Future Targets

- 2025 - Dairy processors to enhance and promote action to improve biodiversity.

The Dairy Roadmap recognises that opportunities for improvement are not limited to farms and that action should be taken at all stages of the supply chain to improve biodiversity.

To help achieve this Dairy UK has developed a biodiversity strategy that calls on dairy processors to recognise the role they can play and implement effective actions. By 2025 processing sites are challenged to implement the actions of this commitment and in doing enhance and promote action that will improve biodiversity.

ENVIRONMENTAL MANAGEMENT

Key Achievements & Commitments since 2008

- >90% of large processing sites have an Environmental Management System (EMS) in place.

Future Targets

- 2025 - Dairy industry to develop and implement an industry standard for Environmental Sustainability training.

Environmental sustainability is key to long-term success of the dairy industry and the continued provision of safe and nutritious produce for years to come.

To this end, the dairy industry plans to develop guidance for environmental sustainability training within processing facilities, with the aim to further embed sustainability and the values of The Dairy Roadmap within the cultures and practices of all dairy companies.

Dairy UK Biodiversity Strategy¹⁸

- Develop and implement appropriate measures on site that make a contribution to enhancing biodiversity These may include but not be limited to:

Complementary planting using native species;

Erecting nesting facilities for birds where not contrary to food hygiene/safety requirements;

Allowing natural regeneration;

The removal of native species;

Avoidance of light pollution in wildlife sensitive corridors

- Alternatively sites will endeavor to engage in biodiversity projects in their local communities. These may include but not be limited to:

Working with local conservation groups/NGOS

Working with local schools (tree planting, education days etc.)

Clean up operations in the local area

- Moderate the impacts on biodiversity where possible in the ways that sites use energy and water, dispose of waste and run their transport operations.

Case Study:

BLACKMORE VALE DAIRY THE CHILLSTORE

In late 2016, BV Dairy opened, a 1000 pallet chillstore. The over-riding design ethos of the building was to minimise the environmental impact by challenging every design decision.

The volume of the chillstore was minimised, whilst still maintaining a safe and efficient workflow, by utilising very narrow aisle (VNA) wire-guided forklifts. The insulation of the walls and ceiling was increased by 50% and airlocks with additional rapid-rise doors were used to isolate the chilled environment from the outside.

Once the building had been isolated from the external environment, the internal sources of heat were tackled. All of the lighting is PIR-controlled LED, which ensures these are active for the minimum time and therefore utilise the lowest amount of energy and heat.

A low Global Warming Potential (GWP) refrigerant was used, together with smart controllers that have enabled the energy demands to be minimised. Floating head pressure, EC fans, inverter controls and liquid sub-coolers are used on the compressor systems; this ensures that the system operates at the optimum parameters relative to the ambient conditions and allows significant energy reductions when the ambient temperature is below 10 °C.

The evaporators inside the chillstore incorporate EC fans and smart controls. Defrost intervals have been minimised and the fans stop operating when the room temperature has been reached. This reduces the energy required to operate the fans and also the heat generated by the fan motors. The entire refrigeration system is continuously monitored by BV Dairy's SCADA system and further optimisation of the defrost setup has been possible as a result of this monitoring.

The roof of the building was optimised for solar photovoltaic panels from the outset. The maximum roof area was orientated towards the South West. A 220kW array was activated in early 2017 and this has been contributing, alongside BV Dairy's existing CHP set linked to the anaerobic digester, to the on-site electricity demands. Overall, it is estimated that the chillstore energy demand will be less than the energy generated by the roof-mounted solar panels, meaning that the building will be self-sufficient for electricity.



3

DAIRY
FARMERS

Under The Dairy Roadmap dairy producers set targets for 2020 and 2025 to help demonstrate the action that is being taken on farm to help protect and minimise the impact of dairy production on the environment. The targets set included commitments to reduce greenhouse gas emissions and improve energy efficiency, water usage and waste management. Early indications have shown that advances are being made on a number of these targets, showing the willingness and determination of producers to achieve these environmental ambitions.

2015 Dairy Farmers Targets

- 1. 90% of dairy farmers are actively nutrient management planning
- 2. 65% of dairy managed farmland in environmental stewardship schemes
- 3. 70% uptake of water use efficiency measures
- 4. 10-15% of dairy farmers investigating and/or implementing at least one form of renewable energy
- 5. 50% of dairy farmers implementing new developments and/or technologies to reduce emissions from agriculture
- 6. Declining trend in serious pollution incidents on-farm
- 7. Dairy farmers encouraged to calculate carbon footprints and implement carbon reduction plans

2020 Dairy Farmers Targets

- 1. 30% reduction in GHG (including carbon dioxide, methane and nitrous oxide) emissions from dairy farms between 1990 and 2020
- 2. 70% of non-natural waste is recycled or recovered as standard practice
- 3. 100% uptake in water use efficiency measures
- 4. 40% of energy used on dairy farms is from renewable resources

POST 2020

Significant developments such as the UK's decision to leave the European Union, our commitment to ambitious new initiatives like the Dairy Declaration and the publication of a new agricultural GHG inventory in 2018 reinforce the need to review our existing 2025 targets to ensure they remain measurable are in line with our current environmental and socio-economic commitments.

We propose to undertake this review over the next couple of years to ensure that our contribution to the Dairy Roadmap remains ambitious and relevant to the range of sustainability challenges ahead.

One platform through which the targets will be reviewed is the Dairy Environmental Issues Group (DEIG). An NFU led initiative, this group was set up in 2017 to help drive positive change and promote the environmental achievements of the dairy sector. The group meets at regular intervals to identify, discuss and propose solutions to the environmental challenges facing the industry.

2025 Targets:

- 1. 90% of dairy farmers implementing technologies/practices to reduce emissions from agriculture
- 2. 85% of farmers using expert advice to optimise feed plans, which is directly linked to reduced emissions
- 3. Dairy farmers to enhance and promote action being taken to improve biodiversity

- Target Met
- On Track
- Further Work Required

CLIMATE CHANGE & ENERGY

Key Achievements & Commitments since 2008

- 24% decline in GHG emissions associated with the production of milk between 1990 and 2015.
- 70% of dairy farmers currently take action to reduce GHG emissions.
- 43% of dairy farmers currently produce or use renewable energy.

Future Targets

- 2020 – 30% reduction in GHG (including carbon dioxide, methane and nitrous oxide) emissions from dairy farms between 1990 and 2020.
- 2020 – 40% of energy used on dairy farms is from renewable resources.
- 2025 – 90% of dairy farmers implementing technologies/practices to reduce emissions from agriculture
- 2025 – 85% of farmers using expert advice to optimise feed plans, which is directly linked to reduced emissions

Under the 2008 Climate Change Act the UK pledged to a reduction of 80% in greenhouse gas (GHG) emissions by 2050 (compared to 1990 levels). The agricultural sector as a whole has a large role in meeting these targets and dairy farmers are playing their part.

In 2015, agriculture accounted for 9.4% of total UK emissions of greenhouse gases, a slight rise in the 7% reported in 1990. Despite the proportional rise, absolute GHG emissions from agriculture have decreased by approximately 16% since 1990¹⁹. More specifically the UK dairy sector was responsible for 30% and 28% of agricultural GHG emissions in 1990 and 2015 respectively. In 2015 GHG emissions from the UK Dairy sector had decreased by 24% since 1990²⁰.

Carbon Footprinting

In 2010, AHDB Dairy and Dairy UK worked in collaboration with the Carbon Trust to develop guidelines for carbon footprinting within the United Kingdom²¹. These guidelines were designed to help those involved at all stages of the supply chain understand the importance of carbon footprinting and provide a common approach for the dairy sector.

This methodology was used by AHDB Dairy as part of a three-year carbon footprinting study (2011-2013) which aimed to provide a robust and externally verified carbon footprinting for British milk. Over the course of three years, the average on-farm carbon footprint fell by 8.1%²².

As of 2017, 70% of dairy farmers are taking action to reduce GHGs with almost 90% of these considering it good business practice to do so²³. Key actions being taken by farmers include:

- Energy efficiency: 76% of dairy farmers are improving energy efficiency to reduce GHGs and 45% are intending to invest more in energy efficiency²³.
- Nutrient management: Almost three-quarters of dairy farms (equivalent to over 80% of the dairy acreage) have a nutrient management plan and nearly 90% have manure management plan. 72% are improving nutrient application efficiency²³.
- Feed planning and management: 80% of dairy farmers always (>60%) or very often use a ration formulation programme or take nutritional advice from an expert when planning livestock feeding regimes²³. By 2025 we want to see 85% of farmers using expert advice to optimise feed plans so there remains work for us to do in this area.
- Renewable Energy: Renewables account for nearly one-third of UK electricity production, and NFU experts estimate that farmers own or host 70% of the UK's solar power capacity and over half of all anaerobic digesters, as well as the majority of wind power. As of 2017 43% of dairy farmers produce or use renewable energy for self-supply or for export. This is above the industry-wide average of 39%²⁴.

Case Study:

RENEWABLE ENERGY USE ON FARM

The Gilman family run a dairy herd of 200 cattle alongside a small arable operation on 160 acres of tenanted land in Staffordshire.

Technology Implemented and Necessary investment:

In 2012 the Gilman's installed a medium-sized wind turbine to meet some of their business energy needs and to provide an additional source of income from exported electricity.

The 50-kilowatt Endurance wind turbine is situated 300 metres from the farmhouse, from where it can barely be heard. There were a few local objections to its installation but planning for the turbine was approved without difficulty, although an upgraded electricity pole transformer was an unexpected cost.

Although eligible for support under the UK Government Feed-In Tariff scheme, bank finance also took some time to agree, since as tenants the Gilman's do not own their farmland.

In addition to the turbine, the family have invested in a 90-kilowatt biomass log burner to heat the farmhouse, which is divided into two independent family dwellings. The heating system was backed by the Government Renewable Heat Incentive Programme and Homegrown and purchased feedstock.

Impact:

Over the past 6 years one third of the output from the Gilman's turbine has been used to power milking machinery and other on-site farm demands with the remainder being exported to the local electricity network.

Industry experts estimate that over 800 turbines of this type have been installed across the UK. On an annual basis each one produces power equivalent to the needs of 35-50 households.

Every year, the Gilman's participate in Open Farm Sunday, where the turbine attracts considerable public interest as a local landmark.





“The Feed Adviser Register is valuable, not just to the farmer but to the nutritionist as well. There’s a lot of trust and financial reliance on feed advisers as well as the health and welfare of the cows. The FAR helps provide farmers with the confidence that they will receive professional advice when advisers first come out onto farm.”

SAM DICKINSON
Lancashire Dairy Farmer

Case Study: AIC FEED ADVISOR REGISTER

The AIC Feed Adviser Register (FAR) was set up in 2013 by AIC and the feed sector in response to Governments’ commitment and industry and consumer demands to reduce emissions from farmed livestock. With Government committed to greenhouse gas reduction, initiatives such as the register allow the agricultural sector to take its own positive steps to reduce emissions through a framework which is both practical and suitable for the industry.

The Register:

To become registered, feed advisers need to demonstrate their knowledge in areas of animal nutrition, welfare, feeding efficiency and animal health with the completion of FAR Module 1 and 2. With the launch of FAR Module 3, feed advisers will also receive training on Environmental Policy and the practical ways to mitigate emissions on farm.

The register allows feed advisers to receive recognition of their professional expertise and experience in providing high quality advice whilst giving farmers the assurance that advisers are competent and provide advice which takes into account both farm business needs and environmental considerations

Good feed advice can help increase yield, improve fertility and cow welfare, lower emissions of methane and ammonia, reduce excretions of protein and help save money through identifying buying opportunities and utilizing farm grown feed effectively.

With Defra identifying knowledge transfer as a key element in reducing GHG emissions, the feed industry, through imparting best practice advice with respect to animal nutrition, has a central role to play in reducing the GHG footprint on farm.

As of the 13th March 2018 there were 1101 registered feed advisers and 42% of those signed up to the register specialise in cattle²⁵.

WATER

Key Achievements & Commitments since 2008

- In 2012, 78% of farmers implemented water efficiency methods (58% in 2010).
- Nutrient and Manure management plans are held by 73% and 89% of dairy holding respectively, helping to minimise water pollution.

Farmer Targets

- 2020 – 100% take of water use efficiency

On farms, the necessity of water for animal welfare and dairy hygiene introduce unique challenges. Nonetheless, over the past ten years there has been a phenomenal rise in the number of dairy farmers monitoring water use.

Between 2010 and 2012 the number of farmers implementing water efficiency measures rose from 58% to 78%. Popular measures include:

- Rain water collection,
- Reusing water from plate coolers
- Diversifying water supplies e.g. through using a borehole or pumping water from a local water source ²⁶

The industry continues to make improvements and encourage further measures to be taken in line with the 2020 targets and the majority of dairy holdings now incorporate some form of water efficiency measures as standard practice.

Recent studies have suggested that it would be useful for dairy producers to benchmark water use in the future to judge the effectiveness of water conserving practices against their own past performance or the performance of other dairy farms²⁷.

The Dairy Roadmap has championed slurry as a valuable resource that through effective management is able to return vital nutrients and organic matter back to the soil. As of 2017, 73% of dairy farmers had adopted nutrient management plans (rising from 60% in 2009).

Good nutrient management helps to reduce diffuse water pollution. Industry initiatives, such as Tried & Tested, have been set up with support from Catchment Sensitive Farming to help farmers improve nutrient management planning through the use of a specific toolkit. This toolkit provides a practical way to plan and record nutrient use and offer advice to help farmers meet regulatory requirements.

From 2 April 2018 new rules for all farmers in England were introduced to help protect water quality “by standardising good farm practices that many are already performing and offering a new approach to regulation.”³⁴. The rules were drawn up with farming and environment stakeholders to recognise and build on the good progress that many farmers have already made in tackling water pollution. They require farmers to keep soil on the land, match nutrients to crop and soil needs and keep livestock fertilisers and manures out of the water – requirements which many UK dairy farmers are already meeting.

POLLUTION INCIDENCES

Between 2008 and 2014 there was a 23% drop in pollution incidences in the dairy sector. Incidences of pollution are strongly influenced by weather conditions. Poor weather puts pressure on slurry store capacity and limits spreading opportunities. A prolonged period of low milk price in recent years has also restricted farmers' ability to invest in the necessary slurry store improvements and spreading equipment that helps to reduce pollution incidences.

Farmers are incorporating a number of measures to help mitigate pollution on farm. These include:

- The use of low emission manure and slurry spreading equipment - the RDPE Countryside Productivity Scheme included grant funding for best practice application equipment
- Covering slurry stores
- Using slurry separators to separate solids and liquids
- Upgrading slurry stores
- Manure management planning - In 2015 90% of dairy farmers had taken up manure management plans.

A recent meeting of the Dairy Environmental Issue Group set out a number of key asks of government to help reduce pollution incidences further. This could be done through:

- The provision of support to enable farmers to improve and expand current slurry storage to prevent overflow and pressure to spread at inopportune times e.g. a tax relief on farm buildings
- An end to farming by set dates. Nitrate Vulnerable Zone closed periods may be exacerbating pollution incidences as farmers struggle to spread slurry within the allotted dates
- Access to volatility tools and better market data to help farmers manage production and mitigate the effects of fluctuating milk prices to allow them to maintain a profitable, productive business and make necessary investments



Case Study:**DIVERSIFIED WATER SOURCE**

The Harvey brothers run a 180 cow dairy herd with 180 followers on approximately 400 acres in Cornwall.

Background:

The farm currently utilises a significant amount of mains water, topped up with well water and spring water, for livestock which have previously had access to the River Ottery to supplement their drinking. This alongside rising water costs meant that the farm was looking to have to spend nearly £12,000 per annum on water.

There is a good flow of water from a river that flows through the property. Unfortunately the river is some distance from the dairy which is also 30 metres higher than the river. Livestock could drink from the river but this causes pollution and river bank erosion.

Having recently embarked upon a river fencing scheme to reduce potential erosion and contamination of the watercourse, the farm decided to seek a more environmentally and cost effective solution to reduce their water costs.

Having contacted Water Powered Technologies, who design and manufacture Zero Energy Water Pumps, they decided to install a Papa Pump system which will provide their livestock watering needs without the use of fuel or electricity, therefore reducing the emission of greenhouse gases and enhancing the farm's sustainable objectives.

The Pump:

The Farm is installing a 6 Pump Zero Energy Hydro Ram System from Water Powered Technologies. The Papa Pumps work in parallel to deliver the required water to a storage tank for gravity feeding throughout the farm. The system will be installed by the farmer with the help of contractor Ivor Bayley. Set against the annual water bill, it will provide a return on investment within 2 years. The Pump system will deliver 16m³ of water per day to 12 troughs via a storage tank

Benefits:

This system will use the (free) natural water resource, delivering the water directly to the livestock and eliminating the need to move animals for drinking. It will also allow the river to be fenced off to keep the animals out of the stream, reducing pollution, improving the water quality and complying with water quality guidelines. The total system is expected to cost circa £25,000 with running costs estimated at less than £100 p.a.

“We considered the alternative options which were to install an electric borehole pump - but with the initial costs of the system - including filtration, on-going electricity, maintenance and pump replacement costs - it became obvious that the Papa Pumps would provide the most cost effective solution along with long term environmental benefits.”

IAN HARVEY
Wiggaton Farm



Case Study:**BLUE FLAG FARMING**

The 'Blue Flag Farming' concept has been proposed by dairy farmers Mike Smith and William Prichard and is supported by the four main Co-operatives active in their area: First Milk, CCF³⁹, PMR and Puffin Produce.

The concept advocates the benefits of a "voluntary led" option over the possibility of designating the whole of Wales as an NVZ. Under NVZ rules farmers are required to implement certain measures, such as controlled date slurry application and increased storage capacity. There are concerns that this approach is not necessarily suited to temperate grassland areas and would require huge capital outlay from farmers when previous designated zones have not always been a success.

The Blue Flag Farming concept aims to offset nitrogen levels through a collaborative industry-led approach. This would be achieved through a farmer controlled audit partnership working alongside accredited farmers and contractors. There would be tiered levels of engagement with each tier aiming to offset a higher percentage of nitrogen.

First Milk Creamery

The project is modelled on the successful offset scheme of the First Milk Creamery in Haverfordwest. Under this scheme farmers select from a range of mitigating measures, the impact of which can be modelled through the ADAS Farmscoper Model. The system is recorded, audited and meets the strict requirements of the Environmental Permitting Regulations and Habitats Regulations. On average, each of the 24 participating farmers are reportedly saving a ton of nitrate from entering the Milford Haven waterway.

Current Status:

Following the presentation of the concept to Welsh cabinet Secretary Leslie Griffiths, investigation is underway on how the Blue Flag Farming could potentially be delivered across the whole of Wales and in every sector.

Commenting on the project, dairy farmer Michael Smith said: "I think this represents a great opportunity for farmers to take ownership of the perceived problem of water quality, to deliver an improved public perception and understanding of the positive contribution that agriculture makes to water quality, in a uniquely bespoke, and measured response, that can be recognised by the public, the regulators, Government and our peers. This would all be achieved whilst building a more efficient and resilient sector to hand on to future generations.



WASTE & RECYCLING

Key Achievements & Commitments since 2008

- 85% of dairy holdings currently taking action to reduce GHG emissions are recycling waste material from farm.
- Farmers are required to use registered waste carriers under the Red Tractor Assurance Scheme.

Farmer Targets

- 2020 - 70% of non-natural waste is recycled or recovered as standard practice.

The 2006 Waste Management Regulations meant that agricultural and horticultural wastes are now classified as 'controlled wastes', so the disposal of farm waste by burning or burying is prohibited unless the activity is licensed/permitted or exempt from licensing. Since this regulation came into force there has been an increase in the number of recycling companies operating on farms to remove and recycle waste materials²⁸.

The 2017 Farm Practice Survey reported that 85% of dairy holdings who are currently taking action to reduce greenhouse gas emissions are recycling waste material from farm and 59% of all dairy holdings are recycling waste²³.

Since this target was set Red Tractor standards have changed to require members to use registered waste carriers. Due to the independent nature of waste carriers it is difficult to acquire accurate, comprehensive data on the number of farm holdings choosing to recycle or recover their waste. However, industry experts believe the amount of waste being recovered from farms by waste carriers has increased.

Following industry lobbying, government is currently considering a study to look at waste disposal on farms. This study would provide the evidence to support expert belief that this target will be met by 2020.

BIODIVERSITY

Key Achievements & Commitments since 2008

- At its peak 70% of agricultural land was in agri-environmental stewardships schemes.
- Under the Campaign for the Farmed Environment 30,000km of hedgerows and 37,000 km of grass margins have been planted.
- 2025 - Dairy farmers to enhance and promote action being taken to improve biodiversity.

Biodiversity has the ability to improve farm productivity through the benefits it provides from a properly functioning agro-ecological structure. The dairy industry recognises the impact it can have on biodiversity and the importance of improving its resiliency in this area. Biodiversity is also an important social patrimony, essential in connecting people to the land and improving the aesthetic value of the landscape.

At its peak in 2013, 70% of agricultural land was in agri-environmental stewardship¹⁰. However, more recent environmental schemes have been narrowly targeted and have not included measure which are suitable for or accessible to dairy farmers, making it extremely difficult for farmers to participate. It is essential that a future agri-environment scheme is accessible to all and takes into account business productivity as a key driver of environmental gains on farm.

In England, the Campaign for Farmed Environment (CFE), an industry-led partnership which aims to improve the environmental condition of agricultural habitats and landscapes, encourages farmers to protect soil and water whilst improving biodiversity, water and soil alongside productive agriculture. In 2014/15 there were 260,000 hectares managed voluntarily under CFE measures³⁰. 30,000km of hedges have also been planted or restored providing habitat and shelter for wildlife whilst 37,000 km of grass margins have been implemented which help prevent pollution of water and protect hedgerows³¹.

This February saw the fifth annual Big Farmland Bird Count (BFBC) organised by the Game & Wildlife Conservation Trust in partnership with FWAG, LEAF NFU and CLA. Over 1000 farmers took part, twice as many participants than in 2014. 121 species of bird were recorded across 950,000 acres. 52% of those taking part in the count were livestock farmers and 41% of participants provided some form of extra seed feed for wild birds.

The assessment of biodiversity is complex and highly context-dependent. As such collecting accurate data and monitoring improvements can be a challenging task. Nonetheless, The Dairy Roadmap, in alignment with national and global initiatives and commitments, is eager to explore how the industry can effectively monitor the uptake of practices that contribute to improving biodiversity alongside maintaining productive farm businesses.

Case Study:

BIODIVERSITY ON FARM

The Barrow family run a 256-acre dairy and sheep farm in Cumbria's Eden Valley. Through First Milk, 90% of the farm's milk supply is bought by Nestlé to go into the Dalston factory.

Paul Barrow is a third-generation farmer whose land boasts red squirrels and a river designated a Site of Special Scientific Interest (SSSI) as a habitat for rare white clawed crayfish.

Alongside his father and uncle, Paul spent the end of 2017 planting wildlife-attracting hedgerows. In return, they started the New Year with a sustainability bonus from Nestlé.

The Nestle sustainability bonus is a response by the world's largest food company to growing pressures on the natural capital which underpins its business. The aim is to maintain the long term sustainability of the Nestle milk supply whilst ensuring the financial and environmental resilience of its suppliers.

All Nestlé's UK dairy farm suppliers, producing 1 per cent of the nation's milk, are involved in the scheme and receive per-litre price premiums for taking practical measures that enhance biodiversity and protect watercourses. As not all measures are suitable on every farm, farmers can choose from a menu of measures to find one that fits their business model.

Speaking about the scheme Paul said:

"It's a win-win all round. The sustainability bonus covers the investment we make in planting new hedgerows, and the hedgerows protect against sediment run-off into our stream and potential disease spread as well as attracting all kinds of wildlife and nesting birds."



SOIL QUALITY

Key Achievements & Commitments since 2008

- 85% of dairy farmers regularly test soil for nutrient content and 88% for pH level.
- Nutrient and Manure management plans are held by 73% and 89% of dairy holding respectively.
- 81% of dairy farmers take action to reduce stocking rates when fields are excessively wet.

Soil degradation involves both the physical loss (erosion) and the reduction in quality of topsoil associated with nutrient decline and contamination. It affects soil quality for agriculture and has implications for the urban environment, pollution and flooding. Currently, 2.2 million tonnes of topsoil is eroded annually in the UK and over 17% of land in England and Wales shows signs of erosion³².

One of the aims of Defra's 25 Year Environment Plan is for all of England's soils to be managed sustainably by 2030³³. The plan sets strategies to improve soil quality in the UK through focusing on developing better information on soil health, tackling the problem of soil degradation through updating guidance on crop establishment and

tillage options and improving soil health through the development of a soil health index.

Well-managed manure application and grazing can improve the soil health of pastures and crop lands. Dairy producers are already making strides to improve the quality and structure of their soils with 81% of dairy holdings actively taking action to reduce stocking rates when fields are excessively wet and over 85% of dairy farmers reporting that they regularly soil test for nutrient and pH content²³.

From 2 April 2018 new rules for all farmers in England were introduced to help protect water quality "by standardising good farm practices that many are already performing and offering a new approach to regulation."³⁴ Under these rules farmers are now required to soil test at least once every 5 years. The increase in soil testing and the development of a soil health index to monitor soils on farm will help drive the improvement of soil quality across dairy holdings in the UK.

The 25 year plan sets out a strategy to improve soil health and reduce soil degradation through a combination of guidance and monitoring using a soil health index³³.

AIR QUALITY

- Ammonia emissions from agriculture decreased by 20% between 1990 and 2014³⁶.
- The UK met its target set under the National Emission Ceilings Directive to reduce ammonia emissions from 2005 levels by 2010 and has committed to reducing ammonia emissions by 8% by 2020 and 16% by 2030.

There has been a long-term decline in air pollution in the UK and with the 2015 emissions of all pollutants continued to decrease (except for ammonia and PM2.5)

In 2014 it was shown that through changes in livestock numbers, production levels and management practices, including the application of less inorganic fertiliser, ammonia emissions in agriculture had reduced by 20% since 1990³⁶.

Practices which are used on dairy farms to help mitigate ammonia emissions include:

- The use of low emission manure and slurry spreading equipment
- Covering slurry stores
- Covering solid manure heaps
- Washing down yards
- Separating slurry and urine in slurry stores
- Implementing grooved, perforated flooring systems
- Nutrient Management Planning to ensure appropriate and timely application of slurry

Under The National Emission Ceiling Directive, the UK has pledged to further reduce ammonia emissions by 8% and 16% by 2020 and 2030 respectively (against 2005 levels). Many farmers are already employing best practice management methods, and dairy producers are starting to take a more integrated approach to tackling ammonia emissions by focusing not just on slurry storage and spreading but also looking at feed rations, cattle housing facilities and cropping plans.

As of 2017 80% of dairy farms use a ration formulation programme or take nutritional advice from an expert²³. The use of AIC registered feed advisers also helps ensure farmers receive advice which takes into account both the farm business needs and environmental considerations.

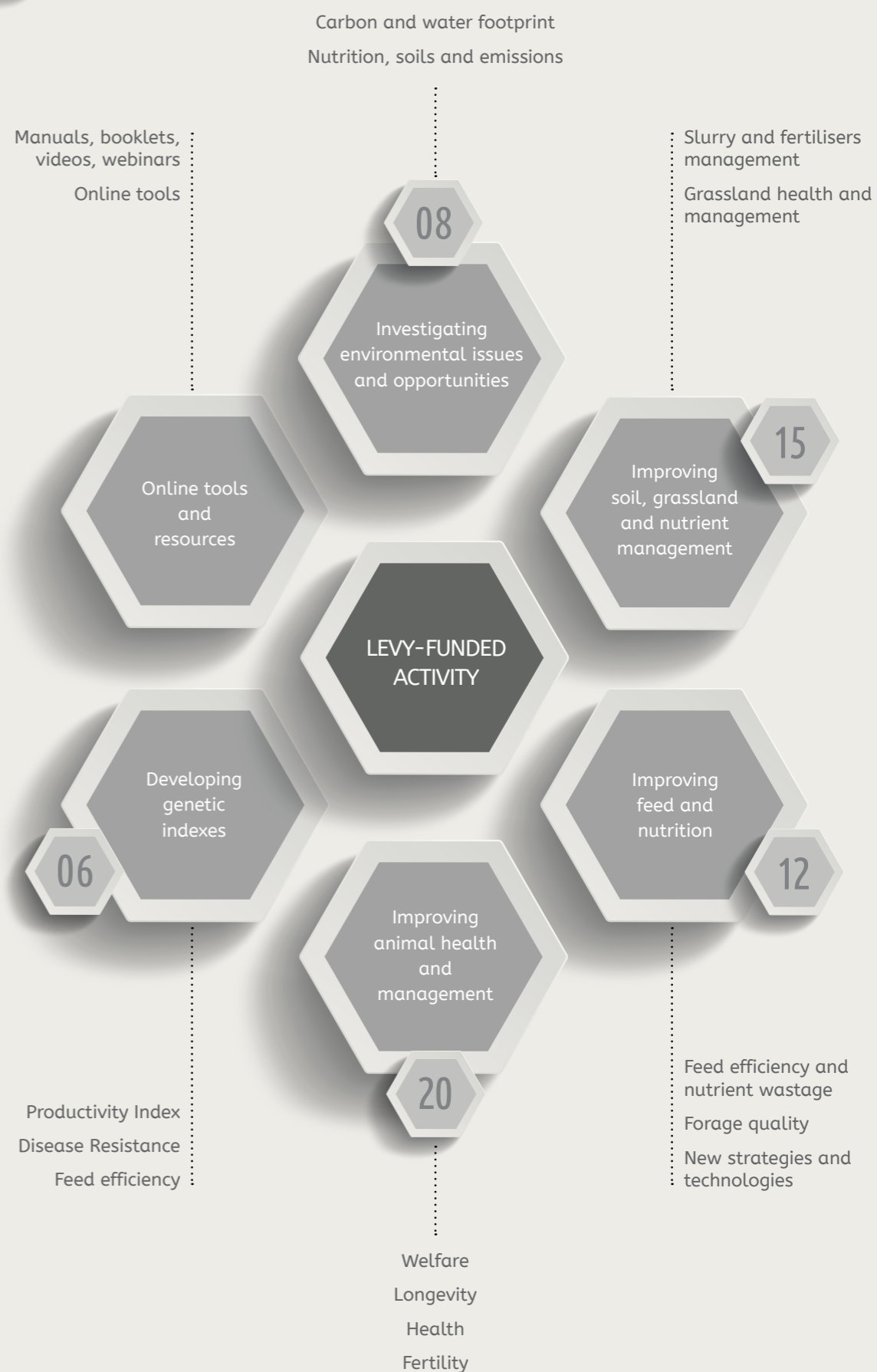
Industry stakeholders, including the NFU, have worked with Defra on a Code of Good Agricultural Practice for Reducing Ammonia Emissions which sets out how farmers can further minimise ammonia emissions in agriculture by making changes to livestock feed and housing, manure storage and application and fertiliser use. The code will be published in 2018.



AHDB RESEARCH ACTIVITY

Research and development is crucial to the dairy industry to increase global competitiveness and to make dairy farming more efficient and increasingly sustainable. AHDB's levy-funded research covers a wide range of activities aimed at increasing dairy farming sustainability and reducing environmental impact.

08 Number of projects in each area



4

NATIONAL ALIGNMENT

THE 25 YEAR ENVIRONMENT PLAN

Published in January 2018, the 25-Year Environment Plan⁴⁰ presents the governments ambition to ensure the current generation “are the first to leave the environment in a better state than they inherited it” A sister document to The Clean Growth Strategy (2017)⁴¹, together they set out goals and strategies to accelerate the pace of the UK’s clean growth whilst protecting English natural capital.

Many of the goals described in the 25 Year Environment Plan are already reflected in the past and present targets of the Dairy Roadmap.

The Dairy Roadmap provides an established framework for delivering against the aims of this plan for the UK dairy sector. A truly ‘living document’, The Roadmap is constantly reviewed and updated in response emerging issues and changing political focus. The future activity of the Dairy Roadmap will, therefore, involve further alignment with the goals and strategy of the 25-Year Environment Plan and the Clean Growth Strategy.

25 YEP GOAL	FARMER TARGETS	PROCESSOR TARGETS
Clean air		2015 Phase out Euro4 engines
Clean and plentiful water	2020 Uptake of water efficiency methods	2015 Environment Management System 2020 Reduction of water brought onto site 2020 Reduction in Chemical Oxygen Demand (COD) load in discharged effluent
Thriving plants and wildlife	2015 Dairy managed farmland into environmental stewardship schemes	
Reducing the risks of harm from environmental hazards	2015 Declining trend in serious pollution incidents on-farm	2015 Environment Management System (EMS)
Using resources from nature more sustainably and efficiently	2015 Nutrient management planning 2020 Implementation of renewable energy technologies and an increase of energy coming from renewable sources	2020 Improvement in energy efficiency 2020 Reduction of water brought onto site
Mitigating and adapting to climate change	2015 Calculation of carbon footprint and implementation of carbon reduction plans 2020 GHG emissions reduction Implementation of renewable energy technologies and an increase of energy coming from renewable sources 2020 Uptake of water efficiency methods 2025 farmers using expert advice to optimise feed plans	2015 Environment Management System (EMS) 2015 Implementation of a Carbon management programme 2015 Removal of all Hydrochlorofluorocarbons (HCFCs) 2015 FTA Logistics Carbon Reduction Scheme or to commit to equivalent fuel efficiency targets 2015 Phase out Euro4 engines 2020 Improvement in energy efficiency 2025 Reduction in carbon-related energy use
Minimising waste	2020 Recycling or recovering of non-natural waste as standard practice	2015 Environment Management System 2015 Anaerobic digestion plants 2020 Zero ex-factory waste to landfill 2020 Increased recycled material in milk bottles 2020 Paper-based cartons to be Forest Stewardship Council (FSC) labelled 2020 All tertiary packaging reusable or recyclable 2025 Reduction in food waste 2025 Improve the design of dairy packaging to minimise waste

RED TRACTOR

Established in 2000, Red Tractor is the United Kingdom's leading farm and quality food assurance scheme. The Red Tractor logo confirms the independent assessors have checked that food or drink meet the comprehensive standard set by Red Tractor from farm to fork⁴².

The Red Tractor can only be used on food that has been produced, packed, stored and transported to Red Tractor standards and there are currently 11,058 Dairy Assured farmers across the UK representing 95% of UK milk production.

The standards cover the following:

- Environmental Protection:

These require a farmer to

- Keep and follow a Manure Management Plan when applying manure/slurry to the land
- Store organic material in a manner that minimises risk of contamination and pollution
- Use fertiliser and soil improvement products which are suitable for their intended purpose
- Apply fertilisers in a manner that minimises the risk of contamination or pollution
- Maintain fertiliser application equipment

Many of the standard required of dairy farmers by Red Tractor align with the aims of The Dairy Roadmap and a selection of these have been integrated into our Processor Targets⁴³.



WRAP

WRAP (The Waste & Resource Action Programme) work with government, business and communities to provide practical solution that will help to achieve a sustainable, and resource efficient economy⁴⁴.

The Courtauld Commitment 2025

The Courtauld Commitment 2025⁴⁵, is a government supported voluntary agreement led by WRAP to tackle waste in the food and drink sector. Launched in 2015, under this voluntary agreement Dairy UK and a number of dairy processors have pledged their commitment to make food and drink production more sustainable and reduce the resources required to produce food and drink by 20% between 2015 and 2025. In order to achieve this it has been calculated that by 2025 the entire food and drink sector must meet the following targets:

- 20% reduction in food & drink waste arising in the UK
- 20% reduction in GHG intensity of food & drink consumed in the UK
- Business signatories are monitoring water use in their own operations and have improved efficiency
- Business signatories are participating in collective action to improve the quality and availability of water in key sourcing areas

All three of these targets are covered by the Dairy Roadmap, and in the case of food and drink waste, dairy processors aim to go even further and achieve a 30% reduction by 2025. To aid in the delivery of these targets, WRAP has set up a Dairy Working Group in association with Dairy UK to target waste hotspots across the supply chain.

The UK Plastic Pact

The Dairy Roadmap also acknowledges the recent launch of The UK Plastics Pact, which establishes a collaborative agreement supported by government to transform the UK plastic packaging sector and prevent plastics from polluting the environment.

The Dairy Roadmap has long set targets that aim to reduce the impact that plastic and other packaging has on the environment. Moving forward we plan to extend these following the example set by The UK Plastic Pact and its signatories, pushing for higher recycling rates, increased recycled content, and innovation to eliminate unnecessary and problematic packaging where possible.

5

GLOBAL
ALIGNMENT

The global dairy sector provides nutritious and healthy food, as well a source of income or livelihood to billions of people all around the world. Similarly, the environmental challenges associated with the production of milk and dairy products are shared the world over.

Through The Dairy Roadmap, the UK dairy industry recognises the profound importance that international collaboration and alignment with global initiatives play in addressing these challenges and driving forward a global dairy industry that will provide a source of safe, nutritious and sustainability for years to come.

The Dairy Roadmap has joined with stakeholders from across the international dairy community in endorsing the Dairy Declaration of Rotterdam and continues to support the development of the Dairy Sustainability Framework and its aim to provide a unified framework for sustainability monitoring around the world.

THE DAIRY SUSTAINABILITY FRAMEWORK

Launched in 2009, the Dairy Sustainability Framework (DSF) sets out a vision for a dairy sector that is continuously committed to the provision of safe and nutritious products from healthy cattle, whilst also preserving natural resources, minimising environmental impact, and ensuring a livelihood across the sector⁴⁷.

The Dairy Sustainability Framework established 11 Global Criteria that together define the aspirations for improvement across the dairy sector. Recognising the variety of the global dairy sector, individual members are free to prioritise these criteria and implement initiatives that deliver the strategic intent for those criteria. At present the Dairy Roadmap directly relates to six of these criteria:

- **Greenhouse gas emissions:** GHG emissions across the full value chain are quantified and reduced through all economically viable mechanisms.
- **Soil Nutrients:** Nutrient application is managed to minimise impacts on water and air, while maintaining and enhancing soil quality.
- **Waste:** Waste generation is minimised and, where unavoidable, waste is reused and recycled.

- **Water:** Water availability, as well as water quality, is managed responsibly throughout the dairy value chain.
- **Soil:** Soil quality and retention is proactively managed and enhanced to ensure optimal productivity.
- **Biodiversity:** Direct and indirect biodiversity risks and opportunities are understood, and strategies to maintain or enhance it are established.

The Dairy Roadmap fully supports the Dairy Sustainability Framework and shares its belief that “sustainability is a journey and not a destination”. At present, the Dairy Roadmap recognises this belief by setting targets for continuous improvement, but we are committed to taking this further.

As part of the future development of the Dairy Roadmap we are currently exploring options for further integration of the DSF monitoring and reporting frameworks, as well as greater alignment with the 11 Global Criteria including those not currently covered by The Dairy Roadmap, namely; Market Development, Rural Economies, Working Conditions, Product Safety & Quality and Animal Care.



THE SUSTAINABLE DEVELOPMENT GOALS

During the United Nations Assembly in 2015, 193 member countries adopted the Sustainable Development Goals (SDGs) signalling a global commitment to end poverty, protect the planet and end inequality by 2030.

It is clear that the dairy sector has a role to play in delivering a number of goals around nutrition, healthy populations, a healthy planet, and helping to lift people out of poverty.

“We are proud that the UK as a leading dairy producing nation is endorsing the Dairy Declaration. We are an innovative industry with a deep commitment to environmental good practice and nutritional benefit. We can take pride in the fact that our nutritious products can play such an important part in meeting global sustainability and nutritional responsibilities and ambitions.”

PAUL VERNON
Chairman of the Dairy Roadmap

THE DAIRY DECLARATION OF ROTTERDAM

Signed in 2016 by the Food and Agricultural Organisation of the United Nations (FAO) and the International Dairy Federation (IDF), The Dairy Declaration of Rotterdam is a landmark partnership that aims to help deliver the United Nation 2030 Sustainable Development Goals and recognises the role the dairy sector can play in securing a sustainable and prosperous future⁴⁸.

The Dairy Declaration acknowledges the positive contribution that dairy makes to countries’

economies, the essential role of dairy in a balanced diet, and the part that the dairy industry can play in tackling environmental degradation and climate change⁴⁹.

In October 2017 the United Kingdom represented by The Dairy Roadmap Steering Group (Dairy UK, the NFU and AHDB) joined over 20 countries around the world in endorsing The Dairy Declaration of Rotterdam. In doing so, The Dairy Roadmap reaffirmed its commitment to the delivery of the Sustainable Development Goals and to creating a sustainable dairy industry worldwide.



THE DAIRY ROADMAP & THE SUSTAINABLE DEVELOPMENT GOALS

Under the Dairy Roadmap, the UK dairy industry has already taken great strides towards delivering the United Nations Sustainable Development Goals, through the development of targets aimed at minimising the environmental footprint associated with the production and processing of milk and other dairy products.

As recognised by The Dairy Declaration, the dairy sector also has a vital role to play in the delivery of SDGs relating to nutrition, healthy populations and poverty alleviation. Although not currently covered by the targets of The Dairy Roadmap, these remain of paramount importance to the UK dairy sector.

As The Dairy Roadmap develops we intend to expand our reach beyond simply the environmental, driving for sustainable change in all aspects of the dairy industry.

SUSTAINABLE DEVELOPMENT GOAL



The UK dairy sector plays a key role domestically and globally in securing economic security thus helping towards the goal of zero poverty. 10% of the global population directly depends on dairy farming, and milk and dairy products account for 14% of global agricultural trade⁴⁹.

The UK dairy sector is the 3rd largest producer of milk in the Europe after Germany and France, and the 10th largest globally⁵⁰. It employs around 70,000 people (50,000 on farm, and a further 23,000 employed by processors⁵¹. Dairy represents 14.8% of the value of agricultural produce in the UK. It accounts for an estimated £8.8 billion in sales at wholesale. Increasing to an aggregate of £27.8 billion once indirect and induced multiplier impacts are taken into account⁵¹.



The dairy industry plays a key role in helping to feed the UK population. Milk and milk products are nutrient-rich and provide significant amounts of protein, calcium, iodine, phosphorus, B12 and B2 to the British diet⁵².

Through The Dairy Roadmap, the UK dairy sector has committed to improve its environmental footprint and ensure the provision of safe, nutritious and delicious dairy products for years to come.



Women play a vital in the global dairy sector, and the production of milk provides a vital pathway to promoting female empowerment and gender equality, especially in rural areas.

Across the world, an estimated 37 million dairy farms are female headed, with women directly owning dairy cows in 25% of cattle keeping households. More broadly it is estimated that around 80 million women across the globe engaged in dairy farming to some extent⁴⁹.

SUSTAINABLE DEVELOPMENT GOAL

FARMER TARGET

PROCESSOR TARGET



Improvements in water-efficiency and water quality, as well as reductions in waterborne pollution, have been targeted in the Dairy Roadmap since 2008.

- 2015 Nutrient management planning
- 2015 Declining trend in serious pollution incidents on-farm
- 2020 Uptake of water efficiency methods

- 2015 Environment Management System
- 2020 Reduction of water brought onto site
- 2020 Reduction in Chemical Oxygen Demand (COD) load in discharged effluent



The Dairy Roadmap has long championed the use of renewable energy sources, energy efficiency and decarbonisation, with farmers and processors surpassing the targets set.

- 2020 Implementation of renewable energy technologies and an increase of energy coming from renewable sources

- 2015 Implementation of a Carbon management programme
- 2015 Anaerobic digestion plants
- 2015 Removal of all Hydrochloro-fluorocarbons (HCFCs)
- 2020 Improvement in energy efficiency
- 2025 Reduction in carbon-related energy use



Target 8.4 aims to improve global resource efficiency and decouple economic growth from environmental degradation. This aligns with a number of dairy roadmap targets which aim to minimise waste, and promote closed-loop or circular systems.

- 2020 Recycling or recovering of non-natural waste as standard practice

- 2015 Anaerobic digestion plants
- 2020 Zero ex-factory waste to landfill
- 2020 Increased recycled material in milk bottles
- 2020 All tertiary packaging reusable or recyclable
- 2025 Improve the design of dairy packaging to minimise waste



This goal recognises that investment and innovation are often key to finding solutions to economic and environmental challenges. The message is echoed by The Dairy Roadmap.

- 2020 Implementation of renewable energy technologies and an increase of energy coming from renewable sources

- 2015 Environment Management System
- 2015 Implementation of a Carbon management programme
- 2015 Increased use of Anaerobic digestion plants

SUSTAINABLE DEVELOPMENT GOAL

FARMER TARGET

PROCESSOR TARGET



The sustainable consumption of resources, the reduction of food waste, and responsible packaging are all key goals of the Dairy Roadmap.

- 2015 Nutrient management planning
- 2020 Implementation of renewable energy technologies and an increase of energy coming from renewable sources
- 2020 Uptake of water efficiency methods.
- 2020 Recycling or recovering of non-natural waste as standard practice

- 2015 Environment Management System
- 2015 Anaerobic digestion plants
- 2015 Paper Cartons to Forest Stewardship council (FSC) labelled
- 2020 Improvement in energy efficiency
- 2020 Reduction of water brought onto site
- 2020 Zero ex-factory waste to landfill
- 2020 Increased recycled material in milk bottles
- 2020 All tertiary packaging reusable or recyclable
- 2025 Reduction in food waste
- 2025 improve the design of dairy packaging to minimise waste



Despite contributing only 2.7% of global GHG emissions⁵³, The Dairy Roadmap challenges the UK dairy supply chain to take action against climate change by lowering emissions, improving energy efficiency, and adopting renewable and emission limiting technologies and practices.

- 2015 Calculation of carbon footprint and implementation of carbon reduction plans
- 2020 GHG emissions reduction
- 2020 Implementation of renewable energy technologies and an increase of energy coming from renewable sources


- 2017 Implementation of a Carbon management programme
- 2015 Removal of all Hydrochloro-fluorocarbons (HCFCs)
- 2015 FTA Logistics Carbon Reduction Scheme or to commit to equivalent fuel efficiency targets
- 2015 Phase out Euro4 engines
- 2020 Improvement in energy efficiency
- 2025 Reduction in carbon-related energy use



Through the dairy Roadmap the UK dairy industry is committed to reducing the impact its waste and in particular plastic packaging has on marine ecosystems.

- 2015 Nutrient management planning
- 2015 Declining trend in serious pollution incidents on-farm

- 2020 Reduction in Chemical Oxygen Demand (COD) load in discharged effluent.
- 2020 Zero ex-factory waste to landfill
- 2025 Improve the design of dairy packaging to minimise waste and maximise recyclability

SUSTAINABLE DEVELOPMENT GOAL	FARMER TARGET	PROCESSOR TARGET
 <p>The Dairy Roadmap and its Targets have made a number of commitments to improve soil quality, restore terrestrial ecosystems and enhance biodiversity.</p>	<p>2015 Dairy managed farmland into environmental stewardship schemes</p> <p>2015 Declining trend in serious pollution incidents on-farm</p> <p>2020 Enhance and promote action being taken to improve biodiversity</p>	<p>2015 Biodiversity strategy</p> <p>2015 Environment Management System</p> <p>2015 Paper cartons to Forest Stewardship Council (FSC) labelled</p> <p>2025 Enhance and promote increased biodiversity</p>

6

THE ROAD AHEAD

Over the past decade, The Dairy Roadmap has led the global dairy industry in promoting environmental best practice, and in setting targets for improvement throughout the entire UK dairy supply chain.

This report highlights the tremendous effort and commitments that have been made so far to improve efficiencies and reduce our environmental footprint, but this enthusiasm and dedication must be maintained to ensure that the targets for 2020, 2025 and beyond are met.

As The Dairy Roadmap marks its 10th anniversary, we remain committed to continuing this success and look forward to expanding our horizons to align with national and global commitments to achieve a sustainable future for the dairy sector and the world.

Broader Horizons

The Dairy Roadmap is a 'living' document, it is evolved and changed since its inception, and future targets are under constant review to ensure that the industry is continuously challenging itself and adapting to changing external factors and emerging issues.

The natural evolution in The Dairy Roadmaps journey is the inclusion of broader reaching sustainability targets. In keeping with convention, this report expands our horizons and considers the extent to which The Dairy Roadmap aligns with external commitments such as the United Nations Sustainable Development Goals, the Dairy Sustainability Framework and on a national level the 25 Year Environment Plan.

Whilst, it is clear that The Dairy Roadmap champions the delivery of an environmentally sustainable dairy industry, dairy also has a vital role to play in sustainable development, as a livelihood, and in the provision of nutritious and healthy foods. As we look to the future, we plan to expand our targets to reflect this role and to ensure that dairy continues to deliver nutritious, safe and sustainable produce for years to come.

7

DELIVERING
THE DAIRY
ROADMAP

The Dairy Roadmap steering group sets the scope and direction for the Dairy Roadmap. The group includes members from Dairy UK, the NFU and AHDB. The steering group is responsible for agreeing and setting improvement targets at 5 year intervals and ensuring that the UK dairy industry continues to align with global best practice.

The Chairmanship of this group rotates biannually between the three members, allowing the continued management and development of the project.



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