

The Global Dairy Agenda for Action on Climate Change

Progress report 2009-2011

October 2011

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Statements of signatories' representatives

“As the President of an organization which signed the Global Dairy Agenda for Action on Climate Change in 2009, I am pleased to share with you our industry's interim achievements. This report is a testimony to the progress that the global dairy sector has made over the last two years in addressing the reduction of greenhouse gas emissions. Through active development of this unique global initiative, the International Dairy Federation pursues its mission to provide the best global scientific expertise and knowledge in support of the sustainable production of quality milk and dairy products for consumers.”

Richard Doyle, President, International Dairy Federation

“I am pleased to see this report on the progress with the Global Dairy Agenda for Action. The initiative is fully in line with the vision of ESADA to promote and advocate for efficient and effective means of achieving health, safety and quality through innovative technologies and knowledge sharing while caring for customer's social and environmental responsiveness.”

Dr. Kipkuri A. Lang'at OGW, Managing Director, Eastern and Southern Africa Dairy Association

“For centuries, the dairy industry has been the cornerstone of sustainable communities, from nutrition to social and economic health. As a signatory for the Global Dairy Agenda for Action, we pledge to ensure the dairy sector is recognized as a vital source of essential nutrients and distinguished for proactively managing its relationship with the environment.”

Donald Moore, Executive Director, Global Dairy Platform

“European dairy industry companies, their industry associations and the European Dairy Industry Association, have supported the GDAA initiative from the outset with complete enthusiasm. With this report I believe we demonstrate that this enthusiasm has been translated into a large number of initiatives which indeed result in reduction of the greenhouse gas emissions along the dairy supply chain. Many of the reported projects show that the co-operation of all stakeholders along the dairy supply chain is accelerating the processes that improve the sustainability of this essential food supply chain.”

Dr. Joop Kleibeuker, Secretary General, European Dairy Association

“SAI Platform unites food and drinks companies on the issue of promoting best practices for sustainable agriculture. By unique precompetitive collaboration the Platform has been able to define Principles & Recommended Practices for farmers, not as a standard, but as guidance and a source of opportunities for a farmer. For us the collaboration in the GDAA signatories in the dairy sector is a great example of using innovative value chain partnerships to build wider capacity for a crucial aspect of sustainability – climate impact. The dairy sector has shown itself to be proactive in picking up this challenge. Two years of activities is now beginning to show results, but we do realize we have only just started.”

Peter Erik Ywema, General Manager, SAI Platform

“In my capacity as Secretary General of the Pan-American Dairy Federation, an institution that brings together the dairy sector from 21 countries, and as signatory of the Global Dairy Agenda for Action, taking into account the importance of this issue and the contributions the dairy sector of the Americas performs to minimize the emission of greenhouse gases, we formed a special committee that has begun to spread, among the dairy industry in the countries of the region, the importance of taking action. In addition, we are collecting specific cases, which pursue that goal, and that will be fed into the Green Paper.”

Dr. Eduardo Fresco León, Secretary General, Federación Panamericana de Lechería

About the signatory organizations

The Global Dairy Agenda for Action (further referred to as 'the Agenda for Action' or 'GDAA') was signed by seven organizations representing participants in the dairy sector from farm through processing to the factory gate. These organizations are the International Dairy Federation (IDF), the International Federation of Agriculture Producers (IFAP), the Global Dairy Platform (GDP), the Eastern and Southern African Dairy Association (ESADA), the European Dairy Association (EDA), the Pan-American Dairy Federation (FEPALE) and the Sustainable Agriculture Initiative (SAI) Platform. Currently, the Agenda for Action is being developed by six of them following the dissolution of IFAP in 2010.

EDA

The European Dairy Association (EDA) represents the interests of the European dairy industry towards European institutions as well as towards international bodies such as the Codex Alimentarius and the World Trade Organization. The EDA collects, relays and analyzes information, and coordinates and stimulates consensual coherent approaches by the European dairy industry to various European and international bodies in order to help them in making decisions.

ESADA

The Eastern and Southern African Dairy Association (ESADA) is a regional association of dairy stakeholders across the dairy value chain. It was founded in 2004 with the overall mission of increasing trade in African dairy products. To this end, ESADA has been actively lobbying for an improved policy environment conducive to regional and international trade, working closely with COMESA and EAC on the regional dairy policy agenda. Additionally, ESADA assists members in the promotion and marketing of their products within the region and across the globe, as well as serving as a source of market information and capacity building for various stakeholders in the dairy industry.

FEPALE

At the Pan American Dairy Congress held in 1991, an initiative was proposed to create an organization that would bring the dairy sector of the Americas together. The Pan-American Dairy Federation was founded on the 26th of November that same year. The purpose of its creation was to unite skills, capacities, talents and resources conjugated in the same direction: To promote the industry's development through the identification of common interests, and to act as a forum connecting the dairy chain institutions.

GDP

Global Dairy Platform (GDP) is an international non-profit organization that provides direction and drive to the dairy industry. It is the only organization that connects CEOs, executives and researchers from corporations, communication and scientific bodies, and dairy industry advocates together to collaborate on worldwide dairy issues. Based in Rosemont, IL, (a suburb of Chicago in the United States) and founded in 2006 by Fonterra, Campina, Dairy Farmers of America and Arla Foods, in alliance with the International Dairy Federation (IDF), GDP is focused on sustaining and expanding global demand for milk and dairy products.

IDF

The International Dairy Federation (IDF) is a non-profit private sector organization representing the interests of various stakeholders in dairying at international level. It was founded in 1903 and is located in Brussels, Belgium. To date, IDF is represented in countries around the world which altogether account for about 86% of the world's total milk production. The mission of IDF is to provide the best global source of scientific expertise and knowledge in support of the development and promotion of quality milk and dairy products to deliver consumers with nutrition, health and well-being.

The Sustainable Agriculture Initiative (SAI) Platform

The food industry is the biggest purchaser of agricultural raw materials; therefore it can play a significant role in how these are grown. Long before today's dramatic global scenario of surging food prices and consequent impacts were unveiled, three companies among the biggest food industries, Danone, Nestlé and Unilever, were already aware that in order to rely on a constant, increasing and safe supply of agricultural raw materials, these must be grown in a sustainable manner. This is why, in 2002, they founded the Sustainable Agriculture Initiative (SAI) Platform, a non-profit organization created to communicate worldwide and to actively support the development of sustainable agriculture practices involving the different stakeholders of the food chain. Today more than forty globally operating companies have joined, eleven of them having operations in the dairy sector.

Executive summary

In September 2009, the dairy sector signed its Global Dairy Agenda for Action on Climate Change, which obligated the industry to make a positive contribution towards reducing global greenhouse gas (GHG) emissions through the delivery of five important commitments:

1. Promote the development of a standard methodology framework for assessing the carbon footprint of milk and dairy products based on robust science.
2. Promote adoption of the world's best practices within the global dairy sector.
3. Seek to advance the establishment of tools to facilitate measurement and monitoring of emissions both on-farm and in dairy manufacturing.
4. Promote improved farmer understanding of agricultural emissions and opportunities to reduce GHG emissions on farm.

5. Support sharing information and aligning research efforts to develop cost effective mitigation technologies for both on farm and manufacturing application.

This two-year progress report shows the sector is fulfilling its commitments, through substantive voluntary action and collaborative engagement. Such broad food industry engagement is quite unique. Furthermore, industry initiatives to deliver these commitments embrace a number of wider sustainability objectives; this acknowledges that measures to address climate change and maintain or improve sustainability work hand in hand, and reflects a broader commitment from the dairy industry to providing a growing global population with the nutritious dairy products they want, in a way that is economically viable, environmentally sound and socially responsible.

	Commitment	Progress and achievements
1.	<i>Promote the development of a standard methodology framework for assessing the carbon footprint of milk and dairy products based on robust science</i>	• Publication of an international life-cycle assessment (LCA) methodology; • This created a common standard to use comparable benchmarks for estimating the carbon footprint of dairy products; • Foundation for an efficient use of resources and focus on action.
2.	<i>Promote adoption of the world's best mitigation practices within the global dairy sector</i>	• Green Paper website identifies, shares, and promotes best practice; • 2010 FAO dairy report provided global context, building our understanding of regional differences, and set an initial per unit of emissions benchmark; • Adoption of emissions reduction targets by stakeholders in the dairy supply chain, demonstrating the momentum already gained by the initiative.
3.	<i>Seek to advance the establishment of tools to facilitate measurement and monitoring of emissions both on farm and in dairy manufacturing</i>	• Establishment of practical tools to make greenhouse gas (GHG) emissions easier to understand and manage at each stage of the supply chain; • The subject of GHG emissions and associated resource management efficiency has become an integral part of farm management globally.
4.	<i>Promote improved farmer understanding of agricultural emissions and opportunities to reduce greenhouse gas emissions on the farm</i>	• Extension activities such as training schemes, workshops and participation in various government and certification programs, promote a better understanding of the 'hot spots' and strategies available to dairy farmers to address climate change and its mitigation.
5.	<i>Support sharing information and aligning research efforts to develop cost effective mitigation technologies for both on farm and manufacturing application</i>	• Current research programs supported by the dairy sector show that when the GHG emissions savings of such programs are reached, there will be a positive impact.

This report identifies that while substantive progress has been achieved across all five commitments, research and dissemination of best practice – the focus of the fourth and fifth objectives – would benefit from additional government and/or industry resources as well as a favorable policy environment if their contribution to global action on climate change is to have maximum impact.

However, as the landscape around future international climate change agreements evolves, the Global Dairy Agenda for Action on Climate Change provides an extremely encouraging example of how self-management and sector-based agreements can work in practice, and demonstrates the positivity and proactivity of the international dairy sector in the on-going delivery of these commitments.

I. Introduction

The Global Dairy Agenda for Action on Climate Change is a statement of commitment by the dairy supply chain to take action to address climate change in a way that is economically viable, environmentally sound and socially responsible.

Dairy products promote the good health and wellbeing of people in all countries of the world. The global dairy sector helps to sustain the lives of people and their communities through the supply of products that deliver essential nutritional building blocks and through the provision of employment in both rural and urban communities.

The sector is a user of natural resources and at the same time has a long history of self-management in the stewardship of its land, air and water. Milk production and dairy processing and distribution are associated with the production of GHG emissions such as methane, nitrous oxide and carbon dioxide. Participants of the dairy sector have been working individually to reduce the emissions associated with their unique activities for some time.

Article 2 of the United Nations Framework Convention on Climate Change identifies that *“...stabilization of GHG concentrations in the atmosphere should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.”*¹

The global population is projected to reach 7.7 billion in 2020 (+11% compared to 2010) and exceed 9 billion in 2050 (+35%) with a population growth rate of 0.7% per annum². This growth along with economic development in many countries will result in more demand for high quality food that is rich in energy, proteins

and micronutrients. Dairy is an important part of a balanced diet, contributing 14 of the 20 essential amino acids. The dairy sector is committed to making a substantial contribution in meeting the nutritional needs of the growing population. We must do this in a way that uses our natural resources more efficiently while delivering social and economic benefits to society.

On this basis, the participants in the global dairy sector came together in September 2009 in recognition that:

- Climate change is a global challenge requiring global solutions;
- The dairy sector has a positive role to play and many participants were already doing so on an individual basis;
- The challenge of addressing climate change sits alongside the challenge of sustainably feeding a growing global population. Both challenges are shared and are in many ways pre-competitive;
- Sustainable action to address climate change must be action which enhances the economic viability of sector participants and the supply of nutritious dietary solutions to consumers;
- A supportive regulatory environment is needed to provide a platform for industry action, and likewise, a demonstration of proactive industry action is needed to support Governments in providing a favorable policy environment;
- By coming together on this shared challenge we can advance our progress more effectively and efficiently.

The outcome was a series of five commitments that showed members of the dairy industry were dedicated to making a positive contribution to global action to address climate change. These commitments were officially signed by seven organizations as the ‘Global Dairy Agenda for Action’ at the World Dairy Summit in Berlin, Germany, on September 24, 2009.

¹ [Article 2](#) of the United Nations Framework Convention on Climate Change (UNFCCC)

² Source: [Population Division](#) of the Department of Economic and Social Affairs of the United Nations Secretariat

Participation in the Agenda for Action has come from a large number of members from each of the signatory organizations, including national dairy organizations, companies and farmers.

The Agenda for Action constitutes a clear promise from the sector to work collaboratively to move forward in the most efficient manner on its shared sustainability journey. In signing the Agenda for Action in 2009, the global dairy sector committed to:

1. **Promote the development of a standard methodology framework** for assessing the **carbon footprint** of milk and dairy products based on robust science.
2. **Promote adoption of the world's best practices** within the global dairy sector and actions that:
 - a. Lead to the reduction of global GHG emissions from dairy production on a per unit of production basis;
 - b. Promote the use of technologies and methods that improve the processing and distribution efficiency of dairy products;
 - c. Optimize economic, environmental and social outcomes for global dairy stakeholders;
 - d. Recognize different levels of development and local conditions;
 - e. Build on existing frameworks and knowledge, including for scientific advancement and technology transfer;
 - f. Promote decision making based on robust science, and
 - g. Complement initiatives in other areas of sustainability.

3. Seek to advance the establishment of **tools to facilitate measurement and monitoring of emissions** both on-farm and in dairy manufacturing.
4. **Promote improved farmer understanding** of agricultural emissions and opportunities to reduce GHG emissions on farm.
5. **Support sharing information and aligning research efforts** to develop cost effective mitigation technologies for both on farm and manufacturing application.

The Agenda for Action acknowledges Article 2 of the United Nations Framework Convention on Climate Change. It is a living document that will evolve with the industry and with current science. It aims to support and guide the dairy sector. With respect to the commitment made in Berlin, the signatory organizations agreed to report progress every two years. This is the first report, first released at the World Dairy Summit in *Parma, Italy, on October 19, 2011*.

In making these commitments, we embrace the challenge of producing more with fewer resources by operating more efficiently to positively contribute to global sustainability efforts.

II. Dairy sector's progress in delivering on its climate change commitments

The commitments we undertook recognize the importance of reducing emissions in both the short and long term. A number of initiatives, like the establishment of a common methodology, provide the foundations for long-term sustainable industry. Short-term improvements such as fertilizer management tools target immediate GHG reductions. In other areas we are making investments today in research and new technologies with a view to delivering substantive GHG emissions reduction opportunities over the coming decades.

Commitment 1: Common approach to carbon footprint methodology

Promote the development of a standard methodology framework for assessing the carbon footprint of milk and dairy products based on robust science

Actions taken since the September 2009 signing of the Agenda for Action

Delivery of a standard methodology framework for assessing the sector's carbon footprint

In November 2010, the International Dairy Federation (IDF) published 'A Common Carbon Footprint Approach for Dairy: The IDF Guide to Standard Lifecycle Assessment Methodology for the Dairy Sector'.

This important guide is the result of more than a year of hard work involving widespread collaboration across the dairy industry, including the Signatories of the Agenda for Action, with input from both scientists and Lifecycle Assessment (LCA) practitioners, and with participation from FAO experts.

During the guide's drafting process, the dairy sector undertook an extensive review process of the different LCA methodologies available. The guide, which is based on cutting-edge best practices, scientific knowledge and current international standards, represents a significant step forward in the calculation of the carbon



Figure 1: The IDF methodology reviewed a range of different standards

footprint for the dairy sector, regardless of the region in the world where the products are produced. The guide and more detailed information can be downloaded from the following website www.idf-lca-guide.org

The IDF Standard LCA methodology to carbon footprint becomes the reference

Since its adoption, the IDF LCA methodological approach has started to be used strategically by a number of stakeholders, including dairy organizations and companies, in order to document the carbon footprint of their products and as a basis for their Life Cycle Management and improved product development. Tools, for example carbon footprint calculators, are being developed or modified to meet the IDF specifications. Some of the examples of work with the guide or efforts to align with it are listed in Appendix 2 of this report.

"DairyCo felt that it was really important to include an IDF-compliant analysis of the data as part of the carbon footprint study because it adds extra weight and credibility to the project. It is vital that the global dairy industry uses comparable methodologies to bring about real change and reduce the environmental impact of dairy farming."

Tim Bennett, Chairman of DairyCo and the Dairy Roadmap Taskforce

Keeping abreast of advancing LCA science

Life cycle assessment science is advancing continuously as more research data is being produced in multiple geographies, and more is being learned about the practical application of the IDF LCA standard approach.

In order to keep abreast of the latest scientific developments and to identify key areas for further refinement of the methodology in milk and dairy production, IDF launched an expert 'LCA Monitoring Group' whose members review scientifically-related developments and published science. They also maintain a link with other international organizations working with the methodology, such as ISO, IPCC, FAO, UNEP and WBCSD and.

What does it mean for climate change and GHG emissions reduction?

It is difficult to manage what you cannot measure. The dairy IDF LCA methodology provides a shared understanding and common language upon which to base dairy sector GHG emissions management, and a robust means for reporting and tracking progress across the sector on common basis in the future.

Coming together to develop a standard international method avoids duplication in method development efforts, thereby using resources efficiently and promoting transparency in emissions reduction reporting.

Strengths of the IDF Standard LCA Methodology

By being more prescriptive, the IDF LCA approach on carbon footprint created clarity and consensus within the global dairy research community on some key LCA methodological aspects such as:

- functional unit to express GHG emissions on a product basis, namely one kilogram of fat and protein corrected milk (FPCM) at farm level;
- setting of system boundaries from feed production, including its inputs, to farm then factory gate;
- allocation rules between co-products for feed production, milk and meat allocation, manufacturing co-products, alternative manure usage and on-site energy generation.



Table 1: *Chosen allocation approaches for the common dairy methodology*

Preferred approach	Allocation situation	Choice	Result
ISO hierarchy	Feed (pre-farm)	Economic	Depends on kind of feed
	Milk/meat and calves (farm)	Physical causality	Based on energy feed inputs to the system and associated milk and meat production
	Manure export (farm)	System expansion	Replaces N, P and K in chemical fertilizer
	Processing (dairy site)	Mix	Based on milk solids for raw material, specific value for use of energy, water
	Combined heat and power (farm, dairy site)	System expansion	Replaces electricity from national grid or heat

Opportunities arising from the IDF Standard LCA methodology

The IDF guide:

- provides a solid basis for the production of consistent and comparable carbon footprint data across the dairy industry;
- enables monitoring of GHG emissions on-farm and at manufacturing sites where Life Cycle Management can be introduced by dairy companies and LCA practitioners.

By doing this, the guide supports:

- benchmarking of sector and corporate carbon performance allowing greater transparency and accountability for progress in achieving reductions;
- estimation and comparison of the impact of different practices, thus creating clarity and a basis for common learning about GHG emissions. It allows dairy producers and others to learn about GHGs, put in place strategies for reduction and adaptation that can be quantified, and to make decisions that enhance the economic, social and environmentally sustainable value of the dairy industry.

Ultimately, the evaluation of dairy products done on a consistent basis supports the evolution of an efficient and sustainable global dairy sector, thus demonstrating the sector's credibility to customers, consumers and wider society.

"In 2011, ERM was commissioned by the Flemish government to provide consultancy services for the project 'Carbon Footprint of the Flemish livestock sector', involving a range of stakeholders from the dairy and meat chain. As to the methodological basis for the project, we recommended and the project's steering committee unanimously endorsed the use of the LCA Carbon Footprint Approach for Dairy published in 2010. This internationally agreed guide provides a clear framework and we believe that it will be used more and more in the future to assess greenhouse gas emissions from the industry."

Marianne Fernagut, Practice Lead, Sustainability & Climate Change, Environmental Resources Management (ERM) Benelux.

Commitment 2: World's best practice adoption and emissions reduction

Promote adoption of the world's best practices within the global dairy sector and actions that:

- a. Lead to the reduction of global GHG emissions from dairy production on a per unit of production basis;
- b. Promote the use of technologies and methods that improve the processing and distribution efficiency of dairy products;
- c. Optimize economic, environmental and social outcomes for global dairy stakeholders;
- d. Recognize different levels of development and local conditions;
- e. Build on existing frameworks and knowledge, including for scientific advancement and technology transfer;
- f. Promote decision making based on robust science, and
- g. Complement initiatives in other areas of sustainability.

Actions taken since the September 2009 signing of the Agenda for Action

Collaboration with FAO on assessing GHG emissions from global dairy cattle

Dairy sector experts actively participated in a FAO Advisory Group on methodology and data for assessment of GHG emissions from the dairy food chain. This collaboration resulted in the publication of the [FAO report](#) 'GHG Emissions from the Dairy sector – A Life Cycle Assessment' in 2010. The analysis forms part of a wider initiative carried out by FAO to assess GHG emissions from a range of animal food chains. This work:

- reassessed previous analysis of livestock's contribution to GHG emissions, identifying that global dairy production accounts for 2.7 percent of global anthropogenic GHG emissions, rising to 4.0 percent when emissions from meat production related to enterprises are included. Knowledge at the sector level better informs policy responses and public attitudes than an aggregate figure ever could;

- supported the approach of considering emissions per unit of production at farm gate (2.4 kg CO₂-equivalent per kg of fat and protein corrected milk) and provided more knowledge of the range of emissions at farm gate;
- improved understanding of the role of local agro-ecosystem characteristics and economic development levels in driving variations in emissions levels;
- highlighted the role of animal-related emissions within total GHG emissions from

dairy production. Methane accounting for over half of total emissions is the largest contributor, while nitrous oxide contributes between 30 and 40 percent.

Dairy is, and will continue to be, produced in a broad range of geographies. The collaboration with the FAO forms a platform for dairy production in each agro-ecosystem to continue or even start on its GHG emissions reduction journey.

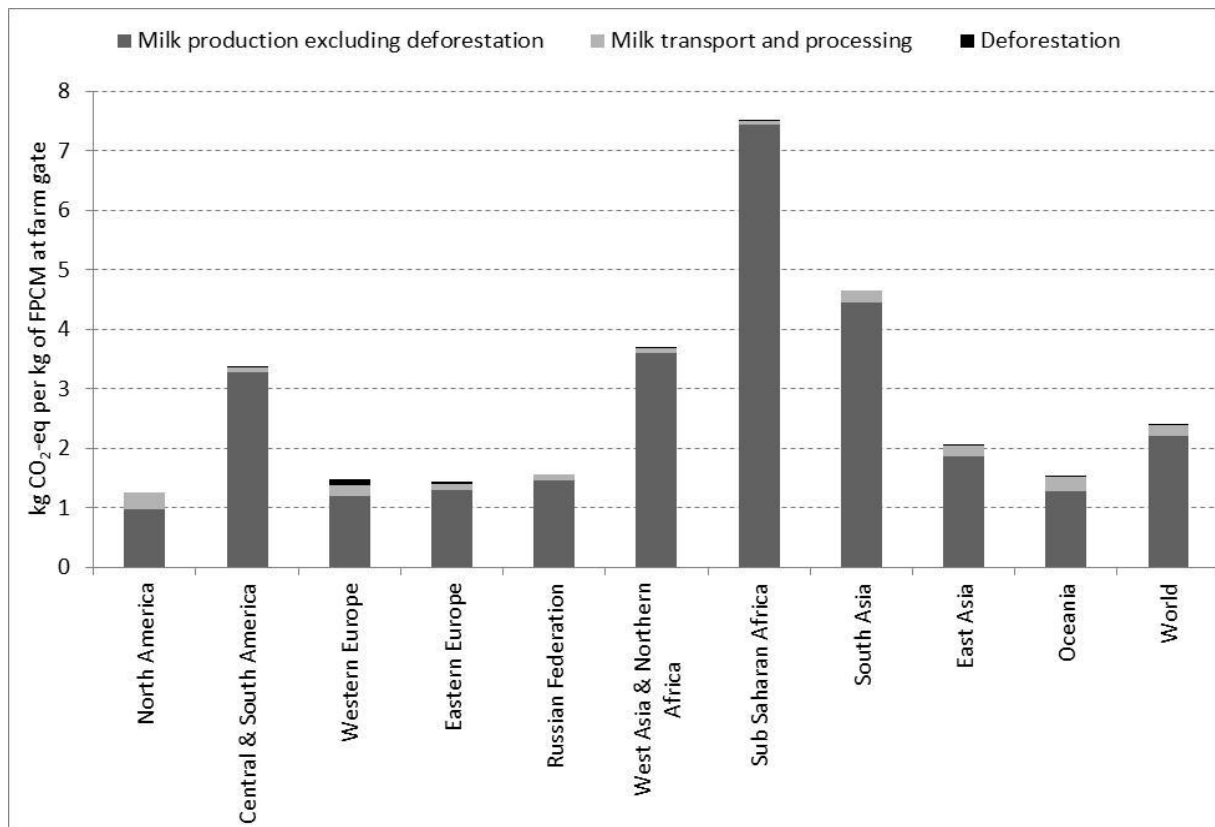


Figure 2: Estimated GHG emissions – kg CO₂-eq per kg of fat and protein corrected milk (FPCM) at farm gate, averaged by main regions and the world (source: FAO, 2010)

The FAO findings set a global sector reference level for dairy emissions and provided a point from which the sector could progress. The study provided more transparency and accuracy in determining the partial role of dairy in the overall livestock contribution to GHG emissions. The LCA method and database developed for the FAO assessment proved to effectively support the calculation of GHG emissions related to dairy production on a global scale. This was an important step towards the subsequent development of a harmonized methodology for the quantification of emissions from dairy within IDF – work which has been achieved later in 2010 as a part of the Agenda for Action's commitments (refer to Commitment 1 above).

Identifying the sector's best practices globally and sharing them publically online in a **Green Paper**

The global dairy sector is taking a proactive approach to support sustainable agriculture. It is identifying, sharing and promoting adoption of the world's best mitigation practices within the global dairy sector, according to the Agenda for Action's second commitment.

The aim is to provide dairy farmers and processors with some practical solutions and hands-on advice regarding what they can do to reduce their environmental impact as part of their daily routines – while improving their business. We all have a responsibility when it comes to these questions and we can all contribute.

"The path to sustainability requires us to address all the steps that need to be taken to reduce the carbon footprint at every stage in the path from milk production to processing up to marketing."

Dr. Amrita Patel, Chairman, NDDB, India

The dairy sector portal to the Agenda for Action, www.dairy-sustainability-initiative.org, provides a one-stop shop for anyone who wants to be better informed about what the dairy supply chain is doing to minimize its impact on climate change.

A 'Green Paper' has been created on a website to facilitate sharing of knowledge from GHG emissions-reducing initiatives. The Green Paper is an online catalogue of case studies illustrating the continuous progress made along the whole of the dairy supply chain. It is creating a number of benefits such as adding to the growing evidence of how the dairy sector is genuinely committed to reducing GHG emissions, promoting emissions-reduction technologies and practices in the dairy chain, and evidencing industry commitments.

The Green Paper website is accessible to all. The website's main sections are available in six languages (English, French, Spanish, Portuguese, Korean and Japanese). The website can be used by organizations and individuals working in the dairy supply chain, to share information about the positive actions they are implementing, on the farm, organization-wide, with suppliers or through research on a local or global level.

The Green Paper case studies are catalogued into six key areas following the dairy supply chain approach:

- Emission reductions on-farm
- Energy efficiency on-farm and in milk processing
- Transport efficiency
- Reduction in loss of milk and milk products
- Resource efficiency (packaging, recycling and recovery of waste)
- Life Cycle Analysis and management

The Green Paper success

Since its creation, the Green Paper has been a dynamic record of the dairy sector's actions to reduce emissions. By connecting geographically-diverse sector participants in sharing emissions reduction efforts, the Green Paper is accelerating the sector's total knowledge. Participants are learning from each other, enabling more effective targeting of resources. The Green Paper, by providing a transparent 'peer review function', is supporting advancement of sound scientific understanding and adoption of the best available solutions.

The Agenda for Action signatories place great emphasis on regular status updates on the Green Paper case studies. The number of online case studies on GHG emissions-reduction initiatives and the countries from which they originate is rising steadily (see chart overleaf).

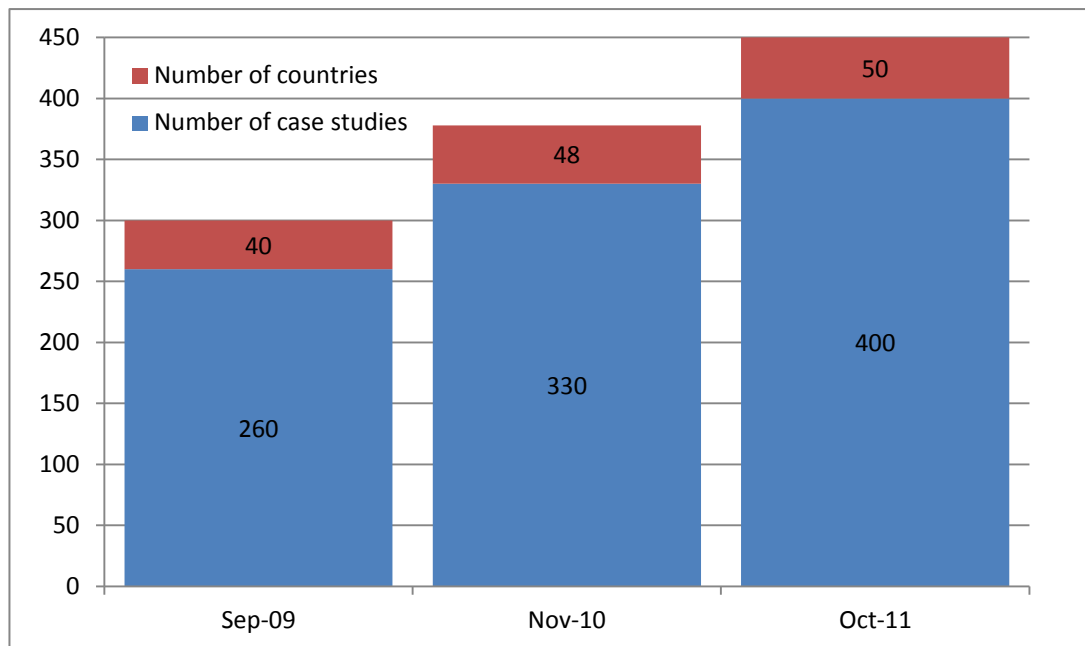


Figure 3: The number of visitors to the site has risen steadily as the number of case studies has grown.

Since its launch in 2009, over 16,000 individuals from as many as 150 countries or territories have visited the website, which suggests a large proportion of the industry has already accessed the case studies. Furthermore, the greatest numbers of visitors are from the world's strongest dairying countries. It would not be expected that dairy farmers themselves would necessarily access the information, but that it would be disseminated through extension and knowledge transfer networks in each country.

www.dairy-sustainability-initiative.org

Map Overlay

1 Sep 2009 - 1 Sep 2011

Comparing to: Site

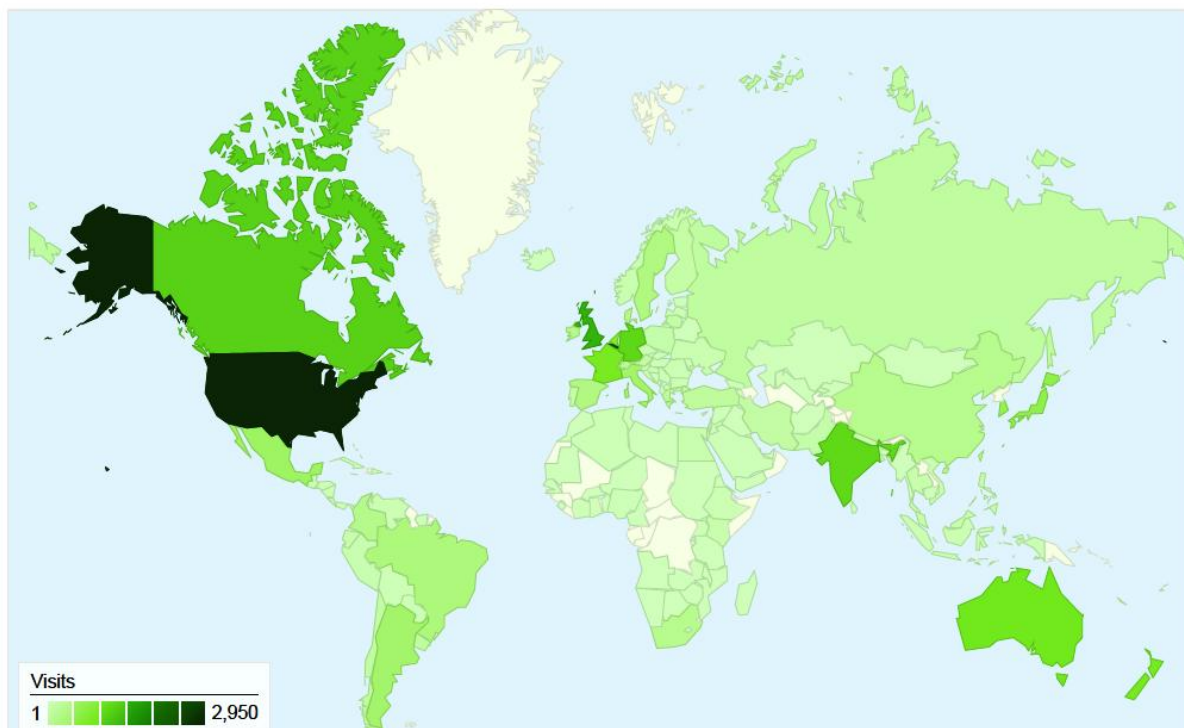


Figure 4: Geographical origin of visits to the Green Paper website (Source: Google Analytics; the more intensive green, the more visits)

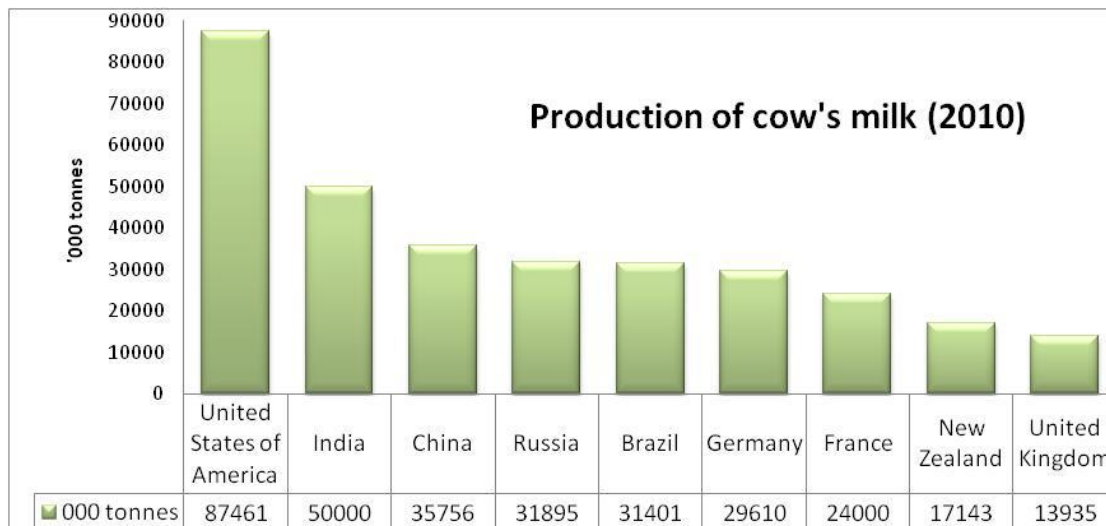


Figure 5: The greatest numbers of visits to the website generally come from countries with the highest levels of dairy production globally (source: The IDF World Dairy Situation Report 2011)

What does it mean for climate change and GHG emissions reduction?

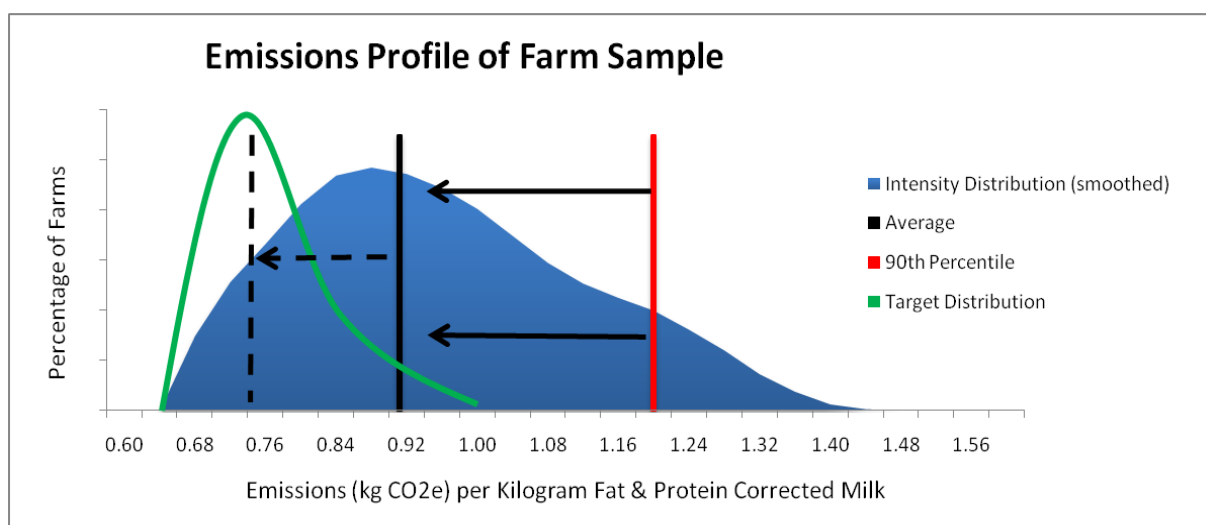
Through this Agenda for Action, the dairy supply chain recognized the need to work together in order to address the climate change challenge, to pool its knowledge, funds and resources to identify the changes in technology and practice needed to further reduce emissions across the supply chain.

The critical dimension, both locally and globally, is to lower the average emissions per unit of milk. This requires identification, quantification, implementation and sharing of best practice. Studies by some dairy processors have shown a large amount of variation in the emissions efficiency of dairy farmer suppliers.

Fonterra Emissions Variation Assessment – New Zealand

The figure below shows the distribution of emissions intensities from a sample of New Zealand dairy farms taken by Fonterra. Most farmers were grouped around 0.90 kilograms of CO₂-e emissions per kilogram of fat and protein corrected milk, however there was a significant 'tail' of farmers who were less emissions-efficient. The figure shows that by assisting less efficient farmers to reduce their emissions to current average levels, and by helping average farmers adopt best practice, the average emissions per unit of milk supplied can be reduced by about 20 percent. This is without any change in technology.

Figure 6: Distribution of emissions intensities from a sample of farms in New Zealand



On dairy farms, GHG emissions reduction on a per unit of production basis³ can be illustrated using a selection of case studies from the Green Paper⁴:

Optimizing overall farm management

[Clover's Best Farming Practices – South Africa](#)

Clover started its own Best Farming Practices in 2006. It is based upon the International Dairy Federation's Best Farming Practice guidelines and focuses on animal health and herd management, animal feed and water, animal medication and agricultural chemicals, milk hygiene and safety, environmental management, personnel, and people visiting dairy farms. All of Clover's milk producers partake in this initiative and are audited every second year by Clover's own staff.

Optimizing animal feeding

[Methane emission reduction through balanced feeding and breed improvement programs – India](#)

The National Dairy Development Board of India tested a ration-balancing program in several field studies. Taking into account the availability of feed resources with the milk producers and the stage of lactation, balanced rations were worked out for the milking animals. In a study conducted in the state of Maharashtra, the average methane emissions were reduced by 19.38 percent in terms of g/kg milk yield in observed lactating buffaloes, to a figure which was significantly lower than baseline emissions.

³ Where possible, resulting carbon reduction is estimated

⁴ The title of each case study contains a link to the Green Paper where a full story with more information is available

Optimizing use of fertilizers

[Optimization of fertilizer use and manure and slurry management – France](#)

This National Program for the management of polluting agents of agricultural origin aims to allow farmers located in high density French farming areas to have adequate effluent storage capacity to spread manure when appropriate and to improve their use of nitrogen. More than 30,000 dairy farmers have been involved and the initiative has resulted in a significant reduction in the use of artificial nitrogen fertilizers.

[Improving manure management and reducing nutrient run-off](#)

[British dairy farmer-funded research and development on mitigation and adaptation to climate change – Great Britain](#)

The project, funded by levy body DairyCo on behalf of farmers, developed rapid, reliable and accurate procedures for the analysis and characterization of farm yard manures and other organic materials through Near Infrared Spectroscopy. The techniques will make a significant contribution towards the improved and sustainable recycling of organic residues in farming with reduced environmental emissions. It will aid decision-making on utilization to maximize nutrient availability and uptake by crops and minimize the chances of both GHG emissions and leaching.

Improving soil management

[Sustainable dairy farming – Robert Grieve, Millbrook, Australia](#)

To be sustainable, Robert has planted shelter belts and protected mature native trees, is sowing perennial rye grass, is growing lucerne to feed his cows, is using natural fertilizers such as Eco Fish granules, and is switching over to humus fertilizers to improve soil quality. The end result is a win-win for the farmer in terms of high milk production per cow, and in improved environmental management and business performance of his dairy farm.

In addition to on-farm actions, carbon dioxide emissions from dairy are being further reduced thanks to ongoing sector improvements in the entire dairy chain due to:

Energy efficiency both on-farm and in processing

[Biogas produced by dairy farms – Mexico](#)

In Mexico, Nestlé collects fresh milk in several dairy production areas where biogas digesters have been built to capture methane from cow manure and use it as energy. Additional biogas plants are under construction as a result of the sustainability analysis at farm level. In 2011, it is projected that around 35 percent of the milk supplied for Nestlé in Mexico will come from dairy farms with biogas plants.

[Initiative to mitigate global warming in milk processing – Japan](#)

As a GHG mitigation strategy, Snow Brand Milk Products Co Ltd adopts a 'thermal storage' system for milk, which is energy and cost saving as well as environmentally friendly. The system produces and stores heat through an inexpensive night-time electricity service which uses less fossil fuel. This enables the business to reduce GHG emissions by 350t CO₂-e per annum in comparison to a conventional system.

Transport and product distribution efficiency

[Dairy Fleet Smart: adopting fuel-efficiency best practices – USA](#)

Through the adoption of transportation and distribution best practices, the Dairy Fleet Smart project aims to reduce GHG emissions for fluid milk by more than 542,000 metric tonnes and reduce fuel costs by nearly \$58 million by the year 2020. Dairy Fleet Smart is one of 10 projects underway to reduce GHG emissions and increase business value for the U.S. dairy industry.

Reduction in loss of milk and milk products

[Arla Foods work with reduction in loss of milk – the case of Gothenburg Dairy](#)

Arla's dairy at Gothenburg (Sweden) launched a specific campaign aimed at reducing loss of milk and production waste by actions such as changing batch size or using fewer machines and lines. The result was a 50 percent cut in waste and savings running into millions of kroner.

Resource efficiency

[Increase recycling of packaging – global](#)

In 2010, over 30 billion Tetra Pak cartons were recycled globally, which was double the number recycled in 2002. In 2011, Tetra Pak committed to help again double the global recycling rates of its used beverage cartons by 2020. In Europe beverage cartons reached a 36 percent recycling rate in 2010 and achieved a combined rate for recycling and energy recovery of 65 percent.

The selection of case studies above demonstrates that progress in dairy sustainability is being made globally at all different levels of development and local conditions. This progress is being achieved by optimizing economic, environmental and social outcomes for global dairy stakeholders in a win-win approach. The case studies show that GHG emissions can be reduced hand in hand with increased business profitability, often as a result of collaboration building on existing frameworks and knowledge, scientific advancement and technology transfer.

In addition, it is important to recognize the indirect co-benefits of reducing GHG emissions in such areas as water quality, biodiversity, and animal health and welfare. In some areas, animal and business performance is enhanced, resulting in more positive social outcomes. The Green Paper contains examples of these co-benefits.

Planting riverbanks in trees – New Zealand

Farmers in the New Zealand's Taranaki region have planted 4,500 kilometers of riparian margins of water streams with indigenous vegetation. These strips sequester carbon, improve local water quality and increase biodiversity. Current plantings are known to sequester over 4,000 tonnes of CO₂ per year.

The Sustainable Dairy Chain – commitment of the Dutch dairy industry

The Sustainable Dairy Chain initiative ('Duurzame Zuivelketen' in Dutch) embodies the commitment of the Dutch dairy industry to take significant action in energy and climate, animal health and welfare, grazing, biodiversity and landscape management. Farmers and dairy processors have set joint sustainability goals for 2020.

Commitment 3: Development of tools to measure and monitor emissions

Seek to advance the establishment of tools to facilitate measurement and monitoring of emissions both on-farm and in dairy manufacturing

Actions taken since the September 2009 signing of the Agenda for Action

The publication of a common method to calculate GHG emissions from the dairy supply chain (the Agenda for Action's Commitment 1) was an important step towards the measurement and monitoring of emissions on dairy farms and in the processing of milk into dairy products. It is important that the principles which sit behind the guide are brought to life and applied within individual operations across the supply chain. This will require the use of measurement and monitoring tools which can be regularly and cost effectively used to inform everyday business decision-making.

Examples of GHG estimation tools world-wide

Various 'carbon footprint' calculators for farm and industry application exist. Their purpose is not necessarily to obtain product-based carbon reporting consistent with dairy LCA methodology. Rather they are tools for facilitating improvements at an operational level in different parts of the dairy supply chain.

Therefore, the opportunity exists to make as many tools as possible compatible with the IDF LCA approach, provided they can be used to improve cross-border understanding and performance benchmarking.

GHG emissions are in many ways intangible. It is important to make them real to farmers and processor. This is the role emissions calculators serve, enabling parties to see and understand how changed management practices, or uptake of new tools, impact their emissions profile.

There are many other less specific tools and models available to the sector to guide producers and supply chains in understanding more about GHG emissions from their businesses. Appendix 2 to this report gives a non-exhaustive overview of some of the tools available, either free of charge or commercially, for a range of users, most particularly farmers, their advisers and policy makers.

"I am really pleased that DairyCo is ensuring the methodology used in Britain is consistent with that used by the IDF. The carbon footprint audit on my farm provided me with opportunities to improve my business and potentially influenced my plans in light of this new knowledge. Some examples are installation of a variable speed vacuum pump to reduce electricity consumption and genetic selection of a less angular, more robust dairy cow to increase herd life and also increase the value of surplus bull calves."

Stewart Jamieson, dairy farmer from Scotland.

Example of farmer participation in using the tools

Case study: European Project [Dairyman](#) is an initiative involving 14 partners, including livestock research institutes from seven EU countries. Dairyman aims to strengthen rural communities in the regions of North West Europe where dairy farming is a main economic activity and a vital form of land use. A network of 120 commercial dairy pilot farms is being set up spanning the participating regions and serving as focal points to inspire local farmers. The impact of new working methods on sustainability of the pilot farms will be monitored. Information obtained will be used to compile a manual on how to assess farm performance and set up a farm development plan. A whole range of farmer decision support tools is being assessed and several [carbon calculators](#) are being tested across 20 of the dairy farms.

Qualitative appreciation of the tools

The appropriateness of tools is impacted by different farming circumstances such as development level, geography and climate.

Case study: [Sustainability Performance Assessment \(SPA\) project](#)

The SAI Platform has continued to examine metrics and indicators for assessing the sustainability of farming. Beginning with principles and practices for sustainable agriculture, the SAI Platform has subsequently developed an initial catalogue of indicators in the SPA project, with a report published in 2010 entitled 'Towards a Simple Set of Farm-level Sustainability Indicators'. This is a work in progress, and in 2011 there was a second phase that will provide further information on the selection of the most practical indicators for measuring, monitoring and reporting sustainability performance, which will in turn contribute to better insight into available calculator tools.

What does it mean for climate change and GHG emissions reduction?

Case study 1: [Developing management tools for feed rations in Sweden](#)

Resource efficient feeding strategies are a key component in sustainable dairy production and are an important part of the development of management tools for animal health and welfare in Sweden. Balancing nutrient requirements of the cow, economy and climate impact of production will be important to attain sustainable solutions. The Nordic feed evaluation system NorFor will give valuable input to making the best choices as the system handles all of these aspects. Animal health is vital for milk production with a low climate impact at farm level. Therefore, the Swedish Dairy Association is planning to further develop a computer program that is at present used for benchmarking animal health between dairy farms. The goal is to calculate the GHG emission cuts from increasing animal health at farm level.

Case study 2: [DairySAT](#) Australia

This industry environmental self assessment tool includes a module on GHG emissions. The module, together with the Dairy GHG Abatement Strategies (DGAS) calculator, is being used by many of the 70 Dairying for Tomorrow natural resource management and climate change projects currently being implemented across Australia. Several Australian milk processors have incorporated DairySAT and DGAS into their farm care programs.

Refinement of existing tools and development of new ones facilitating quantification and regular monitoring of emissions need to be farmer-friendly, practical and easy to understand; they need to consume little time and be flexible enough to deal with advancing science and regular revisions or updates.

To be effective in supporting farm management and decision-making, these tools must also improve farmer understanding of agricultural emissions and opportunities to reduce GHG emissions on-farm (Commitment 4). They are achieving this, and highlight for farmers that emissions actions usually make economic sense, both in the short term (e.g. saving costs) and long term (e.g. enhanced fertility of soils and resilience of the on-farm biological system).

In summary, science and innovation are increasingly being brought to practice and are helping to increase farmer awareness, improving their performance and acting positively on the planet.

Commitment 4: Farmer understanding about GHG emissions

Promote improved farmer understanding of agricultural emissions and opportunities to reduce GHG emissions on farm

The role of farmers

In the food chain, farmers play an eminent role in mitigation and adaptation to climate change. In the dairy chain, approximately 80 percent of GHG emissions originate from the milk production process. Farmers are integral to GHG emission reductions via their production methods as they deal directly, for instance, with carbon sinks in agricultural (and forest) soils and with on-farm biodiversity. Farmers' actions are mainly driven by economic (profitability and medium-term viability) goals with more efficient use of resources that entail GHG emission reductions: a win-win outcome.

That is why dairy farmer understanding of the challenges and opportunities that offer practical, efficient and cost-effective mitigation options is essential to the successful delivery of the Agenda for Action commitments.

Actions taken since the September 2009 signing of the Agenda for Action

Building understanding of the potential for emissions reduction

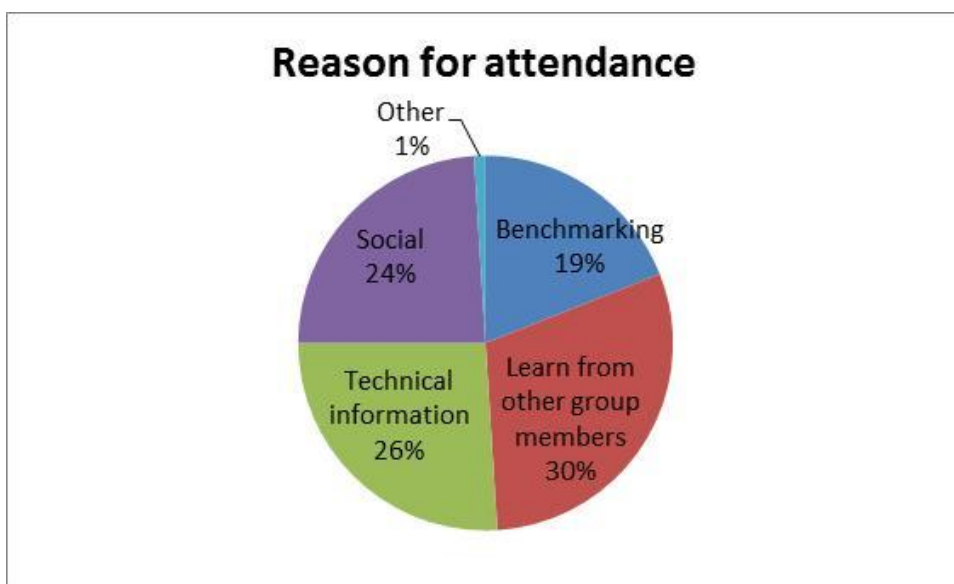
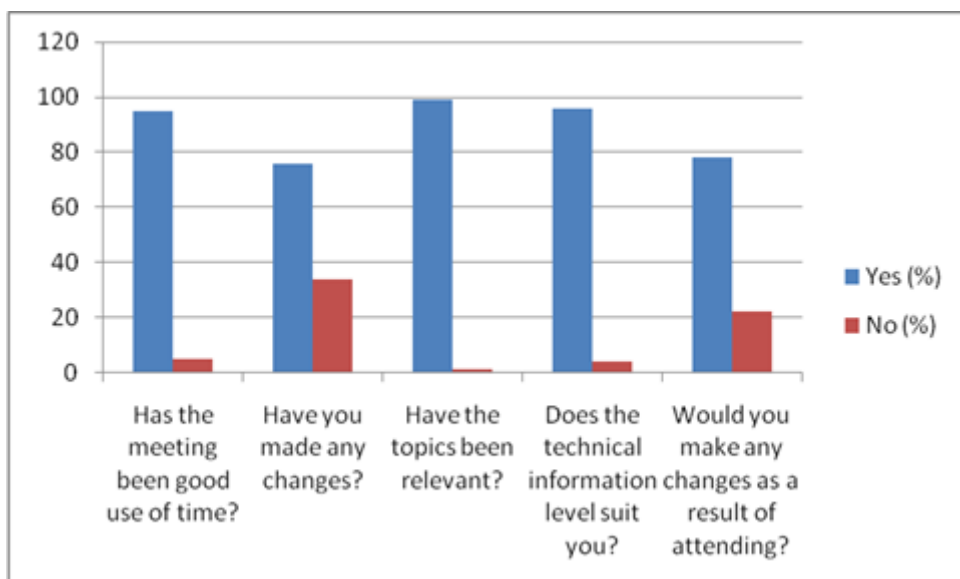
To reduce emissions, farmers must both be aware of their emissions, but more importantly aware of the 'levers' they have within their control to reduce emissions. Participants to this Agenda for Action have been working to better understand the emissions profile differences between farms, how these interact with other parameters, such as farm economics, and then to apply this knowledge to shape farmer extension programs.

Extension activities and capacity building

With an increased sector focus on sustainability, extension and awareness-raising activities such as dedicated conferences, workshops, membership education and training schemes are proliferating the world over. It is impossible to capture here the number of events and initiatives which have taken place since signing the Agenda for Action, but some of the examples are outlined in Appendix 3 of this report.

Case study: [DairyCo Business Groups](#)

The field-based extension team of Britain's levy body DairyCo regularly work with dairy farmer Business Discussion Groups, communicating up-to-date knowledge and research-based information to support farmers in making changes to their businesses and improving their production efficiency. Three core activities in the discussion group portfolio directly relate to the challenge of climate change: on-farm energy consumption; on-farm fertilizer, manure and slurry usage; and on-farm water usage. These business-led discussion groups are a proven way of providing a mutually-supportive environment for farmers through which new developments can be communicated. A 2010 survey shows just how influential this form of communication can be in changing farmer views.



Figures 7 and 8: DairyCo business-led discussion groups have been proven to be an effective way of communicating with farmers; survey results based on a 39% response rate n=136

Cooperation between farmers, industry organizations and other stakeholders

Dairy farmers and milk processing industry organizations are increasingly working together to set collective strategies and common goals. Dairy sector stakeholders also actively engage with governments and researchers in relation to GHG emissions. Examples are described in Appendix 3 of this report.

Case study: [The Path to Sustainable Development – A Strategy for Canadian Dairy Farmers](#)

In July 2010, Canadian dairy farmers adopted a sustainable development strategy to solidify their commitment to underpin the environmental and economic sustainability of dairy farming in Canada. As a start, Dairy Farmers of Canada is partnering with government, academic institutions and the private sector to fund research on sustainable practices in dairy, including the launch of a lifecycle analysis of the dairy farm sector.

Sector's participation in various government and certification schemes

In many countries, raising awareness among farmers is carried out by encouraging them to adhere to diverse voluntary certification and support environmental schemes launched by government or the industry itself. Appendix 4 of this report contains selection of some of these.

Example: [The ABC Program – Brazil](#)

Brazilian farmers are encouraged to adopt low carbon agriculture practices by signing up to the government ABC (low carbon agriculture) program. The initiative pursues the goal of producing food and biofuels while reducing GHG emissions. It promotes actions in six main areas with goals and results to be delivered by 2020, such as stimulating direct planting, crop-livestock-forestry integration (sustainable production strategy that integrates the three types of production in the same area), recovery of degraded pastures, nitrogen fixation, treatment of animal by-products and planting trees.

What does it mean for climate change and GHG emissions reduction?

Through their participation in an array of initiatives, dairy farmers are building their knowledge about climate change, its mitigation opportunities and possible adaptation actions for their farms.

We recognize that with millions of dairy farmers across the world, all at different development levels, it is a challenging task to build awareness and skills. That is why the dairy sector organizations and companies in various countries join forces with a broad range of stakeholders – from academia, financial institutions, associations, government and non-government (NGO) organizations and consumer bodies – to share the goal of advancing sustainability in the dairy sector.

Mitigating climate change cannot be done by any one farmer, cooperative, or even by one segment of our dairy chain. We need to work together as a sector in order to reflect on the diversity of viewpoints and improve how we address these challenges.

Commitment 5: Information sharing and aligning research efforts

Support sharing information and aligning research efforts to develop cost effective mitigation technologies for both on farm and manufacturing application

Science put in practice as underlying principle

The dairy sector is conscious of the key role research and development plays in bringing to light knowledge and innovative solutions to improve milk and dairy production. The signatories of the Agenda for Action recognize the need to base their actions on sound science. We also recognize that the global dairy sector needs access to major mitigation techniques if dairy is to meet the challenge of providing nutrition for a growing population in a way that is environmentally sound and socially responsible.

That's why sector participants invest and actively participate in research. Research work is being supported by stakeholders from across the industry — from farm to retail — who closely work with academics, suppliers, scientists and experts from government and NGO organizations. This support takes the form of expertise, time, money and in-kind services.

However, research itself cannot deliver efficiencies on-farm or in the dairy processing plant. In order to ensure that the mitigation techniques derived from research are available and implemented by farmers, capacity-building and advisory extension activities are required (refer to Commitment 4 above).

Actions taken since the September 2009 signing of the Agenda for Action

Dairy organizations and companies worldwide have been actively involved in a large number of research projects addressing GHG emissions, climate change mitigation and adaptation, and broader sustainability.

This involvement currently takes a variety of forms depending on the country or continent, and includes partnerships with government, research institutes, multi-stakeholder consortia, international research consortia, various organizations' (farmers' levy bodies') and even commercial companies.

In many countries around the world, dairy and farming-related research represents the most significant action towards mitigation of climate change.

Support sharing information and aligning research efforts

Scientific information relevant to dairy is being shared in particular through:

- The dairy sustainability website via its Green Paper – see for example the sections 'Agricultural emissions research' and 'Cow of the future'.
- The IDF Standing Committee on Environment with more than 60 industry experts from all continents.

The sector's commitment to aligning research efforts can be best demonstrated through examples of national cooperation and active dialogue between dairy stakeholders and the Global Research Alliance.

"The Alliance was created to build global networks among agriculture scientists and identify opportunities to reduce GHG emissions from food production. Through the Global Dairy Agenda for Action on Climate Change, the dairy supply chain is also working collaboratively to address climate change while meeting the nutrition needs of a growing world population. We applaud the industry's leadership in developing the Agenda and look forward to exploring opportunities to work together to achieve our common goals."

Hon David Carter, Minister of Agriculture, New Zealand, and

Hon Tim Groser, Minister Responsible for International Climate Change Negotiations, New Zealand, and

Henk Bleker, Minister for Agriculture and Foreign Trade, the Netherlands

The Global Research Alliance (termed 'the Alliance') is an international initiative aimed at reducing the emissions intensity of agricultural products, and was formalized in June 2011 by the signing of a charter by 32 country representatives. The Alliance has been established to address three key areas:

- Find ways to reduce the emissions intensity of agricultural production and increase its potential for soil carbon sequestration, while enhancing food security.
- Improve understanding, measurement and estimation of agricultural emissions.
- Improve farmer access to agricultural mitigation technologies and best practice.

Although a government-to-government initiative, the Alliance is actively seeking to partner with leading industry organizations, including those from the global dairy sector, to better achieve its aims.

"In launching the Global Dairy Agenda for Action we made a call for action from policy makers to create a positive environment for us, from which we can move forward. By aligning government research efforts and pooling resources the Global Research Alliance has taken a significant step forward in supporting, enabling and complementing industry efforts. The sector was particularly pleased that in launching the Global Research Alliance, Governments recognised the dual challenges of food supply and emissions reduction. We agree with and strongly support the Global Research Alliance's focus on reducing emissions per unit of agricultural production."

Peter Erik Ywema, General Manager, the SAI Platform

Ongoing research activities with the dairy sector's involvement

The table in Appendix 4 to this report portrays a non-exhaustive global overview of climate-related research initiatives which are currently being developed in partnership with the dairy sector in major focus areas.

Key areas of emphasis for the research are on the most promising aspects in terms of efficient GHG emissions reduction in the dairy chain. Given that a large portion of GHGs, mainly methane and nitrous oxide, originate from milk production processes on farms, scientists increasingly focus on agricultural emissions research where the biggest opportunities lie, in particular:

- Ruminant nutrition and rumen ecology to reduce production of enteric methane by dairy cattle;
- Manure management, effluent waste treatment;
- Animal selection and breeding to increase and optimize herd population characteristics such as dairy cow productivity and longevity;
- Lower GHG-emitting farming systems, looking at management decisions and the adoption of best practices by dairy farmers to implement multiple measures on-farm, and the subsequent impact on the GHG emissions generated.

In addition, research continues into developing guidelines and tools for farmers, to support the reduction of GHG emissions on-farm (e.g. a project underway in Ireland by Teagasc that will develop a carbon navigator for farmers).

It is important to note that these research projects run over several years and are expected to deliver results in due course.

The substantial degree of investment from the sector in linked research, development and extension activities worldwide can be illustrated by following examples:

- The New Zealand agricultural industry and Government-formed Pastoral GHG Research Consortium (of which Fonterra and DairyNZ are founding and funding partners) will spend NZ\$43 million between 2003 and 2012 in agricultural GHG mitigation research.
- DairyCo (farmer levy board) in Britain now commits 16 percent of annual farmer levy income to research and development;

furthermore, this will rise dramatically in 2011/2012 due to the development of two new research partnerships. The areas to be covered will be dairy cow health, welfare and nutrition, and grass, forage and soil management.

- Between 2007 and 2010, U.S. dairy farmers invested some \$18 million to launch the U.S. Dairy Sustainability Commitment, covering initial costs of research, strategic planning and project development. Other organizations, such as foundations and government, have contributed financial and in-kind services, to help advance farmer's priorities — the Innovation Center for U.S. Dairy received more than \$1.6 million in 2010 from these external organizations.

What does it mean for climate change and GHG emissions reduction?

Examples of pilots

The following examples show significance of potential emissions savings being targeted by some of the current research programs. Visit also the Green Paper for additional information (e.g. 'Cow of the Future' section).

[Experimental farm of AgroParisTech School: Grignon Energie Positive – France](#)

The Grignon Energie Positive (GE+) project, supported by a wide range of both private and public partners, aims to assess the potential solutions that agriculture – including dairy farming – could adopt to face environmental challenges, in particular fossil energy scarcity and global climate change. Initially implemented at the Grignon farm in 2005, the improvement program is now carried out across a network of 20 farms. Thanks to the new practices implemented at the Grignon farm between 2006 and 2010, energy consumption and GHG emissions decreased by 35 and 20 percent respectively per liter of milk produced.

Feed efficiency – Australia

The Ellinbank Research Station in the Australian state of Victoria is carrying out research to reduce methane emissions from alternative sources of cow feed. A number of feeds have been trialed including canola, cottonseed, hominy meal and brewers grains. Research results indicate that for every one per-cent increase in dietary fat, there is a corresponding 3.5 percent fall in methane emissions.

Cow of the Future – USA

Implementation of existing technologies and management practices in the U.S. dairy industry along with continued genetic progress in milk yields is expected to result in 10 to 12 percent reductions of methane emissions per unit of milk over the next decade. To achieve the additional 13 to 15 percent reduction to reach the overall goal of 25 percent requires investment in research to identify and develop new strategies and technologies. Conservative estimates suggest that additional reductions of 15 to 30 percent can be achieved, dependent upon the development of new strategies and technologies and their adoption by the U.S. dairy industry.

Improving the efficiency of dairy production reduces GHG emissions - Ireland

Teagasc has identified using Life Cycle Analysis a number of cost effective practices that farmers can readily adopt nationally, which will reduce their carbon footprint per unit of milk through improved production efficiency. Increasing the length of the grazing season by 10 days is expected to reduce GHG per unit of product by 1.7 percent. Similarly, greater use of artificial insemination to improve the genetic merit of the herd by 10 units will reduce the carbon footprint of dairy production by 2 percent. Improvements in nutrient management and greater use of legumes such as white clover will contribute to reducing GHG emissions by reducing farm N surpluses, e.g. reducing farm N surplus by 25 kg ha decreases the carbon footprint by 1.5 percent.

By its active participation in both fundamental and applied research, the dairy sector wishes to promote policy and strategic decision-making based on sound science. More importantly, the dairy sector is making sure that research brings to light practical and cost-effective mitigation solutions for both on-farm and manufacturing application. Promising solutions are being tested in farm pilot projects and then disseminated to farmers.

III. Summary of progress

Sustainability is a long-term journey of continuous improvement, and the dairy sector is committed to making a positive contribution towards global action to address climate change. The first two years of the Global Dairy Agenda for Action have laid significant foundations from which we will continue to move forward.

The signing of the Agenda for Action in 2009 identified five important commitments towards achieving this goal, it also recognized the shared sustainability journey of signatories and their members. As such, our actions in addressing these commitments reflect the broader responsibility shouldered by the sector in providing a growing global population with the nutritious dairy products they want, in a way that is economically viable, environmentally sound and socially responsible.

Since 2009, the global dairy sector has made progress in the following areas:

- in all its commitments to advance the reduction of GHG emissions,
- along the whole milk supply chain, and
- globally, though in ways appropriate to local circumstances, dictated by the countries' dairy systems and recognizing the unique regional characteristics of production and manufacture of nutritious dairy products,
- while maintaining and building our contribution to communities and sustainable diets.

Some of the most important developments over the past two years have been in setting up 'infrastructure' to support the delivery of other commitments and future goals. For example, an important first step was to gain agreement for a common model to evaluate our progress. The resulting life-cycle methodology – A Common Carbon Footprint Approach for Dairy – allows a calculation of carbon footprint of dairy products in the same way around the world. This creates consistency in measuring results and clarity both internally and externally.

However, the ultimate aim of this piece of work should not be forgotten. The sector built a framework and is currently working on developing practical tools to help dairy stakeholders to identify, quantify, evaluate and continuously monitor the GHG emissions in dairy operations. This is a prerequisite to build actions to reduce emissions and benchmark our improvements.

Actions to positively respond to climate change and sustainability challenges have become more broadly embedded within the dairy sector's strategy, but it is important to capture and share these. The Green Paper website launched in 2009 is testimony to the scale of the dairy sector's commitment globally and allows knowledge transfer with recording and sharing of best practice.

Aside from the Carbon Footprint methodology, which has been successfully published, the sector's other commitments are continuous in nature. Their uptake and development can be illustrated through a number of initiatives taking place worldwide.

A measure of success of the initiative should be its reach and influence. Within two years we have already seen widespread uptake from many countries around the world. We have also seen recognition throughout the breadth of the whole dairy supply chain of the opportunities to cut emissions sustainably, and from organizations central to the debate, such as FAO.

"The collaboration between FAO and the IDF to analyze greenhouse gas emissions from dairy is very successful. In 2010 a detailed report was prepared, which was a major accomplishment and served as an input to the development of IDF's guidebook on carbon footprint in the sector. The collaboration involves sharing technical expertise and resources, and dissemination of the results both to the industry and general public. From the FAO perspective, it is extremely useful to be able to talk to a consolidated and strong sector."

Pierre Gerber, Senior Livestock Policy Officer, FAO

Participation across the dairy supply chain

Geographical participation in the Green paper

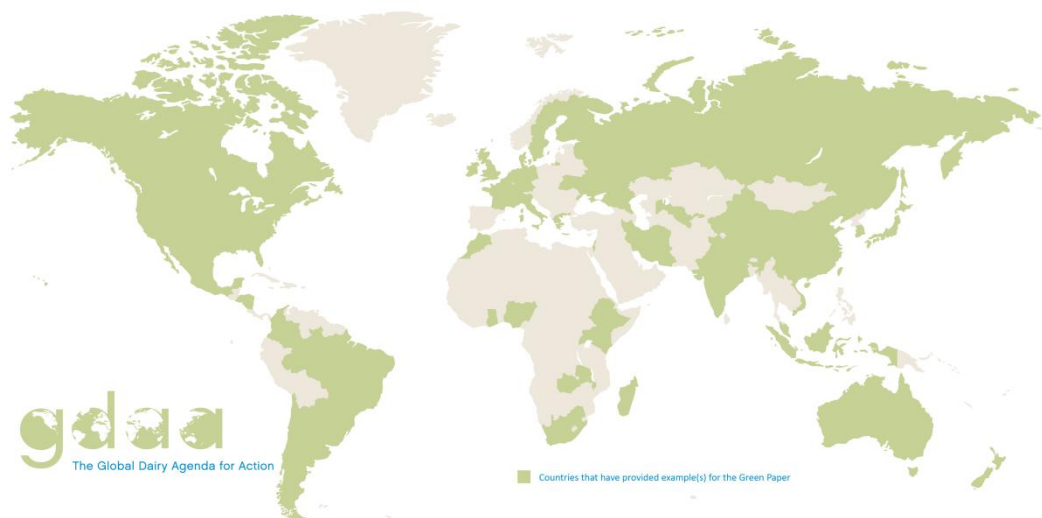
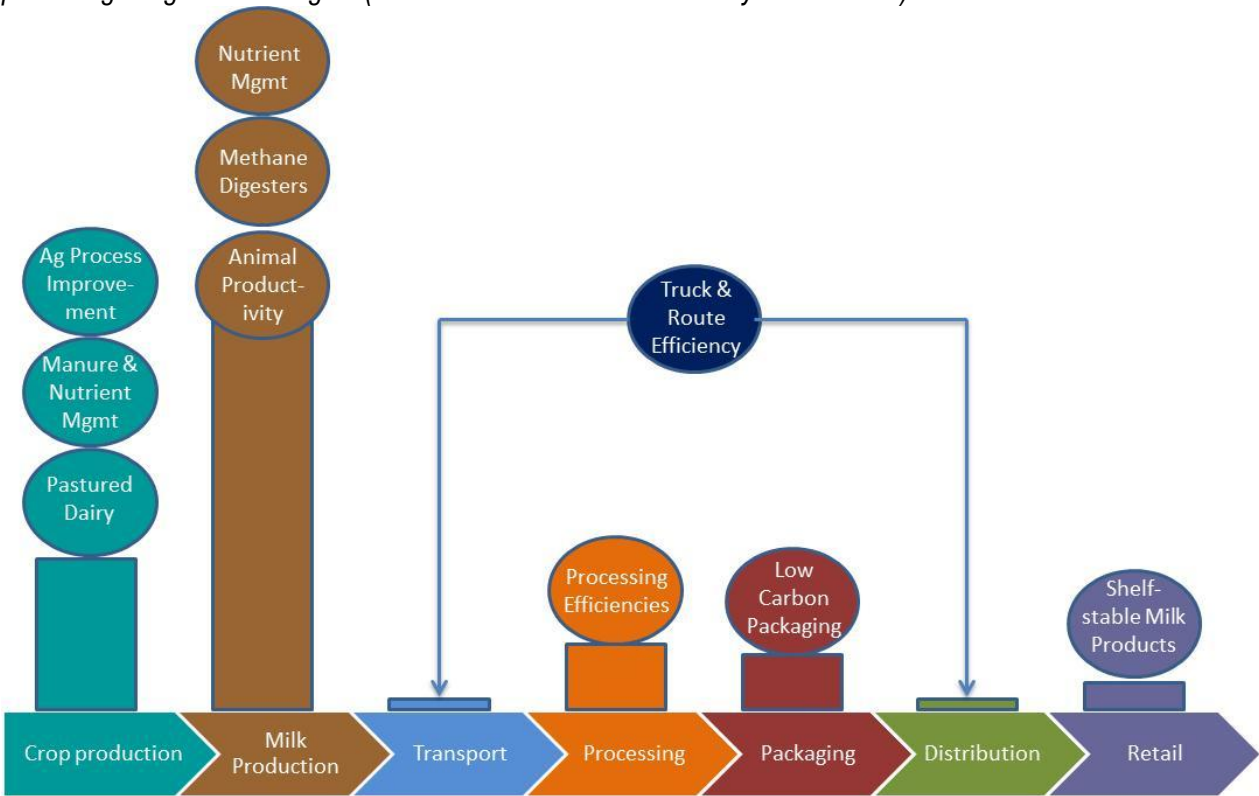


Figure 9: Participation in this initiative comes from the majority of the world’s countries, and all its continents.

Despite different levels of economic and social development, engagement is taking place in both developed and developing countries and across all continents.

The dairy supply chain emits different levels of GHGs at different stages. There are many opportunities to mitigate these from farm to factory gate.

Figure 10: Representation of typical climate change ‘hotspots’ within the dairy supply chain, and most promising mitigation strategies (Source: U.S. EPA and University of Arkansas).



Participation in collaboration with other partners and institutions

The progress made would not be possible without our formal partnership, strategic alliances and collaboration with those who provide specific expertise, legal framework as well as additional resources.

As it will still take many years until the global dairy sector and governments are able to estimate an aggregate level of emissions savings achieved, it is not possible in this first progress report to present a global figure.

However, the examples shown give an appreciation of what has already been achieved in individual or collaborative projects around the world. Furthermore, FAO provided the necessary benchmarks against which the dairy sector will seek to improve.

So at this point of time, we reconfirm our initial commitment from 2009 to focus on climate change and further commit to assess other sustainability issues such as water use, water management and water quality. We have made significant progress but our mission has not been completed as dealing with climate change and sustainability will be a continuing process.

IV. Laying the foundations for further progress

On a per unit of production basis, the dairy sector is committed to emitting fewer GHGs than it is at the moment. The sector is making progress in contributing to actions to address climate change through a comprehensive set of individual activities which incorporate:

- Action to use the tools we have today to address areas where significant emissions are emanating from in 'hotspots' across the supply chain;
- Investment in the development of tools for substantial long term gains;
- A firm commitment to emissions reduction while taking into account different countries' capacity to change.

Specificity of the dairy sector

There is a range of GHG emissions mitigation challenges inherent to food production and to dairy in particular. Unlike industries handling inert materials, dairy farming deals with complex biological functions in production systems that are all at different levels of development. Milk is globally produced by a predominantly heterogeneous community of farmers and dairy processors (e.g. in scale and numbers). There are biological, technical and scientific limitations to achieve rapid change in emission patterns. In some cases, trade-offs between lower emissions and the other effects of a single measure (e.g., economic viability, other environmental indicators) need to be appreciated.

Different reduction targets exist

With a growing amount of awareness, dairy organizations and individual companies in different parts of the world are adopting sustainability strategies and action plans with specific voluntary targets which also aim to reduce GHG emissions, while building economic value across the supply chain. These action plans provide a major new tool to achieve a cut in environmental impact of some nations' dairy sectors. The vast majority of leading dairy businesses, many of them owned by dairy farmers, have sustainability as an integral component of their business structure and everyday activities.

Nonetheless, the wide diversity of milk production situations across the world means that different participants are at different points on their sustainability journey and may not yet be at the point of being able to adopt a more targeted approach. The capacity to reduce GHG emissions from dairy varies significantly between countries depending on a range of parameters such as technological advancement, farming systems and climate. Many countries do not yet have the capacity to measure their progress. It may still take many years before most countries can track changes in GHG emissions with the LCA approach and scientifically assess their real capacity for reduction.

Examples of national and corporate sustainability strategies are given in Appendix 5.

These strategies cannot be disconnected from global policy discussion with regard to climate change and may be further influenced in future by renewed international or specific regional/national emission reduction commitments (e.g. United Nations COP; EU voluntary reduction targets). However, the examples offer an insight into what can be achievable in ten or twenty years' time by voluntary industry actions.

"In the U.S. dairy industry, we have learned that there is incredible power in working together, pre-competitively, through our entire value chain - from farm to retail. System-wide collaborative efforts, in addition to expertise from domestic and international partners in the academic, business, financial, government and nongovernment industries have helped advance our sustainability goals tremendously. Individual organizations cannot continue to try to solve complex industry-wide issues. We all have to work together toward 21st Century solutions that make the global dairy industry, people and the Earth economically, environmentally and socially better – now and for future generations."

**Erin Fitzgerald, Senior Vice President,
Innovation Center for US Dairy/DMI**

V. Future of the GDAA initiative

Overview

The Global Dairy Agenda for Action (GDAA) was launched as a living document. At this time its signatories are taking the opportunity to review progress and develop the next steps.

Sustainability is a long-term journey of continuous improvement. The first two years of the Global Dairy Agenda for Action have laid significant foundations from which we will continue to move forward.

At this point of time, we reconfirm our initial commitment from 2009 to focus on climate change and further commit to assess other sustainability issues such as water use, management and quality issues. Our mission has not been completed as dealing with climate change and sustainability is a continuous process.

Looking forward from this point

The dairy sector will continue to invest and work to meet its commitment to reduce the GHG emissions associated with each kilogram of milk produced globally. In other words, we are committed to contributing to meet the increasing global demand for food in an emissions-efficient way. The progress will be made in a way and over a timeframe that also recognizes and avoids compromise to the dairy sector's broad social and economic contributions to our communities. These contributions include employment creation, rural development and poverty alleviation – as stated previously, emissions reduction must work hand in hand with sustainability goals. For an industry focused on provision of food products that further the health and wellness of billions of consumers this is the most responsible approach we can adopt. We must now look at specific actions to maintain progress.

Reinforcing the commitments

- Starting in October 2011, the Agenda for Action's progress will be reported biannually during the IDF World Dairy Summit. The global dairy sector's commitments are not static and the degree to which they are being met will be evaluated in a qualitative and a quantitative manner.

Methodology to assess the carbon footprint of milk and dairy products

- As stakeholders become familiar with the use of the dairy LCA carbon footprint methodology, the GDAA signatory organizations will keep track of scientific methodological developments and collect examples of case studies that demonstrate how the methodology is helping users to measure, manage and reduce their carbon footprint. These examples will highlight effective carbon management along the global dairy sector value chain, bringing greater profitability and more sustainable production.

Sharing best practice

- The global dairy sector will continue to share best practice to mitigate climate change. The Green Paper contains a range of GHG emissions mitigation practices. The quality of the Green Paper in terms of access, content, visibility and search-ability will be further improved, and its content will be publicized more widely.

Related research

- The GDAA will continue to focus on research related to GHG emissions and other sustainability issues affecting the dairy value chain. The signatory organizations will seek to identify partners to stimulate further research.

Addressing other sustainability issues

The GDAA signatory organizations are conscious of the wider sustainability issues relevant to the global dairy sector. These include more efficient management of natural resources (water, biodiversity, air, soil fertility), animal health and welfare, and nutritional density (environmental footprint/nutrient density of different foods), while acknowledging the contribution of dairy to beneficial economic and social outcomes.

The Agenda for Action started with a focus on the climate impact of dairy. Acknowledging the

global concern regarding water scarcity and in recognition of the desire to meet a wider sustainability agenda, GDAA is set to assess the issue of water use, water management and water quality in relation to milk and dairy production, including appropriate scientific assessment approaches to be used internationally.

The objective of this assessment will be to better understand the impact of these water issues on the sector and vice versa, and to identify how to best address the challenge through a holistic approach on an international level.

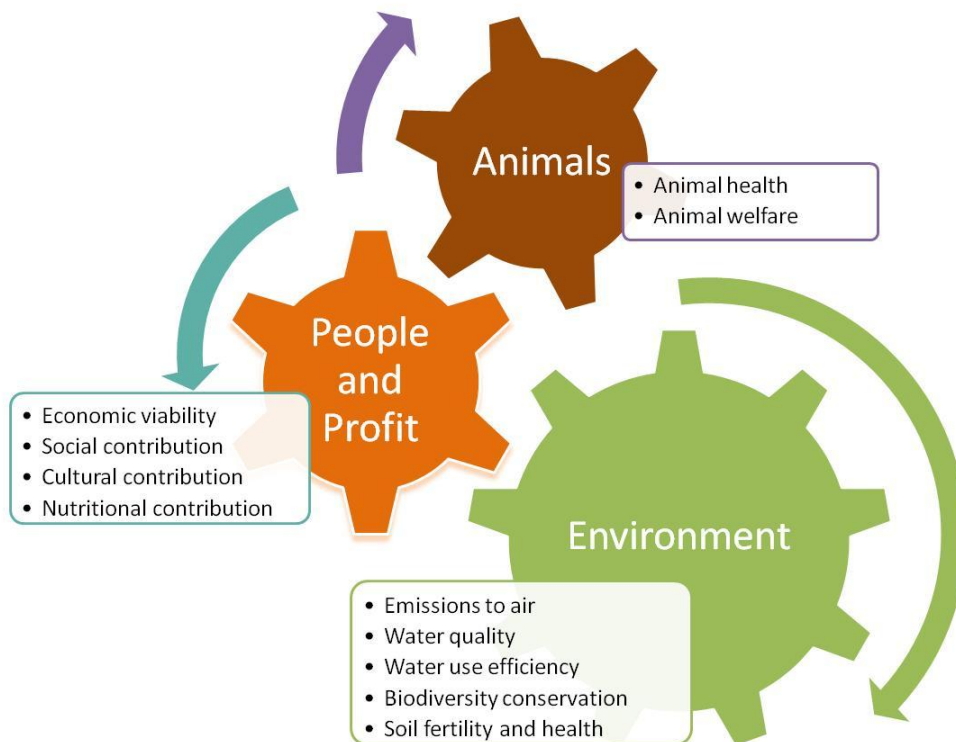


Figure 11: A summary of wider sustainability issues

Engaging with all stakeholders in the dairy supply chain

Dairy farmer involvement in developing the Agenda for Action is crucial as dairy farming encompasses the biggest potential to reduce emissions of GHGs from the dairy supply chain. Although dairy farmers are represented in some of the Agenda for Action signatory organizations, the dissolution of the IFAP in 2010 created a gap. So in order to further promote the Agenda for Action in farming

circles internationally, the signatories recognize the need to secure farmer participation in this global initiative. The recent establishment of the World Farmers Organization (WFO) offers an opportunity that will be explored as soon as WFO becomes operational in commodity issues (expected in 2012).

Other strategic alliances will be sought to support the development of the Agenda for Action, including scientific experts, dairy chain partners and wider society.

VI. Conclusions

A flexible and collaborative approach

We realize that a progressive and sufficiently flexible approach in climate change mitigation is needed if the global dairy sector is to take into account its wide diversity in farming conditions across different geographies and climates. The ongoing implementation of our Agenda for Action and its Green Paper catalogue have confirmed that different levels of development and local conditions exist which means that there is no one-size-fits-all solution to reduce our carbon footprint.

The dairy sector's efforts do not happen in isolation. We value the power of partnership. We developed this Agenda for Action on a collaborative, pre-competitive basis with a range of stakeholders across the sector and from broader society. Due to our conviction that major achievements can only happen if there is a substantial, concerted and international collaboration on mitigation, we are ready to engage with interested stakeholders who are willing to join us on our mission – or who simply wish to learn from our experiences. Consumers are also important stakeholders as they can be highly influential in stimulating change within the industry. Failure to communicate technological changes that might be necessary to reduce climate impact could create reputational problems in the future; equally, consumer demand could be stimulated to help drive change.

Research, knowledge transfer and extension

Continued investment in research, development and knowledge transfer of new technologies is required to move the industry forward and improve the uptake of best practice measures. Securing a good level of investment from the sector and its partners in future emissions reductions may prove to be a decisive factor, especially for situations where current costs-effective mitigation potential is limited.

A critical path to enhanced climate sustainability is bringing improved technologies and services to farmers at their doorstep. It is the adoption of these technologies and services by farmers across the globe that will make the real difference. But it is the extension, education and delivery of services to the farmers at their doorstep that will be the real challenge. It is important for primary producers to identify how they can tackle carbon emissions while develop their business in a complementary way, but to achieve change they need knowledge and practical support.

That's why we recognize that achieving sustainable outcomes requires both farming and manufacturing to invest in practices, technology and decision-making that strikes the right balance between economic growth and environmental management. Research and dissemination of best practice – the focus of Commitments 4 and 5 in this document – are also areas deserving of further government assistance. In this respect, the dairy sector makes a call to policy makers to provide a favorable landscape for dairy to fulfill its commitments.

The future for policy and climate change agreements

Current developments indicate that future international climate change agreements will be different in nature to the current Kyoto Protocol. Future agreements are likely to be politically binding on nations rather than legally binding global treaties. Measures such as sector-based initiatives will be important adjuncts to these new agreements. The Global Dairy Agenda for Action on Climate Change provides a positive example of how sector-based agreements can work in practice and positions the international dairy sector well as a positive and proactive industry.

A renewed call to policy makers

A supportive policy environment is required both at national and international level to take into account the wide diversity of dairying systems in order for the sector to deliver on its climate change commitments while fulfilling its social and economic goals.

Important progress in addressing GHG emissions can be made by putting more emphasis on regularly-reviewed industry self-management, and in even greater collaborative efforts – thereby avoiding some of the unintended consequences of broad government regulatory approaches. The signatories of this Agenda for Action strongly believe that sharing best practice will promote decision-making based on sound science.

The overarching role of sustainability

Sustainability has become integral in our daily practices and decisions. We produce food more efficiently than we did five, ten or twenty years ago, but we can do even better. As thinking and acting sustainably cannot be limited to actions related to the sole issue of climate change, we are now charting a path forward covering other sustainability challenges in our continued Agenda for Action.

Our progress supports the conviction that dairy deserves to be a preferred source of nutrition. By addressing the efficiency of milk and dairy production, we address the increasing demand for food on global basis, and in particular protein demand. Food security, dairy sustainability and viability of the producer and the whole of the supply chain cannot be dissociated, and the Global Dairy Agenda for Action on Climate change is a testimony of our effort to achieve these goals.

Appendices

1. Summary of GDAA key achievements in the period 2009 - 2011
2. Non-exhaustive list of tools to facilitate measurement and monitoring of emissions both on-farm and in dairy manufacturing
3. Examples of actions aiming to promote improved farmer understanding of agricultural emissions and opportunities to reduce GHG emissions on farm
4. Non-exhaustive global overview of climate related research initiatives developed in partnership with the dairy sector
5. Examples of national and corporate sustainability strategies (action plans) with specific voluntary targets

Appendix 1

Summary of GDAA key achievements in the period 2009 - 2011

	Commitment	Progress and achievements
1.	Promote the development of a standard methodology framework for assessing the carbon footprint of milk and dairy products based on robust science	• Publication of an international life-cycle assessment (LCA) methodology; • This created a common standard to use comparable benchmarks for estimating the carbon footprint of dairy products; • Foundation for an efficient use of resources and focus on action.
2.	Promote adoption of the world's best mitigation practices within the global dairy sector	• Green Paper website identifies, shares, and promotes best practice; • 2010 FAO dairy report provided global context, building our understanding of regional differences, and set an initial per unit of emissions benchmark; • Adoption of emissions reduction targets by stakeholders in the dairy supply chain, demonstrating the momentum already gained by the initiative.
3.	Seek to advance the establishment of tools to facilitate measurement and monitoring of emissions both on farm and in dairy manufacturing	• Establishment of practical tools to make greenhouse gas (GHG) emissions easier to understand and manage at each stage of the supply chain; • The subject of GHG emissions and associated resource management efficiency has become an integral part of farm management globally.
4.	Promote improved farmer understanding of agricultural emissions and opportunities to reduce greenhouse gas emissions on the farm	• Extension activities such as training schemes, workshops and participation in various government and certification programs, promote a better understanding of the 'hot spots' and strategies available to dairy farmers to address climate change and its mitigation.
5.	Support sharing information and aligning research efforts to develop cost effective mitigation technologies for both on farm and manufacturing application	• Current research programs supported by the dairy sector show that when the GHG emissions savings of such programs are reached, there will be a positive impact.

Appendix 2

Non-exhaustive list of tools to facilitate measurement and monitoring of emissions both on-farm and in dairy manufacturing

Country	Carbon footprint calculator and related decision tools
New Zealand	OVERSEER® : the computer model of this tool calculates and estimates the nutrient flows in a productive farming system and identifies risk for environmental impacts through nutrient loss, including run off and leaching, and greenhouse gas emissions
Australia	Dairy Greenhouse gas Abatement Strategies Calculator (DGAS): this allows farm managers to calculate the impact of adopting different abatement strategies on their total farm GHG emissions and can help them work out the strategies best suited to their farming system
USA	The E-CO2 Project: ongoing adaptation for use on US Dairy farms with modifications to meet the IDF specifications "Beta comment version" calculator developed for University of Wisconsin-Madison for cheese manufacturing The Dairy Farm Stewardship Toolkit: The Dairy Research Institute is developing a Dairy Farm Stewardship Toolkit for dairy producers to evaluate their production techniques and identify potential improvements in management practices.
Canada	Holos: a whole-farm modeling software program to estimate and reduce GHG emissions from farms Atlantic Dairy Forage Institute: testing a calculator of GHGs and emission reductions from dairy farms
France	Dia'terre®: diagnostic tool for on-farm energy and GHG emission assessment GES'TIM: methodological guide to estimate impact of different farming activities on GHG emissions Danone Danprint tool: a tool for measuring the carbon footprint of company's products from upstream to downstream on all activities of the group
U.K.	Example of a carbon calculator for dairy farms: E-CO2 Project: is being adapted to provide footprint figures based on the IDF LCA methodology.
EU	Dairyman : an EU project where several carbon calculators are being tested on 20 dairy farms and a whole range of farmer decision support tools is being assessed for content and quality
Sweden	Klimatkollen : meaning 'Climate-check', a calculation tool which is part of a _project called "Focus on nutrients"
The Netherlands	Kringloop-Kompas: meaning 'cycle compass', this allows farmers to score their performance on climate, footprint, air, water, soil and biodiversity Klimaatlat: meaning 'the Climate Yardstick' is an interactive website to inform farmers about measures to reduce GHG emissions. It shows which sources on the dairy farm score high in gas emissions and which measures can best be used to reduce them. A website-built program calculates the quantity of emitted GHGs.

Examples of work with the IDF LCA guide

- Dairy industries in:
 - New Zealand (Fonterra), Denmark and Sweden (Arla Foods), France (Danone), United Kingdom (e.g. DairyCo), Italy (Granarolo), Canada (Yoplait), United States of America (a model is being adapted for use on U.S. Dairy farms) – for more information about some of the work being done, visit the Green Paper website section “[Life cycle assessment and management](#)”.
- Researchers in partnership with the dairy sector:
 - Denmark and Sweden: research project of PhD students Anna Flysjö (Århus University and Arla Foods, Denmark) and Maria Henriksson (Swedish University of Agricultural Sciences, Sweden).
 - Flysjö, A., et al. 2011. [The impact of various parameters on the carbon footprint of milk production in New Zealand and Sweden](#). *Agricultural Systems*. Vol. 104 (6) pg. 459-469
 - Flysjö et al. 2011. [How does co-product handling affect the carbon footprint of milk? Case study of milk production in New Zealand and Sweden](#). *International Journal of Life Cycle Assessment*. Vol. 16 (5) pg. 420-430.
 - Kristensen T., et al 2011. [Effect of production system and farming strategy on greenhouse gas emissions from commercial dairy farms in a life cycle approach](#). *Livestock Science*. Vol. 140 (1), pg. 136-148
 - Norway: research project [KLIMAT – Cooperation on Environmental and Climate Gas Documentation of Food Products](#)
 - France: Research of the French Livestock Institute on “Lifecycle assessment of carbon footprint of milk from French dairy farms” is underway. Presented at Conference ‘*The global environmental footprint of dairy products*’ during the IDF World Dairy Summit 2011 in Parma, Italy.
 - United States of America: Thoma et al. 2010. [Greenhouse Gas Emissions of Fluid Milk in the U.S.](#), University of Arkansas. Presented at *LCAFood2010 7th International Conference in Bari, Italy*.
 - Canada: [Environmental and Socio-Economic Impacts of Milk Production in Canada](#) (full environmental and socio-economic assessment observing the IDF LCA Guide for carbon footprint)
 - Australia: [Lifecycle assessment of carbon in the Australian dairy industry](#)
- Policy makers in:
 - The European Union – consideration of the IDF LCA methodology in the work currently developed by the [European Food Sustainable Consumption and Production Round Table](#)
 - Belgium – Flemish government commissioned a study on “Carbon Footprint of the Flemish livestock sector” (due to be published by the end of 2011).
- Product developers, carbon consultancies:
 - The E-CO2 Project; Environmental Resources Management (ERM), Bureau Veritas CODDE

Appendix 3

Examples of actions aiming to promote improved farmer understanding of agricultural emissions and opportunities to reduce greenhouse gas emissions on farm

Extension activities

The Netherlands	Dairy industry and dairy farmers organize workshops for farmers to increase their awareness about the issue of sustainability (e.g. FrieslandCampina organised: 140 theme sessions with more than 6000 participating farmers)
U.K.	Over 24 presentations have been given to dairy farmers between March 2010 until April 2011 on the area of carbon footprinting and reducing GHG emissions, and, in broader terms, the environmental impact of GB dairy farming. The vast majority of these presentations have been given at the request of dairy farmers, demonstrating that there is increasing interest among the dairy farming community. The DairyCo extension team is involved in working on a daily basis with dairy farmers seeking to improve their efficiency of production (targeted fertilizer use, energy efficiency and strategic feeding of cows), which will reduce emissions as a direct result. Low Carbon Farming conference was organized by Dairy U.K., in full partnership with DairyCo, on 22 June 2010 targeting dairy farmers, consultants and advisors. It examined the tools available to dairy farmers to reduce their environmental impact – with case studies.
FEPAL	Between March and June 2011, FEPAL in cooperation with CAMPO VIVO Consultores organized an international correspondence course titled " Sustainable dairy production: man, environment and economy integrated into one intelligent system ". The 10-week course was designed for a broad range of participants such as milk producers, dairy advisors and technicians, students specializing in animal production and others. The three facets of sustainability: economic, social and environmental were explained in depth.
Brazil	The International Forum on Strategic Studies for Agriculture and Livestock Development and Respect for the Climate - FEED 2011 is organized annually by the Brazilian Confederation of Agriculture and Livestock (CNA) with the main goals of discussing, evaluating and seeking solutions to climate change impacts on the Brazilian agricultural and livestock activities. Participants from Brazil and other countries assisted to a dedicated session on 'The production of dairy products and the challenges of reducing emissions' was held, including a presentation on the GDAA.
India	On 4-6 th February 2011, the 39 th Dairy Industry Conference (DIC) was organized at Salt Lake City, Kolkata in India. The event centered on sustainability. In its technical program, the Conference hosted a number of presentations about sustainable dairy development in India.
ESADA	On 25-27 th May 2011, ESADA organized the 7 th African Dairy Conference and Exhibition at Dar es Salaam in Tanzania. A session was dedicated to climate change challenges on the African continent, with a particular focus on the role of women and cooperatives of smallholders.
Australia	Climate Toolkit : A web based toolkit with information about Climate and Greenhouse Gas emissions, regional climate impacts and the Dairy Greenhouse Gas Calculator.

Cooperation between farmers, industry organizations and other stakeholders

U.K.	Dairy Roadmap and Greenhouse Gas Action Plan : The U.K. Dairy Roadmap report reviews the sector's progress against its 2010 targets and re-examines the future targets to ensure that they remain challenging and are based on the most recent scientific research. The Action Plan will bring the outcomes of all existing initiatives together under the same umbrella, documenting the changes that farmers are making and reporting progress.
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France	Day of training for agricultural technicians on GHG emissions and ways of improvement. Guide on best environmental practices in animal farming was published in 2011 intended for agricultural technicians and dairy farmers. Greater energy efficiency: to improve energy consumption of tractors, of materials for cooling milk on the farm, and an audit on energy consumption of dairy farmers
Sweden	The Federation of Swedish Farmers' collaborative project "Focus on Nutrients". The extension visits to dairy farms, focusing on the climate aspect, is increasing rapidly. The Federation of Swedish Farmers has launched a campaign called "Climate Smart Business", focusing on win-win solutions where farmers can reduce the climate impact and costs. Meetings are being held and there are brochures and films on You Tube showing good examples of farmers making changes saving both money and GHG-emissions. Not all about dairy but at least two good dairy examples concerning cost- and GHG-efficient feeding strategies involving roughage of high quality and home grown protein feed.
U.S.	Increasing awareness and understanding of the issues relating to GHG emissions through university, industry, processor and NGO meetings with producers and other stake-holders to discuss and identify the areas in which most progress can be made. The Innovation Center for U.S. dairy has strategic partnership and alliances with key organizations such as WWF, USDA and others. More in the U.S. Dairy Sustainability Commitment progress report from December 2010.
Canada	Dairy Farmers of Canada's Sustainable Development Strategy was launched in 2011 and is being promoted across the industry. The objectives are to reduce GHG emissions from Canadian dairy farms, promote the efficient and sustainable management of natural resources on dairy farms, and benchmark the socio-economic performance of dairy farms. There are 13 research projects in support of the strategy. The University of Guelph will receive funding under the government of Canada's Agricultural Greenhouse Gases Program (AGGP). An amount of \$2.8 million was announced by the government of Canada to develop and validate Best Management Practices (BMPs) for livestock and cropping systems on dairy farms. Feeding strategies, manure management and cropping systems management will be investigated and mitigation strategies evaluated at each stage. Measurements will be taken of GHG emissions and carbon sequestration to understand the impacts and determine the overall effect on emissions from the whole farm. Research will be done in three provinces and an economic assessment made of the BMPs to identify the most cost-effective. There are multiple partners under the project including support from Dairy Farmers of Canada, Alberta Milk, and researchers from institutions in Quebec, Nova Scotia, Ontario and Alberta will collaborate on the project. Technology transfer activities are planned and one of the deliverables will be the creation of a Best Management Practices manual for dairy production. Greenhouse Gas Mitigation Program for the Dairy Sector developed in partnership with Agriculture and Agri-Food Canada's Agri- Science. The dairy component of the GHGMP, delivered by the Dairy Farmers of Canada and called "Our Cows, Our Air," has carried out demonstration projects in various regions across Canada.
The Netherlands	The Sustainable Dairy Chain annual report 2010 "breakthrough in sustainability". The Commitment of the Dutch Dairy industry to take significant steps concerning three main topics: energy and climate; animal health, welfare and grazing; and biodiversity (closing of mineral loops, sustainable soy, landscape conservation). Dairy farmers and the processing industry have set collective goals. We are in the process of making them more specific. Publication of the "Roadmap to an energy-neutral dairy chain in 2020 and a climate neutral growth". We see production of green gas by manure digestion as the foremost "sustainability multiplier": energy production, greenhouse gas reduction and manure refinement. The dairy chain has the potential to produce its own energy and more, and reduce greenhouse gas emissions by 30% in 2020, compared to 1990 figures. Just started a project on monitoring of sustainability on dairy farms to provide farmers with online tools to assess the opportunities for improvements in one or more of the three topics and to assist them with practical advice and to offer them a benchmark against the average or 10% best achievements of their colleagues. On sector level this will gradually result in a bottom up collection of data to show the progress the chain is making as a whole.

Australia	<u>Dairying for Tomorrow</u>: a practical natural resource management (NRM) program to secure the future of Australia's dairy farms. There are currently 70 Dairying for Tomorrow projects being implemented across Australia. Between 2004 and 2011 over 50% (4,000) of Australian dairy farmers participated in natural resource management and climate change projects involving Dairying for Tomorrow tools and frameworks. Over 80% of participating farmers made changes to their farming practices. Australian Government partnership with Dairy Australia "<u>Mitigation and Adaptation in the Australian Dairy Industry</u> (MAADI) with its component <u>Future Ready Dairy Systems</u> (FRDS, 2010 -2012). The objective of the MAADI project is demonstration and validation of climate change mitigation and adaptation options, strategies, and technologies with a network of 15 on-farm demonstration sites. FRDS will involve more than 3,000 farmers and service providers through workshops, field days, case studies, and professional development activities. Delivery is based around farmer to farmer learning and is focused on ensuring dairy farmers have knowledge and understanding about the range of viable, practical and profitable options for climate change adaptation and mitigation that are relevant to their systems. Participation rates and feedback to date has been very positive.
New Zealand	Technology transfer to farmers and continued implementation of technologies to reduce energy use at dairy manufacturing sites. Since 2003, Fonterra's New Zealand dairy farmers have reduced emissions by an estimated 8.5% per kilogram of milk solids. This has resulted in a reduction of 1.4 million tonnes of carbon dioxide equivalent emissions per year from that which would have occurred if the 2003 base level of intensity had remained. Dairy Energy Assessment Project – individual energy assessments for 150 Fonterra suppliers then supporting these suppliers to implement improvements. A targeted reduction of 10% of on-farm electrical energy consumption is expected.

Sector's participation in various voluntary government and certification schemes

Germany	<u>DLG Certificate "Sustainable Agriculture"</u> – Fit for the Future"
Brazil	Brazilian producers are encouraged to low carbon agriculture by signing up to Brazilian government support scheme " <u>The ABC Programme</u> " – see also above in the report's text.
India	The ambitious National Dairy Plan (NDP), which spans over a period of fifteen years, envisages major interventions in two areas: - Increasing the productivity of milk animals, i.e. doubling milk production by 2021-22 through genetic improvement and a more scientific approach to feeding. - The organized sector, both cooperative and private operators, will have to increase their share of milk's marketable surplus from 30% to 60% (160 million kg per day) to lead to food safety and provide a direct link to milk producers and through that a remunerative price and technical inputs. This will necessitate both expansion of existing as well as creation of new processing facilities.
Australia	<u>The Carbon Farming Initiative</u> is a carbon offsetting scheme being established by the Australian Government to provide opportunities for farmers by reducing carbon pollution. Dairy NSW Energy Efficiency Program (DEEP) provides a free on-farm energy audit, supported by an incentive program to improve existing practices. To date, approximately 400 farms have participated and planning is underway to implement this project in other dairy regions.
Sweden	Two dairy companies (Milko and Skånemejerier) have participated in the project of climate certification and labelling of food. The labelling takes a whole food chain approach, with rules at farm level, dairy level, packaging, logistics etc. Dairy was among the first food groups to be labelled and now there are consumer milks and milk products with a climate label available in shops. The dairy farmers delivering the milk have made changes in order to reduce the GHG-emissions at farm level, e.g. increasing energy efficiency, increasing the amount of home grown feed and reducing the amount of soy- and palm oil feed products.

U.K.	Department for Environment, Food and Rural Affairs' (Defra) integrated advice pilot FF0204 aiming to provide a robust system of integrated advice to the farming industry. This will help to strengthen the ability of the farming sector to ensure a secure, resilient, environmentally and economically sustainable and healthy supply of food with improved standards of animal welfare. On completion of this study in 2012, farmers and their advisers will be better able to make balanced decisions that integrate and contribute to both economic and environmental objectives relevant to their business and motivation. The overall aim is to develop a novel, farmer-focused approach to deliver flexible, integrated advice that balances farm business objectives with Defra policy objectives, and integrates measures to achieve multiple wins.
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Non-exhaustive global overview of climate related ongoing research initiatives developed in partnership with the dairy sector *

Country	Ruminant nutrition and rumen ecology (enteric methane)	Manure handling, effluent waste treatment	Animal selection and breeding (cow productivity, other herd population characteristics)	Lower GHG emitting farming systems, farm management decisions, adoption of best practices	Other	Form of partnership	Major delivery dates
New Zealand	✓		✓	✓	N ₂ O formation and mitigation	Dairy industry commitment to funding research on mitigating on-farm GHG emissions through the Pastoral Greenhouse Gas Research Consortium (PGgRc) – partnership between New Zealand pastoral industries and the foundation for Research Science and Technology (FRST). Dairy industry is a foundation member of PGgRc www.pggrc.co.nz Formation of Agricultural Gas Research Centre which also provides administrative support to the New Zealand based Secretariat of the Global Research Alliance, and manages the Livestock Emissions Abatement Research Network (LEARN).	2013

* LCA-methodological research and production of GHG and NH₃ inventories not included;

In bold: name of the research initiative. For more information follow the link or visit the Green Paper website www.dairy-sustainability-initiative.org

Appendix 4

Country	Ruminant nutrition and rumen ecology (enteric methane)	Manure handling, effluent waste treatment	Animal selection and breeding (cow productivity, other herd population characteristics)	Lower GHG emitting farming systems, farm management decisions, adoption of best practices	Other	Form of partnership	Major delivery dates
Australia	✓ <u>Reducing Emissions from Ruminant Livestock Program</u> – e.g. CH₄ quantification	✓ <u>Methane to Markets in Agriculture</u> - methane into renewable energy		✓ Reducing Emissions from Ruminant Livestock Program	<u>Nitrous Oxide Reduction Program</u> – developing spatial and temporal scaling tools to compare best management practices to reduce N₂O emissions International Consortium for Improving Processing Sustainability – development of a self-cleaning technology to reduce bio-fouling of milk processing by 50-80%. Reduction in the energy requirement of spray drying. <u>Mitigation and Adaption in the Australian Dairy Industry</u> - validation of emerging adaptation and mitigation strategies, interactions with farming systems	Various forms of initiatives: - Government support multi stakeholder research program - A multi stakeholder project - Australian Government partnership with Dairy Australia	2012-2013
USA	✓	✓ Increase farm-based renewable energy production	✓	✓ project <u>“Green Cheese”</u>	A comprehensive LCA for cheese is under way to assess factors including greenhouse gas emissions, water use and quality, land use and biodiversity. As of August 2011, the research team has surveyed 24% of all cheddar and 38% of mozzarella, representing about 80 % of natural cheese. Findings will be available at the end of 2011.	The comprehensive LCA for cheese is being conducted by University of Arkansas and University of Wisconsin-Madison. It was commissioned by the Dairy Research Institute, an affiliate of the Innovation Center for U.S. Dairy	2011

* LCA-methodological research and production of GHG and NH₃ inventories not included;

In bold: name of the research initiative. For more information follow the link or visit the Green Paper website www.dairy-sustainability-initiative.org

Appendix 4

Country	Ruminant nutrition and rumen ecology (enteric methane)	Manure handling, effluent waste treatment	Animal selection and breeding (cow productivity, other herd population characteristics)	Lower GHG emitting farming systems, farm management decisions, adoption of best practices	Other	Form of partnership	Major delivery dates
Canada	✓	✓		✓	Other projects on Canadian Dairy Research Portal , e.g. modeling through transition, bioenergy generation from manure	Dairy research cluster – Partnership between Dairy Farmers of Canada, Canadian Dairy Commission, Agriculture and Agri-Food Canada (government) Research activities at Canadian universities	2013
Brazil	✓		✓	✓ Grassland management	Pecus research network with its project component 'RumenGases': focus on methane Modeling land use Biomass project – sustainable use of land in six Brazilian biomes	International University partnerships (e.g. EU co-funded project Animal Change) Cooperation between the Brazilian Agricultural Research Corporation Embrapa, the farmer's organization CNA and other industry stakeholders	2015 and 2019
Germany					Food industry network to share improvement practices for energy efficiency: " Energietische 2011 "		2011
The Netherlands	✓ Feed	✓ Manure refining and energy production	✓ Routemap to extend cow life	✓ New farming systems	Program for farm energy saving with benchmarks Transportation network for green gas Roadmap to an energy neutral dairy chain in 2020 and a climate neutral growth Monitoring		2020

* LCA-methodological research and production of GHG and NH₃ inventories not included;

In bold: name of the research initiative. For more information follow the link or visit the Green Paper website www.dairy-sustainability-initiative.org

Appendix 4

Country	Ruminant nutrition and rumen ecology (enteric methane)	Manure handling, effluent waste treatment	Animal selection and breeding (cow productivity, other herd population characteristics)	Lower GHG emitting farming systems, farm management decisions, adoption of best practices	Other	Form of partnership	Major delivery dates
U.K.	✓	✓	✓	✓ Sustainable intensification through increased scales of production Lean thinking and benchmarking DairyCo footprint study – identify 'hot spots' for farmers to improve efficiency	N ₂ O mitigation and fertilizer application Improvement of forage (phosphorus, nitrogen) Sustainable water for livestock Animal welfare and climate change Modeling the impact of controlling endemic diseases on GHG emissions	DairyCo (carbon footprinting study) Government projects (Defra)	2011-2014
Ireland	✓		✓ effect of different genotypes/breeds on enteric CH ₄	✓ grassland management and enteric methane	N ₂ O mitigation and optimizing fertilizer application (nutrient management) Soil carbon sequestration in pastures	This high priority cross-sectoral research program within Teagasc relies on extensive consultation with farming interests, food processing sector, and other state agencies in the course of prioritizing research and knowledge transfer activities on sustainability.	2011-2012
France	✓	✓ Anaerobic digestion pilot project	✓	✓ Energy neutral (positive) farm	Adding economic value to avoided carbon emissions: carbon trading	Grignon Energie Positive : industry-university partnership	2013

* LCA-methodological research and production of GHG and NH₃ inventories not included;

In bold: name of the research initiative. For more information follow the link or visit the Green Paper website www.dairy-sustainability-initiative.org

Appendix 4

Country	Ruminant nutrition and rumen ecology (enteric methane)	Manure handling, effluent waste treatment	Animal selection and breeding (cow productivity, other herd population characteristics)	Lower GHG emitting farming systems, farm management decisions, adoption of best practices	Other	Form of partnership	Major delivery dates
Norway	✓ adding components to the feed					Research project ' Increased value creation in food production through characterizing and mitigating emissions of greenhouse gases from agriculture in Norway '	2012
Japan	✓			✓	CH ₄ monitoring system Application of Clean Development Mechanism (CDM) on livestock – emission reduction credits for projects in developing countries		2016

* LCA-methodological research and production of GHG and NH₃ inventories not included;

In bold: name of the research initiative. For more information follow the link or visit the Green Paper website www.dairy-sustainability-initiative.org

Examples of national and corporate sustainability strategies (action plans) with specific voluntary targets⁵

Country/ Organization	GHG Reduction goals	Share of global cow's milk production ⁶	Estimation of CO ₂ -eq. emissions avoided
Examples of national dairy strategies			
United States / Innovation Center for U.S. Dairy, Inc.	25% reduction in GHG from the U.S. fluid milk supply chain by 2020 http://www.usdairy.com/Sustainability	14.6%	Based on 2007-2008 data, a 25% reduction would equal 31,310,305 metric tonnes ⁷
Germany/German Farmers' Union (DBV)	DBV Strategy Paper : 25% reduction in CH ₄ and N ₂ O emissions from farming by 2020 (30% reduction by 2030) Double the reduction of CO ₂ by 2020 through renewable energy generation	4.9%	-
United Kingdom/ Dairy Supply Chain Forum chaired by DairyU.K.	Dairy Road map and agricultural Greenhouse gas Action plan : 20-30% reduction in GHG balance from dairy farms by 2020	2.3%	3 million metric tonnes
The Netherlands/ Dutch dairy sector and government	With 'The Sustainable Dairy Chain initiative' ' Duurzame Zuivelketen ' dairy industry and dairy farmers take action in energy & climate, animal health & animal welfare, grazing and biodiversity and environment. The goals on climate and energy are: - 30% reduction on GHG in 2020 compared with 1990 and climate neutral growth - 20% sustainable energy in 2020 and an energy neutral dairy chain - 2% energy efficiency a year (1.5% industry and 0.5% in the chain), adding up to 30% energy efficiency in the period 2005-2020. Execution of the " Roadmap to an energy neutral Dairy chain in 2020 and a climate neutral growth ".	2.0%	-

⁵ Click on the text highlighted in the second column to get more information on the respective items

⁶ Source : The IDF World Dairy Situation report 2010 (production figures from year 2009)

⁷ Source: Thoma et. al. Greenhouse Gas Emissions of Fluid Milk, University of Arkansas, 2010.

Company	GHG Reduction goals
Examples of corporate strategies	
Arla Foods	25% reduction in GHG emissions from production, transport and packaging by 2020 as compared to 2005 baseline
Fonterra	Carbon reduction Action Plan > 30% reduction by 2030 in GHGs (methane, nitrous oxide and carbon dioxide across the full supply chain (and farm inputs, processing and transportation to port for destination)
Danone	30% reduction in carbon footprint per kg of product by 2012
Friesland-Campina	“Route2020” : climate-neutral growth throughout the entire chain, from cow to consumer; > 30% reduction of GHG by 2020 (dairy farm and milk transportation); 1.5% reduction in energy use per year (dairy processing)
Unilever	Sustainable Living Plan (not dairy specific): By 2020 CO ₂ emissions from energy from Unilever factories will be at or below 2008 levels. This represents a 63% reduction per tonne of production and a 43% absolute reduction (versus a 1995 baseline). By 2020, more than double the use of renewable energy to 40% of company’s total energy requirement
Supplying industries	
Tetra Pak	Environmental targets : cap carbon emissions at 2010 levels by the end of 2020 = 40% relative reduction in GHG emissions by 2020 in company operations with an estimated 5% compound annual growth rate



The Global Dairy Agenda for Action

International Dairy Federation

70/B, Boulevard Auguste Reyers

1030 Brussels - Belgium

Tel: +32 2 733 98 88

Fax: +32 2 733 04 13

E-mail: info@fil-idf.org

www.fil-idf.org

www.dairy-sustainability-initiative.org

For general enquiries, contact:

Stanislav Jaš

Environment & Sustainability Officer

Tel : +32 2 325 67 53

Fax : +32 2 733 04 13

E-mail : SJas@fil-idf.org

For media enquiries, contact:

Marylène Tucci

Communications Officer

Tel : +32 2 325 67 44

Fax : +32 2 733 04 13

E-mail : MTucci@fil-idf.org