



2011 U.S. Dairy Sustainability Report

U.S. DAIRY SUSTAINABILITY
COMMITMENT

 **INNOVATION
CENTER FOR U.S. DAIRY.**
HEALTHY PEOPLE • HEALTHY PRODUCTS • HEALTHY PLANET



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About This Report

The *2011 U.S. Dairy Sustainability Report* is the second progress report published by the Innovation Center for U.S. Dairy® and covers activities in the 2011 calendar year, except where clearly noted. Our previous report, *U.S. Dairy Sustainability Commitment Progress Report*, was published in December 2010 and covered the period from 2007 through Aug. 31, 2010.

This report is intended to update stakeholders on the 2011 progress of the U.S. Dairy Sustainability Commitment. We have expanded last year's focus on greenhouse gas (GHG) emissions by including broader discussions of environmental, social and economic aspects, impacts and opportunities across the dairy industry. The report discusses material topics, which were identified through the development of the Sustainability Measurement and Reporting Framework for U.S. Dairy described on page 16, as well as input we received from the stakeholder feedback efforts described on page 55.

As promised in last year's report, our 2011 report follows Global Reporting Initiative (GRI) Sustainability Reporting Guidelines, Version 3.1, Level C. Reporting boundaries are twofold: specific performance and progress of sustainability efforts led by the Innovation Center to support the U.S. Dairy Sustainability Commitment, and broader sustainability efforts and performance measures of the U.S. dairy industry as a whole. Refer to the GRI Content Index on page 56 for a complete list of GRI indicators and applicable boundaries.

Looking forward, we intend to publish annual updates of our sustainability progress.

Feedback

We would like to hear your views on this report. Please contact us at InnovationCenter@USDairy.com or follow the link on USDairy.com/Sustainability/Report to take a brief survey.

Learning More

We have published the following companion documents:

- > The *2011 U.S. Dairy Sustainability Report Executive Summary* discusses key initiatives and highlights 2011 achievements and performance: USDairy.com/Sustainability/Report.
- > *Sustainability in Practice*: Visit USDairy.com/Sustainability/Stories and USDairy.com/Sustainability/Awards to read about dairy farms and businesses employing sustainable practices that are good for business, communities and the environment.

ACKNOWLEDGEMENTS

The Innovation Center would like to acknowledge the organizations that contributed to the development and production of this report: Concept Green LLC for report development, Irish Design for report design, Glasgow Media for illustrations, and The Schiele Group for printing services. Cover photo is by David Barr/Photobar.

We also would like to thank our stakeholders, the Sustainability Council and report reviewers for their valuable contributions in 2011. In addition, the efforts of our interns deserve special recognition: Alice Hartley, Alex Sear, Alex Silvester, Aaron Stoermann and Ajay Varadharajan (The A-Team) at the Innovation Center, and Matt Eversman at World Wildlife Fund (WWF).

PRINTING INFORMATION

The original print run of this report uses Hanno Art Silk Text and Cover recycled and FSC Certified paper.



“Sustainability and conservation make good business sense. Consumers want affordable, high-quality products that are produced in a way that protects our natural resources and the communities and people we touch.”

Mike McCloskey

Co-Owner, Fair Oaks Dairy and Chair, Sustainability Council, Innovation Center for U.S. Dairy



WELCOME

To Our Stakeholders

We are pleased to introduce the *2011 U.S. Dairy Sustainability Report*. We are proud of the accomplishments the industry has achieved since joining together in 2007 to address sustainability challenges and opportunities for U.S. dairy pre-competitively.

As we write this letter, our planet just welcomed its seven-billionth inhabitant. In the time it takes to read this report, the population will have increased by more than 8,000.¹ Over the next 20 years, we must dramatically increase our food production – by at least 70 percent by some estimates – in order to address global needs.

Much of the population growth is occurring in emerging economies with expanding middle classes that require wholesome and nutritious food products to satisfy both basic nutritional needs and discretionary tastes. Feeding the world efficiently and responsibly, while conserving the planet's natural resources, will be a key sustainability challenge for dairy and other food and agriculture sectors. Additional challenges will include the logistical and policy aspects of trade, transportation, food safety and traceability on a worldwide scale. The dairy industry's ongoing advances in productivity will contribute to producing nutritious food for future generations.

Today, like many industries, we face resource challenges, such as rising energy costs, land availability, and water quality and availability, and other environmental impacts. In addition, society demands responsibly produced dairy foods with considerations of health, nutrition, food security, workforce safety and animal care – all of which are discussed in this report. Addressing these challenges amidst a global economic recession motivates us to identify new opportunities and innovative solutions that can create business value to strengthen our industry and the U.S. economy.

Before the industry gathered at the U.S. Dairy Sustainability Summit in 2008, we saw many individual organizations working on their own to develop sustainability practices and conservation measures. Today, thanks to the efforts of the Innovation Center for U.S. Dairy and the industry's shared sustainability commitment, roadmap, projects and research, we see a tremendous amount of collaboration and cross-pollination of best practices and knowledge.

Looking back on 2011, we made real progress through our sustainability efforts. The year marked three years of work spent laying the necessary groundwork – research, development, demonstration and deployment – to meet our 2020 greenhouse gas reduction goals. Research findings on dairy's impacts fueled the development of new tools that help put science into the hands of decision makers.

With Innovation Center-led environmental projects well under way in 2011, we launched a new industrywide initiative to establish the Sustainability Measurement and Reporting Framework for U.S. Dairy, which will create a common approach to measure and report on environmental, social and economic aspects of the industry.

We are proudest of our efforts to mobilize and engage dairy stakeholders. In 2011, we developed key strategic partnerships with governmental and nongovernmental organizations, and we engaged more than 830 stakeholders who invested approximately 6,700 working days, valued at over \$6.2 million, to support sustainability efforts throughout the year.

It is obvious from our efforts over the years that dairy has made a unique commitment. The plain fact is that sustainability and conservation make good business sense. Consumers will continue to demand that we not only produce high-quality products at an affordable price, but that we produce those products in a way that protects our natural resources and the communities and people we touch.

We hope readers of this report will recognize the breadth of our activities and initiatives, and come away with their own conclusion that the U.S. dairy industry has achieved traction. We are prepared and committed to build on the momentum we have established and look forward to hearing your thoughts about our progress.



Tom Gallagher
CEO, Innovation Center for U.S. Dairy
and Dairy Management Inc.™



Larry Jensen
Chair, Innovation Center Board of Directors
and President, Leprino Foods Company

Dairy Industry Snapshot

The U.S. dairy industry – from dairy producers to processors to local grocers – has long played a significant role in our nation’s food system, communities and economy by providing wholesome, nutrient-rich products that promote good health.

Dairy Value Chain

FEED PRODUCTION

Crops such as corn, alfalfa hay and soybeans feed dairy cows.



MILK PRODUCTION

Dairy cows are housed, fed and milked on dairy farms.



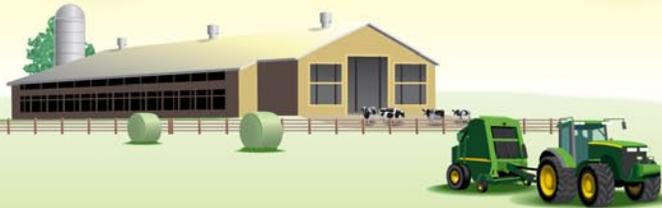
MILK TRANSPORTATION

Milk is transported from farm to processor in insulated tanker trucks.



PROCESSING

Processing plants bottle milk and turn it into cheese, yogurt and other products.



2010 Milk Production



53,127
licensed dairy farms



98%
of farms are family owned

9.1
million cows



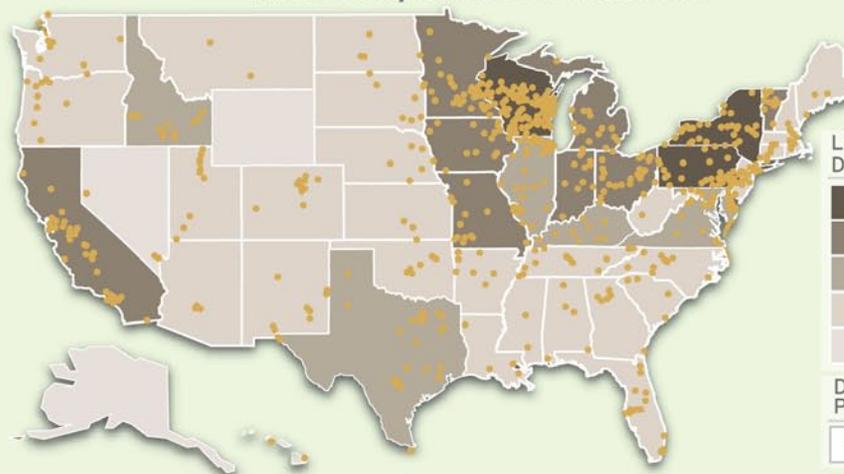
192.8
billion pounds of cow milk

California produces **21.3%** of the U.S. milk supply



The **top five** dairy-producing states: California, Wisconsin, Idaho, New York and Pennsylvania

2010 Dairy Farms & Processors



Sources are referenced in endnotes 2 through 6.

The industry operates throughout the entire country; dairy producers, processors, transporters and sales points are in all 50 states. It is a leader in introducing new and improved dairy products, processes and packaging to markets around the world.

PACKAGING

Packaging in paperboard and plastic containers keeps products fresh.



DISTRIBUTION

Companies deliver dairy products to retailers, schools and other outlets.



RETAIL

Milk and dairy are available at 178,000 retail outlets.



CONSUMER

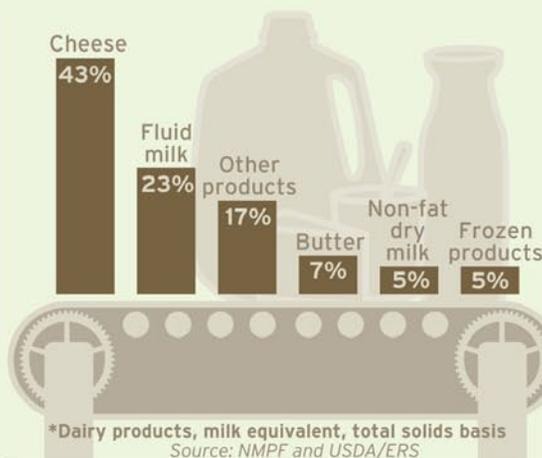
Dairy foods supply 70% of calcium and 18% of protein in average American diet.¹¹



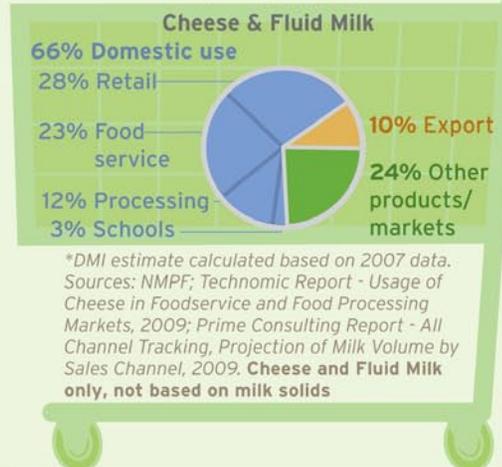
2010 Dairy Processing



2010 Estimated Share of Commercial Usage by Product*



2010 Share of Commercial Usage by Market*



Sources are referenced in endnotes 7 through 10.

A Shared Vision for Sustainability

Sustainability Vision

We commit to being leaders in sustainability, ensuring the health and well-being of our planet, communities, consumers and the industry.

U.S. Dairy Sustainability Commitment Stakeholder Representation



Balanced stakeholder representation is important to ensure that all viewpoints and perspectives are represented.

For generations, dairy farm families and businesses have viewed taking care of the environment as an inherent part of producing fresh, wholesome milk and milk products. Their livelihood depends on being good stewards of the land and water, dedicated animal caretakers and productive members of their communities. In fact, compared to 1944, the dairy industry now produces a gallon of milk using 90 percent less cropland, 65 percent less water, 76 percent less manure and a 63 percent smaller carbon footprint through production efficiencies, cow nutrition management and other improvements.¹²

What is unprecedented is how the dairy industry has recently come together pre-competitively to take a leading role in promoting sustainability and providing consumers with the nutritious dairy products they want in a way that makes our industry, the earth and its people economically, environmentally and socially better – now and for future generations.

In 2007, the board of directors for Dairy Management Inc. (DMI) – which builds demand for dairy products on behalf of dairy producers and dairy importers – launched the U.S. Dairy Sustainability Commitment. The following year, more than 250 representatives from the dairy industry, academia, government and nongovernmental organizations (NGOs) attended the U.S. Dairy Sustainability Summit to focus on opportunities to build business value and reduce GHG emissions across the value chain. The outcome of the summit was a shared sustainability vision, guiding principles and a voluntary, industrywide goal to reduce GHG emissions for fluid milk by 25 percent by the year 2020, using a 2007/2008 baseline.

Following the summit, the Sustainability Council, described on page 12, chartered multiple project teams to develop *A Roadmap to Reduce Greenhouse Gas Emissions and Increase Business Value*.¹³ The roadmap outlines a portfolio of high-priority projects, which is estimated to increase business value by \$238 million and reduce GHG emissions

per gallon of milk by approximately 11 percent – nearly half of the ambitious 25 percent reduction goal. Work on these projects began in January 2009, and an update on their progress starts on page 24.

Our commitment does not stop with GHG emissions; we have initiated efforts to understand dairy's environmental impacts and opportunities beyond GHG emissions, as well as our social and economic impacts and opportunities, as highlighted throughout the report. As indicated in the graph at left, more than 800 stakeholders are actively involved in the U.S. Dairy Sustainability Commitment.

Feeding the World in 2050 and Beyond

As we work toward lowering the environmental impacts of producing dairy products, we recognize that the ways we address today's challenges and the decisions we make must consider the needs of future generations. Faced with projections of a world population exceeding 9 billion by 2050 and needing at least 70 percent more and higher quality food, we recognize that the dairy industry must continue to become more sustainable through optimization of available environmental, social and economic resources.^{14,15}

The U.S. is already the largest cow milk producer with the highest productivity rates of any country in the world.¹⁶ From 1961 to 2009, milk production per cow in the U.S. has increased on average by 280 pounds per year – more than four times the world average.¹⁷ Fifty-eight percent of the milk productivity increase during that period (an additional 7,728 pounds of milk per cow) is attributed to improved breeding.¹⁸ Management approaches and technology – including better practices regarding cow comfort and milking – and state-of-the-art equipment contributed an additional 5,553 pounds of milk per cow.¹⁹

Still, global milk demand is projected to almost double to two trillion pounds of fresh milk equivalents by 2050.²⁰

Environmental factors such as water scarcity, GHG emissions and decreasing availability of arable land will present ongoing challenges. Already 70 percent of suitable agricultural lands globally are in use or under protection; in North America, net arable land is projected to continue to decline annually by 2 percent due to urbanization and development.²¹

The current and projected state of health and nutrition are pressing issues. Globally, one billion people are hungry and another billion are malnourished.²² In the U.S., approximately 49 million people, including 17 million children, live in households struggling to put enough food on the table.²³ Milk's high nutritional content, combined with its low cost – approximately 25 cents per serving – reinforces its important role in healthy diets.

The Food and Agriculture Organization of the United Nations (FAO) defines sustainable diets as “those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable, nutritionally adequate, safe and healthy, while optimizing natural and human resources.”²⁴

FAO also recognizes that farmers will need new technologies to produce more from less land and fewer hands. The global dairy industry is examining how science and technology can contribute to environmentally sustainable and socially responsible dairy production today and in the future.

Producing more with less, therefore, is not simply a business advantage; it is a global responsibility. Continuing to embrace innovation and adopt new technologies while considering sustainability impacts will enable the U.S. to improve efficiencies to help feed the world sustainably for future generations.

WHAT'S IN THIS GLASS IS AT THE HEART OF ALL WE DO.

Milk is a valuable source of essential nutrients that promote good health: calcium, potassium, vitamins A, D and B12, protein, phosphorus, riboflavin, magnesium and zinc.

ENVIRONMENTAL

Innovations and efficiency improvements have enabled the industry to reduce the environmental impact of a gallon of milk.

SINCE 1944:²⁵

- 90% less cropland
- 76% less manure
- 65% less water
- 63% less carbon

We are continuously improving through partnerships, research and projects.

OUR FIRST GOAL 25%

GHG REDUCTION FOR FLUID MILK BY 2020

~25¢ LOW COST PER SERVING



ECONOMIC

- Dairy products are affordable and readily available.
- Milk is the lowest-cost food source of dietary calcium.²⁸
- Adequate dairy consumption can lower risk of certain chronic diseases,²⁹ which has the potential to lower healthcare costs by as much as \$200 billion over a five-year period.³⁰
- Dairy farms and businesses support rural economies in all 50 states.

SOCIAL

A wholesome choice for a healthy, active lifestyle, dairy products taste great and deliver essential nutrients.

HEALTH BENEFITS:

- Bone health
- Weight management
- Exercise recovery

>90%

OF SCHOOLS PROVIDE LOW-FAT AND/OR NON-FAT MILK²⁶

18%

OF PROTEIN IN AMERICAN DIET IS PROVIDED BY DAIRY PRODUCTS²⁷

U.S. Dairy Sustainability Awards



"In the U.S. dairy industry, we have learned that there is incredible power in working together, pre-competitively, through our entire value chain and beyond. This program is a great example of how system wide collaborative efforts can help dairy secure a bright future, providing healthy products, healthy businesses and a healthy planet to future generations."

Paul Rovey
Arizona Dairy Producer
Chair of Dairy Management Inc.
Member of the judges panel



In September 2011, the Innovation Center for U.S. Dairy and the Dairy Research Institute® announced the U.S. Dairy Sustainability Awards. This new program recognizes dairy farms, businesses and collaborative partnerships for efforts that deliver outstanding economic, environmental and/or social benefit, thus helping advance the sustainability of the dairy industry. We collaborated with Elanco, U.S. Dairy Export Council®, Center for Advanced Energy Studies (CAES) and Idaho National Laboratory as award sponsors, and with WWF, United States Department of Agriculture (USDA), MilkPEP and Dairy Research Institute for program support.

Nominations, which were accepted through December 1, 2011, were judged by a panel of experts from academic institutions, USDA, U.S. Environmental Protection Agency (EPA), WWF, media and dairy industry leaders. Each nomination was evaluated not only on its economic, environmental and social impact, but also on its potential for adoption by other dairy farms and businesses.

Inaugural Program Award Recipients

Elanco Award for Outstanding Dairy Farm Sustainability

Blue Spruce Farm | Bridport, Vermont
Holsum Dairies, LLC | Hilbert, Wisconsin
Werkhoven Dairy, Inc. | Monroe, Washington

U.S. Dairy Export Council Award for Outstanding Dairy Processing & Manufacturing Sustainability

Darigold, Inc. | Seattle, Washington

Honorable Mention

Oakhurst Dairy | Portland, Maine

Center for Advanced Energy Studies/Idaho National Laboratory Award for Outstanding Achievement in Energy

Brubaker Farms | Mount Joy, Pennsylvania
DF-AP, LLC | Gooding, Idaho

The nomination period for the 2013 awards will begin in August, 2012.

Winners of the *Elanco Award for Outstanding Dairy Farm Sustainability:*



Blue Spruce Farm, operated by the Audet family in Bridport, Vt., is admired as a pioneer in operational efficiency. It was one of the first farms in the country to install a variable speed vacuum pump control, reducing energy used during milking by nearly 60 percent. Blue Spruce also was the first dairy farm to participate in the successful Central Vermont Public Service's Cow

Power™ program, which allows consumers to purchase renewable energy generated on a dairy farm.



For **Holsum Dairies, LLC**, of Hilbert, Wis., sustainability of the community and the natural environment were significant factors when they designed the dairy and planned the operations. Holsum relies on a model of trust and mutual benefit in working with nearly 40 local crop farmers and custom harvesters to provide all of the dairy's forage needs. In this win-win relationship,

benefits to the farm, the community and the environment include higher quality feed; 11,000 acres under a single nutrient management plan; lower cost and emissions associated with manufacturing and transport of fertilizer; more efficient crop production; and more precise fertilizer application.



A decade ago, **Werkhoven Dairy, Inc.**, of Monroe, Wash., assumed a leadership role in developing Qualco Energy, a collaborative partnership between their farm and the neighboring dairy and beef producers of the Sno/Sky Ag Alliance, the Northwest Chinook Recovery (an organization working to restore salmon habitat), and the 3,500-member Native American Tulalip Tribe. Read more on page 51.

Winner of the *U.S. Dairy Export Council Award for Outstanding Dairy Processing & Manufacturing Sustainability:*



Through a companywide commitment to sustainability, **Darigold, Inc.**, in Seattle, Wash., has empowered its employees to work together to reduce use of water, fuel and energy, as well as waste. Darigold improved water usage by more than 13 percent (water gallons per unit). It recycles 50 percent of its waste, and has seen nearly a 50 percent improvement in fuel usage

per unit, equal to more than 216,000 gallons of diesel fuel annually. The company has completed more than 20 sustainability-driven packaging redesigns, reducing cost by more than \$1 million and greatly reducing corrugated cardboard and plastic usage.

Honorable mention of the *U.S. Dairy Export Council Award for Outstanding Dairy Processing & Manufacturing Sustainability:*



Family-owned **Oakhurst Dairy** of Portland, Maine, was one of the first companies in Maine to sign on to the governor's Carbon Challenge and has developed a sustainability roadmap with long-term reduction goals across all aspects of the operation. Installation of a solar energy system, the use of hybrid delivery trucks and biodiesel fuel, and other practices helped Oakhurst

reduce its plant energy, GHG emissions, water use and transportation fuel use by roughly 10 percent each – achieving half of its overall goal – from 2008 to 2010.

Winners of the *Center for Advanced Energy Studies/Idaho National Laboratory Award for Outstanding Achievement in Energy* are:



Brubaker Farms of Mount Joy, Pa., mastered energy efficiency by creating a successful new revenue stream through the implementation of an anaerobic digester system. The farm now produces its own electricity, and the surplus electricity – enough to power approximately 200 homes – is sold to the local utility. The Brubaker family is committed to sharing its lessons learned by

hosting busloads of visitors to tour the property, which includes three solar panels totaling 10,000 square feet that produce an additional 130 to 150 kilowatt hour (kWh) on sunny days.



In a collaboration that formed **DF-AP, LLC**, of Gooding, Idaho, Dean Foods Company and AgPower Partners launched the first third party owned and operated dairy digester project in the nation, an innovative approach revealing new possibilities for digesters on dairy farms. Read more about the Big Sky West project on page 33.

Achieving Traction

The Innovation Center is leading sustainability efforts in four key areas: research, goals, innovation projects and measurement and reporting. The progress of these sustainability efforts is the main focus of this report. In addition, the following sections include the status of the dairy industry across environmental, economic and social dimensions to provide context for our work and issues facing the industry. Throughout the report, we highlight some specific examples of the U.S Dairy Sustainability Commitment in action.

2008 - 2009	2010	2011	2012	2013									
BEGINNING WITH SCIENCE: LCA research helps us understand the industry's environmental impacts and prioritize improvement efforts across the dairy value chain.													
GHG LCA for Fluid Milk – Completed in 2010; findings submitted for publication. GHG Results: 17.6 lbs. of carbon dioxide equivalents (CO ₂ e) per gallon of milk consumed.													
Comprehensive LCA for Fluid Milk – Started with focus on water with ongoing study of land use, nutrient cycles and other impacts. On-farm water assessment completed in 2011; findings to be released in 2012.													
Processing and Packaging LCA – Completed in 2011; findings to be released in 2012.													
Comprehensive LCA for Cheese – Completed for cheddar and mozzarella cheese in 2011; with initial GHG results released.													
<table border="1"> <thead> <tr> <th colspan="3">GHG Results: Lbs. CO₂e per lb. of cheese consumed</th> </tr> <tr> <th>Cheddar</th> <th>Mozzarella</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>8.7</td> <td>7.5</td> <td>8.3</td> </tr> </tbody> </table>					GHG Results: Lbs. CO ₂ e per lb. of cheese consumed			Cheddar	Mozzarella	Average	8.7	7.5	8.3
GHG Results: Lbs. CO ₂ e per lb. of cheese consumed													
Cheddar	Mozzarella	Average											
8.7	7.5	8.3											
SETTING GOALS: We set voluntary industrywide goals and published a roadmap to achieve the first goal: reduce GHG emissions for fluid milk by 25 percent by 2020.													
TRANSFORMING RESEARCH INTO RESULTS: Our GHG reduction projects aim to reduce GHG emissions by approximately 11 percent and deliver an estimated \$238M in business value across the value chain.													
MEASURING AND REPORTING: Research findings contribute to the development of an industrywide framework to measure and report sustainability performance.													
													
Sustainability Measurement and Reporting Framework for U.S. Dairy project launched.													
Fall 2011–Summer 2012: Develop guiding principles, identify and define indicators for initial topics:													
<table border="1"> <tbody> <tr> <td> Economic: local economic impacts and product differentiation Environmental: energy, GHG emissions, water quantity and quality Social: working conditions, animal care, community contributions </td> <td> Summer: Board review of guiding principles; Board and public review of environmental indicators and metrics. Winter: public review of social and economic indicators. </td> <td> January: Submission of draft Framework to Innovation Center Board for approval. Topics for consideration after 2012: Economic: value across the supply chain, financials and others Environmental: waste, biodiversity/land use, crop production and others Social: food safety, health and nutrition, and others </td> </tr> </tbody> </table>					Economic: local economic impacts and product differentiation Environmental: energy, GHG emissions, water quantity and quality Social: working conditions, animal care, community contributions	Summer: Board review of guiding principles; Board and public review of environmental indicators and metrics. Winter: public review of social and economic indicators.	January: Submission of draft Framework to Innovation Center Board for approval. Topics for consideration after 2012: Economic: value across the supply chain, financials and others Environmental: waste, biodiversity/land use, crop production and others Social: food safety, health and nutrition, and others						
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YEAR	MILESTONES
2008	<p>250 participants attend the U.S. Dairy Sustainability Summit. <i>A Roadmap to Reduce Greenhouse Gas Emissions and Increase Business Value</i> is published.</p>
2009	<p>Innovation Center board of directors endorses roadmap; project teams start working. Innovation Center and WWF establish partnership. Innovation Center and USDA sign memorandum of understanding to increase access to research and financial resources. USDA recognizes Innovation Center at United Nations Framework Convention on Climate Change in Copenhagen as an example of voluntary leadership. 425 team members participate in Innovation Center-led sustainability efforts. \$2 million in cash and in-kind services are secured for sustainability efforts. Innovation Center becomes founding member of The Sustainability Consortium. Seven organizations sign the Global Dairy Agenda for Action on Climate Change on behalf of the world's dairy associations and companies.</p>
2010	<p>USDA announces energy conservation and efficiency initiative through the Natural Resources Conservation Service (NRCS). GHG Life Cycle Assessment (LCA) for Fluid Milk is completed; key findings are presented at the International Conference on LCA in the Agri-Food Sector. Comprehensive LCAs for fluid milk, cheese, and processing and packaging begin. Innovation Center becomes an affiliate of the U.S. Environmental Protection Agency's (EPA) SmartWay program. 500 team members participate in Innovation Center-led sustainability efforts. \$6.6 million in cash and in-kind services are secured for sustainability efforts.</p>
2011	<p>WWF and Innovation Center renew partnership. CAES and Innovation Center establish partnership. NRCS awards the dairy industry a \$1.1 million grant for the development of Farm Smart™ tools for dairy producers. Sustainability Measurement and Reporting Framework for U.S. Dairy project begins. Cow of the Future™ project team establishes research priorities. U.S. Dairy Sustainability Awards program is launched. Farm Energy Efficiency™ team launches the SaveEnergy online tool. Project teams develop tools for Farm Smart (on-farm), Dairy Plant Smart™ (processing) and Dairy Fleet Smart™ (transportation). 834 team members participate in Innovation Center-led sustainability efforts. \$8 million in cash and in-kind services are secured for sustainability efforts.</p>
2012	<p>Planned accomplishments in 2012 include:</p> <ul style="list-style-type: none"> > Publication of results from the Comprehensive LCA for Cheese, the Processing and Packaging LCA, and the water assessment as part of the Comprehensive LCA for Fluid Milk. > Release of Dairy Plant Smart and Dairy Fleet Smart tools, and pilot test of Farm Smart. > Preparation of first draft of Sustainability Measurement and Reporting Framework for U.S. Dairy.

Stakeholder Engagement and Collaboration



Each year, an increasing number of stakeholders from within and outside of the dairy industry contribute time and expertise by serving as members of the Sustainability Council (which added 22 new members in 2011) and Innovation Center-led project teams and working groups. In 2011, 834 stakeholders contributed 53,962 hours, reflecting an estimated \$6.2 million in business value.³¹

The U.S. Dairy Sustainability Commitment is based on four key pillars: innovation, leadership, measurement and collaboration. The Innovation Center values broad-based stakeholder collaboration for the multiple perspectives and expertise it brings. Our approach to stakeholder engagement focuses on common goals, strengths and positive outcomes rather than differences and disagreements. By building bridges across the dairy value chain and with organizations outside of the industry, we aspire to foster consensus and innovation.

The Innovation Center considers any person or entity interested in the U.S. dairy industry to be a valued stakeholder. From farm to table, this includes feed providers, dairy producers, cooperatives, processors, transportation companies, retailers, food service providers, brands and consumers. Stakeholders also are program grantors and funders, as well as individuals and organizations that lend time and expertise to specific projects and initiatives. Stakeholders outside of the dairy value chain include governmental organizations, academia, other agricultural sectors and NGOs that represent environmental and social objectives. These groups all help the Innovation Center to understand diverse opinions and insights regarding a range of topics, from life cycle assessment (LCA) research to sustainable food production.

Methods of engagement include formal stakeholder groups, partnerships and affiliations, as well as public dialogue and outreach.

Formal Stakeholder Groups

The following stakeholder groups are formally organized with a long-term focus on a specific aspect of the dairy industry.

“In order to succeed, we need the viewpoints of governmental organizations, scientists, academia, dairy producers, cooperatives, consumer groups, brands, nongovernmental organizations and special interest groups that focus on key issues such as animal care, greenhouse gas emissions, water and labor practices.”

Erin Fitzgerald
Senior Vice President, Sustainability
Innovation Center for U.S. Dairy

> **Boards of directors for the Innovation Center for U.S. Dairy, Dairy Management Inc. and Dairy Research Institute** provide time, expertise and oversight for the U.S. Dairy Sustainability Commitment. Refer to page 6 for more information.

> **Sustainability Council**, formed in 2008, is a 90-member group that represents over 65 organizations across the dairy value chain. The Sustainability Council meets two to three times annually to oversee U.S. Dairy Sustainability Commitment progress and strategic direction. Leaders from across the value chain and other stakeholder organizations are invited to participate in the council to achieve diverse perspectives and subject matter expertise.

In 2011, we welcomed 22 new members to the Sustainability Council: Alliance Dairies, American Farmland Trust, CAES, ChemTreat, Inc., Coalition on Agricultural Greenhouse Gases, Elanco, Fiscalini Farms, Global Dairy Platform, Stauffacher Highway Dairy, Leprino Foods Company, Maddox Dairy, McDonald’s USA, Medeiros & Son Dairy, Nestlé, PepsiCo Inc., Prairieland Dairy, Retail Industry Leaders Association, Si-Ellen Farms, Syngenta Crop Protection, The Sustainability Consortium, Tillamook County Creamery Association and Werkhoven Dairy, Inc.

- > **Project teams and task forces** bring together representatives and subject matter experts from the dairy industry, academia, NGOs and government agencies to work on Innovation Center-led sustainability projects and initiatives. These multi-stakeholder groups are at work on LCAs, GHG reduction projects and an industrywide Sustainability Measurement and Reporting Framework, all of which are discussed in greater detail beginning on page 16.
- > **Research funders and academic institutions** support our efforts to put science in the hands of decision makers. USDA, the Walton Family Foundation and the Packard Foundation funded key research efforts in 2011. Refer to page 54 for details.
- > **Common Voice Network** is an industry stakeholder group of dairy communicators from across the dairy value chain. The group's shared goal is to communicate actionable, relevant information about the dairy industry with a common voice to help individual companies and the U.S. dairy industry succeed both domestically and internationally.

Strategic Partnerships

In 2011, we formed and renewed key partnerships that will help us achieve our sustainability vision by providing valuable expertise, perspectives and resources. Overviews of our key partnerships appear throughout this report in context with their many efforts.

- > **World Wildlife Fund:** Since 2009, WWF – the largest independent global conservation organization – and the Innovation Center for U.S. Dairy have collaborated through a partnership based on a shared commitment to creating a more sustainable dairy industry. Learn more on page 15.

- > **U.S. Department of Agriculture (USDA):** In 2009, the Innovation Center and USDA signed a Memorandum of Understanding to provide access to research and financial resources to support the dairy industry's 2020 GHG emissions reduction goal. Learn more on page 23.

- > **Center for Advanced Energy Studies (CAES):** In 2011, the Innovation Center for U.S. Dairy, the Dairy Research Institute and CAES launched a national research program focused on enhancing the economic viability of dairy farms and rural communities. The CAES partnership represents the Idaho National Laboratory, the U.S. Department of Energy and the state of Idaho (through its research universities). Learn more on page 33.

Affiliations and Collaborations

We participate in other sustainability initiatives that have relevance to dairy agriculture to inform, learn and share with like-minded stakeholders.

- > Field to Market, The Keystone Alliance for Sustainable Agriculture (fieldtomarket.org), is a collaboration of producers, agribusinesses, food companies, conservation organizations, and university and agency partners seeking to create sustainable outcomes for agriculture.

- > International Dairy Federation (IDF) (fil-idf.org) is a leading source of scientific and technical expertise for all stakeholders of the dairy chain.

- > Sustainable Agriculture Initiative (saipatform.org) is a 30-member food industry initiative focused on supporting and developing sustainable agricultural practices on a global scale.

- > The Sustainability Consortium (sustainabilityconsortium.org) is an independent organization administered by the Global Institute of Sustainability at Arizona State University and the Applied Sustainability Center at the University of Arkansas.

GLOBAL DAIRY: COLLECTIVELY ADDRESS- ING GLOBAL CHALLENGES



The global dairy industry is committed to providing consumers with the

nutritious dairy products they want, in a way that is economically viable, environmentally sound and socially responsible. The Innovation Center actively works with the international dairy community to enhance sustainability through organizations such as the Global Dairy Platform, International Dairy Federation and the Sustainable Agriculture Initiative.

Two years after the signing of the Global Dairy Agenda for Action on Climate Change, a worldwide industry pledge to reduce carbon emissions, the global industry released a progress report for 2009 to 2011. The report highlights the ways that countries around the world are fulfilling this pledge through voluntary action, initiatives and collaboration, including the efforts of the U.S. dairy industry. The progress report is available at dairy-sustainability-initiative.org.

Stakeholder Engagement and Collaboration

“I am really impressed with the scale and scope of what the dairy industry is doing. They’re fearless, forward-thinking leaders who say, ‘Let’s get everyone at the table to talk about this, then let’s make it happen.’ They are great at encouraging others and raising the bar through initiatives that help the industry’s bottom line, and then they share with everyone else in agriculture.”

Debbie Reed
*Executive Director
Coalition on Agricultural Greenhouse
Gases (C-AGG)*

Members include NGOs, academia and businesses whose mission is to foster scientific innovations for consumer products.

- > Sustainable Food Lab (sustainablefood.org) is a consortium of businesses, nonprofits and public organizations whose common goal is sustainable food systems.
- > National Initiative for Sustainable Agriculture (wisa.cals.wisc.edu/nisa) was initiated in 2010 by various national agriculture leaders and University of Wisconsin-Madison researchers to develop a producer-led program aimed at improving the sustainability of American agriculture.

Collective Approach to Knowledge Sharing

Since the gathering of dairy industry stakeholders at the 2008 Sustainability Summit, dairy has led the agricultural industry in its collaborative approach to developing profitable, sustainable solutions. Following the adage, “a rising tide lifts all boats,” dairy’s sustainability work is influencing other agricultural sectors.

In 2011, Innovation Center thought leaders participated in sustainability conversations within dairy and agriculture, as well as outside of our sector. We engaged in public dialogue at conferences and symposia, and through scientific peer-reviewed publications, webinars and presentations. Leaders from across the dairy industry engaged in discussions with peers to mobilize participation in areas such as energy efficiency, renewable energy and water quality.

Key Outreach and Engagement Highlights in 2011

Conferences and Presentations

In 2011, more than 40 presentations on the U.S. Dairy Sustainability Commitment reached diverse audiences totaling more than 3,500 people, including environmental and food scientists; environmental, sustainability and energy experts; and professionals from across the dairy supply chain. Prominent organizations featuring speakers from the Innovation Center included the National Academies of Science, Food Marketing Institute, the American Center for Life Cycle Assessment and the International Dairy Federation.

Peer-Reviewed Projects

Established by America’s dairy producers, the Dairy Research Institute supports the U.S. Dairy Sustainability Commitment with technical research in nutrition, products and sustainability. Each research project is subject to rigorous peer review to validate findings. For a review of current and completed sustainability research, visit USDairy.com/Sustainability/ResearchProjects.

Articles and News Releases

Sharing better practices, case studies and project results through newsletters and dairy industry, environmental and business news media is a means of driving stakeholder engagement, innovation and industrywide improvement. Highlights in 2011 include five newsletters, seven news releases and six articles authored by the Innovation Center for U.S. Dairy, which together had the potential to reach more than 13 million people based on reported circulation.

PARTNERSHIP HIGHLIGHT: World Wildlife Fund



In 2009, World Wildlife Fund (WWF) - the largest independent global conservation organization – and the Innovation Center for U.S. Dairy formed a transformative partnership based on a shared commitment to creating a more sustainable dairy industry. The two organizations seek to build on each other's networks, knowledge and experiences, both domestic and international, as they work to improve the economic, social and environmental sustainability of the dairy industry. The partnership includes Innovation Center sponsorship of a full-time WWF employee who works with the Innovation Center staff to jointly develop strategies, plans and programs to advance mutual conservation goals.

WWF brings a unique and powerful perspective to the table. It views conservation as a matter of protecting “priority places” (areas of the world with the greatest biodiversity and high conservation value), but also works to help high-priority commodity markets minimize their environmental impact on those high-value areas. The dairy industry is one such market.

The partnership, which was renewed in 2011, has been beneficial to the U.S. Dairy Sustainability Commitment. It covers six main areas for collaboration: corporate engagement; development of the Sustainability Measurement and Reporting Framework for U.S. Dairy; assessment of opportunities to apply scientific results to real-world processes; the potential for a global dairy roundtable focused on standards and certification; communications with external stakeholders; and internal reporting and project management.

The effort has already seen successes in each focus area, including the advancement of several corporate relationships, exploratory meetings toward a global dairy roundtable and the following highlights from 2011:

- > WWF applied its risk assessment methodology to U.S. dairy's sustainability efforts to provide direction and prioritization for the Sustainability Measurement and Reporting Framework for U.S. Dairy, described on page 16.
- > Climate, fresh water and LCA specialists from WWF reviewed the dairy industry's work to characterize its carbon and water footprints. In addition, collaboration has begun on a white paper regarding better management practices specific to water use and quality.
- > The Innovation Center and WWF collaborated with USDA and EPA's AgSTAR to present the Digester Finance Summit, which was held in Washington, D.C. in September 2011. Read more about the summit on page 33.
- > WWF supports the U.S. Dairy Sustainability Awards, a new program described on page 8 to recognize outstanding efforts by members of the dairy value chain.

“WWF commends the U.S. dairy industry for recognizing the need to address key environmental, social and economic issues. By expanding its focus from greenhouse gas emissions to include broader impacts on water, energy and land and integrating social and economic considerations, the Innovation Center is continuing to help the dairy industry become a leader in sustainability.”

Dr. Jason Clay
*Senior Vice President
Market Transformation
World Wildlife Fund*

Sustainability Measurement and Reporting Framework for U.S. Dairy

“Measurement is imperative for both the credibility and substance of our sustainability initiatives. Proper measurement is a prerequisite for proper reporting, for which there will be more demand over time.”

Jed Davis
Director of Sustainability
Cabot Creamery Cooperative

In 2011, the Innovation Center launched the development of the Sustainability Measurement and Reporting Framework for U.S. Dairy to establish a consistent and credible baseline for measuring and reporting environmental, economic and social performance. The goal of the project is to identify relevant topics and performance indicators for the dairy industry by collaborating with a wide range of stakeholders, analyzing scientific results on impacts, and learning from and building on existing measurements and reporting initiatives.

The project leverages the Innovation Center’s industrywide expertise, broad participant base and collaborative, open-forum approach to sustainability. To date, this is the only sustainability measurement and reporting framework for the U.S. dairy industry that is based on both technical information and practical input from stakeholders throughout the dairy value chain and from government agencies, researchers and NGOs, such as WWF.

Based on a triple-bottom-line approach, the Framework under development includes guiding principles and environmental, economic and social topics that address a sustainable dairy food system, along with specific metrics and calculation methods for each topic where possible. Selection and prioritization of material topics have been based on research related to dairy’s impacts, stakeholder feedback, availability of industry-level data and other assessment criteria. A public comment period on the draft environmental indicators and metrics is planned for summer 2012.



The Framework Task Force has identified eight topics for the initial phase of the project and proposed additional topics – such as food safety, nutrition, waste and biodiversity – to be considered for development after the completion of the first phase in 2012 (See table on next page). Work is under way on the identification and definition of indicators within the initial topics for milk production and processing. The Environmental, Social and Economic sections that follow provide more discussion on these topics.

Learn more about the industry’s approach in the Measurement Matters white paper at USDairy.com/Sustainability/MeasurementMatters.

STRUCTURE FOR THE SUSTAINABILITY MEASUREMENT AND REPORTING FRAMEWORK		
GUIDING PRINCIPLES		
ECONOMIC	ENVIRONMENTAL	SOCIAL
Considers the direct and indirect economic contributions that the dairy industry provides across the supply chain	Focuses on the environmental impacts and performance of the dairy industry	Addresses the dairy industry's impacts on stakeholder groups and communities, in addition to animal care
INITIAL TOPICS FOR DEVELOPMENT IN 2012		
<ul style="list-style-type: none"> Local economic impacts Product differentiation 	<ul style="list-style-type: none"> Energy GHG emissions Water 	<ul style="list-style-type: none"> Working conditions Animal care Community contributions
PROPOSED TOPICS FOR CONSIDERATION AFTER 2012		
<ul style="list-style-type: none"> Value across the supply chain Financials Others TBD 	<ul style="list-style-type: none"> Waste Biodiversity/land use Crop production Others TBD 	<ul style="list-style-type: none"> Food safety Health and nutrition Others TBD

SPOTLIGHT ON REPORTING AND DISCLOSURE EFFORTS UNDER WAY



Organizations across the dairy value chain recognize the importance of communicating their sustainability efforts and performance to consumers, investors, NGOs and other stakeholders. To date, 14 organizations have published sustainability reports: 12 are Sustainability Council members and eight have followed the Global Reporting Initiative's Reporting Framework – the world's most widely used standard for best practices in sustainability reporting.

In addition, dairy producers and processors are participating in voluntary disclosure initiatives such as the Carbon Disclosure Project, an independent not-for-profit organization holding the largest database of primary corporate GHG emissions information in the world. Prairie Farms Dairy, Inc., began participating in 2010. Dean Foods and Kraft Foods Inc. were featured in the Carbon Disclosure Project's 2011 S&P 500 Carbon Disclosure Leadership Index, with 2011 marking Dean Foods' third consecutive year on the index. The annual index highlights companies within the S&P 500 with the most comprehensive climate-related disclosure practices.

Sustainability Reporting	
● ■	Ben & Jerry's
● ■	Danone (The Dannon Company in U.S.)
● ■	Darigold, Inc.
● ■	Dean Foods
● ■	General Mills
● ■	Hilmar Cheese Company
● ■	Kraft Foods Inc.
● ■	The Kroger Co.
● ■	Land O'Lakes, Inc.
● ■	McDonald's
● ■	Nestlé
● ■	PepsiCo Inc.
● ■	Syngenta
● ■	Walmart
●	Sustainability Council member
■	GRI-based report

“We believe that when it comes to big issues such as reducing greenhouse gas emissions or safeguarding our water supply, no individual sector – government, NGO or business – can make as big of a difference working alone as we can working together.”

Jason Clay
Senior Vice President, Market Transformation
World Wildlife Fund



ENVIRONMENTAL

Environmental Impacts and Opportunities

Consumers are increasingly making decisions based on what they perceive to be environmentally and socially sound choices, and they expect the companies they buy from to do the same. In fact, a 2011 study by the Natural Marketing Institute found that 74 percent of those surveyed felt that it is important for companies not just to be profitable, but also to be mindful of their impact on the environment and society. In addition, 56 percent said they are taking personal steps to help the environment.³²

The reduction of GHG emissions was identified as an initial priority of the dairy industry at the Sustainability Summit for U.S. Dairy in 2008. At that time, we needed to understand dairy's emissions profile, learn how each step along the value chain contributed, and then develop solutions for reducing emissions while creating business value for our industry.

Now that the GHG reduction projects launched in 2009 are well under way, we are turning our attention to other environmental aspects of our industry – water, air quality, land use and ecotoxicity. We follow the same measured approach that we used with GHG emissions: start with science-based, peer-reviewed research to measure and understand a particular aspect, then engage and mobilize a broad group of stakeholders to develop strategies, projects, performance measures and tools designed to reduce our impacts and increase business value for our industry.

GLOBAL COLLABORATION

The Innovation Center has worked with the International Dairy Federation (IDF) and the Food and Agriculture Organization of the United Nations (FAO) to develop a common LCA methodology and a credible and comparable baseline for dairy globally. As part of the IDF and FAO collaboration, the FAO issued a report with the findings from their global dairy LCA showing that global dairy production, processing and transportation contributes 2.7 percent of the total global GHG emissions.³³

DAIRY VALUE CHAIN ENVIRONMENTAL IMPACTS AND OPPORTUNITIES

FEED PRODUCTION

MILK PRODUCTION

PROCESSING

PACKAGING

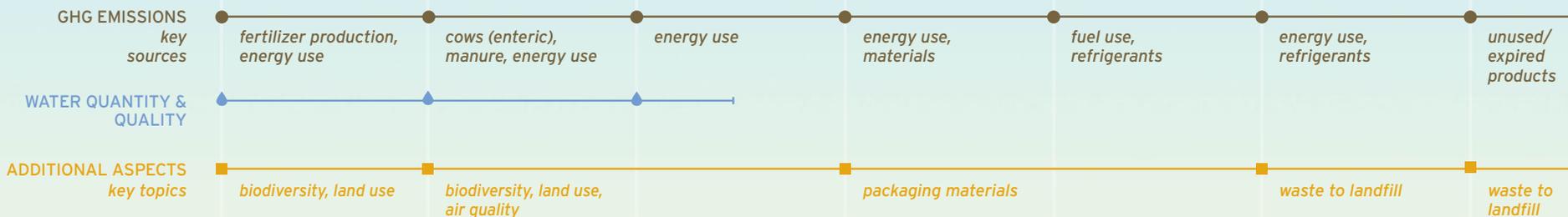
TRANSPORTATION/
DISTRIBUTION

RETAIL

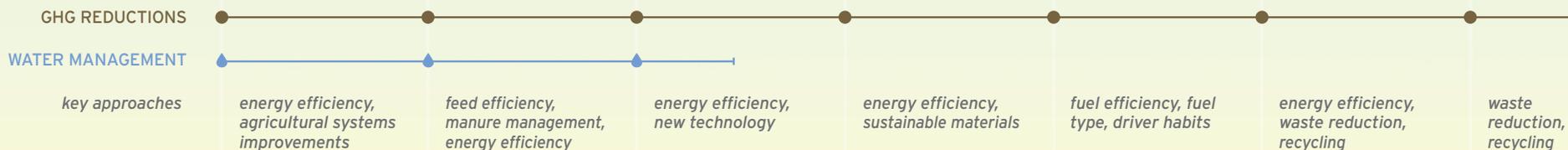
CONSUMER



KEY ENVIRONMENTAL IMPACTS based on completed and ongoing LCA research



IMPROVEMENT OPPORTUNITIES



Beginning with Science

Science guides our work; it provides a research-based understanding of the impacts of the dairy industry and directs us to key risks and opportunities. Our approach encompasses LCA research, process-based modeling and applied science. In particular, several research projects using an LCA approach have been fundamental to the industry's sustainability commitment.

LCA Research

An LCA examines environmental impacts of a product through its entire life cycle, from cradle to grave (product creation through disposal). This comprehensive approach enables us to determine impacts across our value chain, beginning with feed production for dairy cows; continuing with milk production, transport, processing, packaging and distribution to retailers; and ending with consumers who purchase and use dairy products (as illustrated on page 20). As such, LCAs serve as the foundation of our work by providing an accurate snapshot of impacts such as GHG emissions and water use, establishing benchmarks to measure improvement, and helping to identify and prioritize mitigation opportunities.

Our LCA studies follow the International Organization for Standardization (ISO) standards for life cycle assessments, the world's most recognized and widely used methodology for analyzing a product's life cycle.³⁴ Each study undergoes peer review by a group of experts from scientific academia as well as industry, environmental NGOs and governmental organizations.

While initial research focused on GHG emissions and fluid milk, the scope of subsequent and ongoing LCAs has broadened to evaluate other environmental issues such as water, land use and packaging, and to assess cheese.

Scan-level GHG LCA for Fluid Milk

This initial study used secondary data sources to estimate GHG emissions across the value chain. The results informed the development of the GHG emissions reduction projects and goals described on page 25.

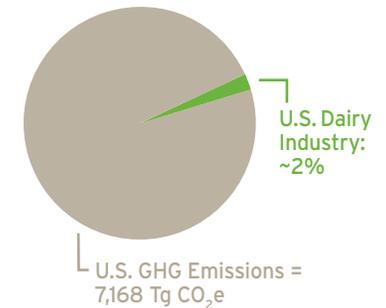
GHG LCA for Fluid Milk

Completed in 2010, this LCA is the first national carbon footprint study of its kind and the largest scale effort in the world at the time. Primary data was collected from 536 farms, 50 processing plants and 210,000 round trips transporting milk from farm to processor. In conjunction with other sources, the peer-reviewed study established that the U.S. dairy industry accounts for approximately 2 percent of our country's GHG emissions.³⁵

Key findings

- > LCA results provide guidance on where to focus measurement and innovation efforts. Study analysis revealed that 90 percent of the GHG footprint can be explained by approximately 20 variables readily available from individuals in the supply chain. Managing these 20 variables through targeted programs can address the factors known to contribute most to the industry's impact.
- > On the farm, management practices matter most, more than factors such as farm size, region or type of business.
- > Energy management practices are important across the supply chain. The impacts from fuel and electricity span all stages of the supply chain; therefore, opportunities for improvement exist in all stages.

For more information, go to [USDairy.com/Sustainability/Science](https://www.usdairy.com/Sustainability/Science).



The U.S. dairy industry accounts for approximately 2% of total U.S. GHG emissions.³⁶

“We surveyed 536 dairy farms and 50 processing plants, and analyzed more than 210,000 round trip milk deliveries. In the end, the Greenhouse Gas Life Cycle Assessment for Fluid Milk data reflected 25 percent of all milk processed and 11 percent of all milk transported in the U.S. in 2007. The scale of this study was unprecedented: it was the biggest, most ambitious national-level greenhouse gas life cycle assessment of fluid milk in the world.”

Dr. Greg Thoma
*Bates Teaching Professor of
 Chemical Engineering
 University of Arkansas*

Comprehensive LCA for Fluid Milk

Started in 2011, the study builds on the GHG LCA with an initial focus on water and followed by a review of land use, nutrient cycles, human toxicity and ecotoxicity.

Water Assessment

In 2011, the research team completed a water footprint for the dairy industry, which establishes a baseline from which to evaluate water quality and availability. Findings will help identify better management practices for the industry. Read more about the assessment on page 38.

Processing and Packaging LCA

Conducted from 2009 to 2011, the study evaluated the processing and packaging impacts of white and value-added milks and coffee creamers. One of the initial 10 GHG reduction projects launched by the Innovation Center, it represents the first combined processing-packaging LCA to be undertaken in any industry. Findings will be published in 2012.

We will continue to research additional aspects of our industry to better understand impacts, promote innovation for new tools and uncover additional mitigation opportunities.

Comprehensive LCA for Cheese

Conducted from 2009 to 2011, the assessment evaluated GHG emissions, land use and water use impacts of cheese production from farm gate to processing to consumer. The LCA data set was compiled through surveys representing approximately 20 percent of U.S. cheese processing capacity – including 24 percent of the mozzarella and 38 percent of the cheddar processed in the U.S. Final results are expected to be published in 2012. The research supports the development of a computer simulation model, which will be available for all data providers from the survey. Users can enter their individual data to benchmark themselves against the industry average and to calculate what-if scenarios to help with business decisions.

Key findings

- > Because it is a primary ingredient in cheese, the environmental impact of milk production is a significant contributor to the footprint of cheese. Refer to the project summaries beginning on page 26 to learn about GHG reduction efforts on the farm.
- > Energy management in the plant is also a key driver. The Dairy Plant Smart project, described on page 34, focuses on energy and GHG reductions in processing plants.

CARBON FOOTPRINT OF CHEESE ³⁷		
Type of Cheese (average moisture content)	Pounds (lb.) CO ₂ e per lb. cheese consumed	Kilograms (kg) CO ₂ e per kg cheese consumed
Cheddar (36.8%)	8.7	8.7
Mozzarella (48.6%)	7.5	7.5
Average (41%)	8.3	8.3

PARTNERSHIP HIGHLIGHT: U.S. Department of Agriculture

In late 2009, the U.S. Department of Agriculture (USDA) and the Innovation Center signed a landmark memorandum of understanding (MOU) that outlines their partnership to support the U.S. dairy industry's goal to reduce GHG emissions for fluid milk by 25 percent by 2020.

As a result, USDA funding awarded through USDA Rural Development programs and USDA Natural Resources Conservation Service (NRCS) has supported the dairy industry's efforts to: adopt anaerobic digester systems that capture methane gas from manure to create electricity, coordinate LCA research and support energy audits to help make the dairy industry as energy efficient as possible. USDA support helped with the development, launch and promotion of the SaveEnergy tool, an online resource for energy efficiency, described on page 28. During fiscal year 2011 (Oct. 1, 2010 to Sept. 31, 2011), the USDA/Innovation Center MOU increased dairy's access to resources in the following areas.³⁸

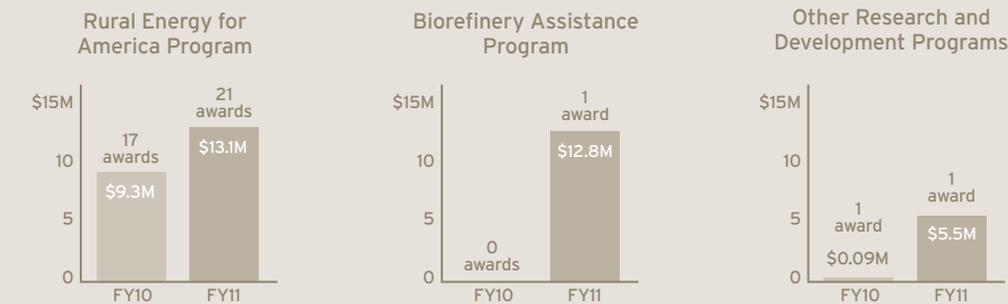


\$13.1M
Rural Energy for America funds in FY 2011

"Digester technology is a true triple bottom line solution for America's dairy producers. It's a clean, homegrown source of renewable energy. The jobs created through anaerobic digesters cannot be outsourced overseas, and with an American-made fuel source that's renewable and accessible, we can help ensure domestic energy security for future generations. Also, it helps dairy producers turn waste into energy and income. It's a win-win for everyone – the environment, the economy and the country – and we're proud to support this exciting technology."

Dallas Tonsager
USDA Under Secretary for Rural Development

USDA RURAL DEVELOPMENT FUNDS (FY 2010 AND 2011)



Dairy's share of Rural Development funds in 2011 increased by 234 percent from 2010.

USDA NATIONAL RESOURCE CONSERVATION SERVICE FUNDS (FY 2010 AND 2011)



Dairy industry access to NRCS Conservation Innovation Grants doubled from 2010 to 2011. In addition, on-farm energy audits in 2011 increased by 400 percent over 2010 participant levels.

GHG Reduction Projects



>650
stakeholders
involved in
GHG reduction
projects

“Our carbon footprint research showed us that management practices matter most. On the farm, it’s all about the feed production system, the cow herself and the manure. Off the farm, it’s about energy management.”

Dr. Ying Wang
Director of Sustainability Research
Innovation Center for U.S. Dairy

One of the Innovation Center’s key strategies is to facilitate innovative sustainability projects that support the industry’s sustainability commitment. In January 2009, the Innovation Center launched the portfolio of 10 projects outlined in *A Roadmap to Reduce Greenhouse Gas Emissions and Increase Business Value* available at USDairy.com/Sustainability/Science.

Before selecting these projects, the Innovation Center and stakeholders involved in the Sustainability Summit considered the risks and opportunities related to GHG emissions and their potential financial implications. A growing number of consumers are considering the carbon footprint and other environmental dimensions of products alongside taste, cost, quality and health factors. Increasingly, brands and retailers are evaluating the sustainability of suppliers and their products through supply chain assessments, audits and reporting requirements to assess risk. Risks could include potential regulatory changes relating to GHG emissions; rising costs and disruptions in supply chains related to availability of resources; social unrest; weather-related events; or failing harvests. Producers across agriculture, including dairy farmers, are among those directly affected by changing weather patterns. Risks such as adverse effects on crop production could have financial implications for all segments of the dairy industry.

We have not quantified the financial implications of the various GHG-related risks across the entire industry. Instead, we are focusing on tangible opportunities for GHG reductions across the value chain. Improvements in energy and resource efficiency can help businesses reduce operating costs and increase profits. Renewable energy generation can provide new sources of revenue while creating domestic jobs, increasing community support for dairy operations and reducing America’s dependence on nonrenewable fossil fuels. Decision-support tools that help farm and business managers make better choices

that optimize resources, mitigate negative environmental impact and create business value are a primary strategy.

The GHG reduction projects pursue these opportunities and, in turn, mitigate various risks. The goals established for each project collectively aim to reduce GHG emissions by approximately 11 percent – nearly half of the dairy industry’s voluntary 2020 reduction goal – while delivering an estimated \$238 million in business value across the supply chain. Project scope, potential business value and progress against GHG reduction goals will be reviewed in 2013.

Transforming Research Into Results

The GHG reduction projects put research to work in a variety of ways. Many transform science into results through the development of practical tools and comprehensive resources, which help managers and owners select approaches to deliver beneficial and sustainable outcomes for their unique operations. For example, three “smart” projects – Farm Smart, Dairy Plant Smart and Dairy Fleet Smart – feature tools to support measurement, improvement and reporting efforts, including those described in the Sustainability Measurement and Reporting Framework for U.S. Dairy section on page 16.

The Farm Energy Efficiency project promotes the adoption of existing best practices, while the Dairy Power™/Biogas Capture and Transport™ project fosters the development of new business models to remove barriers to adoption of new practices. The project portfolio also includes research efforts designed to fuel future innovations and improvement.

All of the projects address the importance of outreach and education to ensure success and leverage the power of partnerships and collaboration through multi-stakeholder teams. For more information, go to USDairy.com/Sustainability/Projects.

GHG REDUCTION PROJECTS

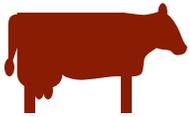
LCA FINDINGS: ON-THE-FARM GHG EMISSIONS (metric tons)		LCA FINDINGS: BEYOND-THE-FARM GHG EMISSIONS (metric tons)		
<p>20.3%</p> <p>FEED PRODUCTION</p> <p>7,156,487 est. CO₂e</p>	<p>51.5%</p> <p>MILK PRODUCTION</p> <p>18,202,920 est. CO₂e</p>	<p>5.7%</p> <p>PROCESSING</p> <p>1,998,539 est. CO₂e</p>	<p>3.5%</p> <p>PACKAGING</p> <p>1,238,969 est. CO₂e</p>	<p>7.7%</p> <p>TRANSPORTATION/DISTRIBUTION</p> <p>2,713,389 est. CO₂e</p>
<p>2020 GOAL: Reduce GHG emissions of fluid milk by 11%, based on 2007-2008 baseline, while creating \$238 million in business value.</p>				
<p>ESTIMATED REDUCTION POTENTIAL AND BUSINESS VALUE OF CURRENT PROJECTS</p>				
<p>0.65%</p> <p>\$8 MILLION</p>	<p>6.93%</p> <p>\$75 - \$308 MILLION</p>	<p>1.45%</p> <p>\$97 MILLION</p>	<p>N/A</p>	<p>1.54%</p> <p>\$58 MILLION</p>
<p>PROJECT OVERVIEW AND 2011 SUMMARY PROGRESS</p>				
<p>Farm Smart: Provide farmers easy access to robust, real-time, on-field data through a decision-support toolkit for dairy and crop production management, enabling decisions that are better for business and the environment.</p> <p><i>Farm Smart preliminary version of the tool developed and tested on two farms</i></p>	<p>Farm Energy Efficiency: Reduce on-farm energy use and costs through a combination of energy education and outreach, on-farm energy audits and energy-efficient farm operations.</p> <p><i>Energy audits in 2011: 310</i> <i>Est. GHGs reduced: 700 metric tons</i> <i>Est. energy cost savings: \$148,000</i> <i>SaveEnergy web resource launched</i></p> <p>Cow of the Future: Reduce dairy cow enteric emissions through feed improvements, natural additives and other innovations.</p> <p><i>Research priorities paper published</i> <i>Review panel guidelines published</i> <i>Advisory panel formed</i></p> <p>Dairy Power/Biogas Capture and Transport: Deploy anaerobic manure digester technology to recover methane gas for use as renewable energy and transit fuel.</p> <p><i>Digesters online in 2011: 15</i> <i>Est. GHGs destroyed: 1.2 million mt</i> <i>Est. GHGs avoided: 301,000 mt</i></p>	<p>Dairy Plant Smart and Next Generation Cleaning: Increase energy management at fluid milk processing plants; identify and adopt reduced-temperature cleaning technologies.</p> <p><i>Two tools within the Dairy Plant Smart toolkit developed and beta-tested</i></p> <p>Next-Generation Processing: UV: Research, develop and test ultraviolet (UV) illumination technologies to adjunct pasteurization process and lower energy used in pasteurizing safe, nutritious milk products.</p> <p><i>Proposed inclusion of UV illumination in Grade "A" Pasteurized Milk Ordinance</i></p>	<p>Processing and Packaging LCA: Research to identify environmental aspects of processing and packaging white and value-added milks and creamers. Research conducted 2009 to 2011.</p> <p><i>LCA research submitted for peer review</i> <i>Developed white paper (to be released in 2012)</i></p>	<p>Dairy Fleet Smart: Accelerate adoption of management practices that reduce fuel consumption, costs and GHG emissions in the transport and distribution of milk.</p> <p><i>Dairy Fleet Smart tool developed and beta-tested (to be launched in 2012)</i></p>

* Retail and consumer segments are not included; GHG emissions are shown in metric tons of carbon dioxide equivalents

** Data source: Thoma et al., Greenhouse Gas Emissions of Fluid Milk, University of Arkansas, 2010. Baseline emissions values are based on 2007 to 2008 data.

ON-THE-FARM PROJECT

Cow of the Future™



25.1%
of dairy's carbon footprint is from enteric emissions

2020 Goals

- > Reduce GHG emissions for fluid milk by 600,000 metric tons
- > Increase business value by \$20 million to \$250 million, depending on rate of feed efficiency, yield improvements and adoption rates

Stakeholder Contributions

Number of Stakeholders: 77

2011

Est. Hours	2,533
Est. Value	\$291,295

Values are reported for project members other than Innovation Center staff and consultants.



Enteric methane is the largest source of GHG emissions associated with milk production. The Cow of the Future project seeks scientifically sound, economically viable and socially responsible ways of reducing enteric methane emissions through improvements in dairy cow nutrition, genetics and health. The project focuses on the adoption of existing technologies and practices, as well as research into new opportunities for emissions reductions.

Progress

In 2011, the project team evaluated and identified research areas with the greatest potential to reduce enteric methane emissions and published the ***Cow of the Future Research Priorities for Mitigating Enteric Methane Emissions from Dairy*** white paper. To encourage public dialogue and cross-industry collaboration regarding enteric emissions research, the team launched the white paper in July 2011 at the American Dairy Science Association's Environmental Impact of Beef and Dairy Systems Joint Symposium, which was sponsored by the Innovation Center. Additional outreach with the U.S. Dairy Forage Research Center has further advanced collaborative enteric emissions research opportunities to meet a common goal of enteric emissions reductions.

“The dairy industry has to be proactive in addressing the environmental concerns that come with producing milk, and the Cow of the Future initiative is doing exactly that.”

Alexander N. Hristov, Ph.D., P.A.S.
*Associate Professor of Dairy Nutrition
Department of Dairy and Animal Science
Pennsylvania State University*

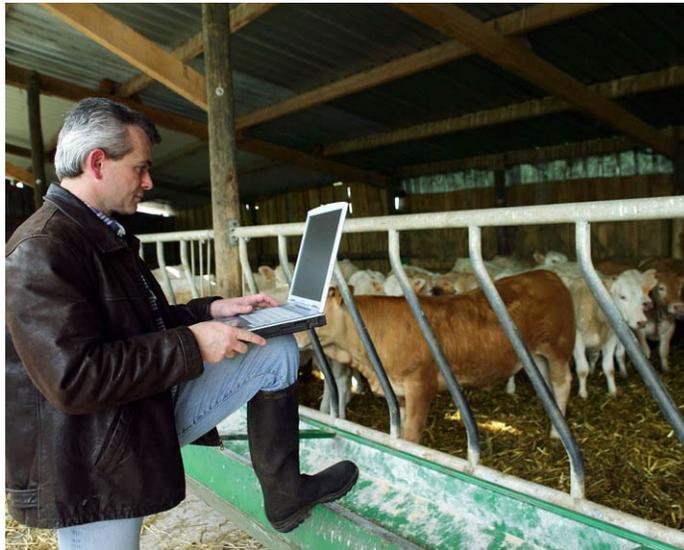
The Cow of the Future project team also developed a process for evaluating potential projects through an open, inclusive review process to ensure that all projects adopted by the team are scientifically sound, economically viable, environmentally beneficial and socially acceptable. By establishing published guidelines and review panels for the scientific and feasibility reviews, the team laid the groundwork for a solid research pipeline in 2012 and beyond. The team also initiated a project to develop a guide which documents the connections between existing best management practices and their potential to reduce GHG emissions. A multi-stakeholder advisory panel, formed in 2011, provides oversight, expertise and guidance to the Cow of the Future project team.

What's Next

The Cow of the Future team will continue to foster research opportunities through public dialogue, peer-reviewed publications, cross-industry collaboration and a series of communications on better management practices for reducing enteric emissions.

The team plans to submit a manuscript, *Mitigating Enteric Emissions: A Comprehensive Update*, for peer review in 2012.

ON-THE-FARM PROJECT
Farm Smart™



“Farm Smart is meant to fully illuminate the consequences of the choices we make within the farming system. [It] will allow us to connect actions taken in one zone of the farming operation to consequences, both the obvious and less obvious, in others. That’s what’s really powerful about it, and that’s what people like me are really advocating for. To our knowledge, there are not a lot of systems, maybe not any systems, that are expected to be as sophisticated and comprehensive as Farm Smart.”

Dr. Molly Jahn
*Special Advisor for Sustainability Science
 University of Wisconsin-Madison*

The objective of the Farm Smart project is to combine scientific research and practical experience with environmental indicators to produce a robust decision-support toolkit for dairy and crop production management that is beneficial for business and the environment. The Farm Smart project will give dairy producers the tools and information they need to assess, measure and reduce environmental impacts based on their unique farm operations, while benefiting their bottom line.

Progress

In 2011, USDA’s Natural Resources Conservation Service awarded the dairy industry a \$1.1 million grant to fund the development of a Dairy Farm Stewardship Toolkit for dairy producers. The toolkit will enable producers to analyze their stewardship practices, develop and track improvements, and communicate their stewardship performance to stakeholders.

To develop the toolkit, the project team is integrating and building upon existing work, including carbon and water calculators based on Innovation Center LCA results and models for carbon and nitrogen biochemistry. The toolkit also builds on the Vital Capital Index and Toolkit for Dairy Agriculture, which was developed through a partnership between the Manomet Center for Conservation Sciences and the Innovation Center. An initial pilot test focusing on the impact of dairy farms on water quality was completed with two farms through funding provided by the Walton Family Foundation. Refer to page 38 for more information about the foundation’s support.

What’s Next

In 2012, pilot testing of the toolkit will be expanded.

2020 Goals	
>	Reduce use of nitrogen fertilizer by 10 percent
>	Reduce GHG emissions for fluid milk by 230,000 metric tons
>	Save \$8 million in input costs through reduced use of nitrogen fertilizer

Stakeholder Contributions	
Number of Stakeholders: 73	
2011	
Est. Hours	3,252
Est. Value	\$373,980

Values are reported for project members other than Innovation Center staff and consultants.

Farm Energy Efficiency™

2020 Goals

- > Conduct 7,200 energy audits by 2020
- > Improve energy efficiency by 10 to 35 percent per farm, for annual savings of \$400 to \$42,000 per farm
- > Reduce GHG emissions for fluid milk by more than 50,000 metric tons

Stakeholder Contributions

Number of Stakeholders: 39

2011

Est. Hours	1,433
Est. Value	\$164,749

Values are reported for project members other than Innovation Center staff and consultants.

“Farmers are the original conservationists. Historically, we have raised the bar by reducing, reusing and recycling, using new technology and improving management practices on our dairies. Still, many dairy producers aren’t aware of how easy or affordable it could be to adopt energy-efficient best practices. We want to change that with tools like SaveEnergy.”

Steve Graybeal

Dairy Farmer Leader of Maryland & Virginia Milk Producers Cooperative Association and a member of the Innovation Center for U.S. Dairy’s Sustainability Council

The Farm Energy Efficiency project promotes energy conservation and efficiency through a combination of education and outreach efforts, as well as consolidated resources to help dairy producers reduce energy use, operating costs and GHG emissions. The project connects dairy producers with solutions ranging from simple, low-cost changes (such as switching light fixtures) to investments in new equipment.

Progress

The project team focused its 2011 efforts on the promotion of energy audits, development of the new SaveEnergy

KEY 2011 RESULTS³⁹

310 energy audits performed
 2,105,954 kilowatts saved
 \$147,784 estimated savings
 700 mt CO₂e estimated reduction

web tool and outreach in order to build capacity and mobilize dairy producers to reduce energy use on their farms.

Energy Audits: Professional energy audits can reduce a dairy farm’s energy use by 10 to 35 percent. In 2011, the Innovation Center accounted for 310 energy audits, 159 of which were funded through the NRCS Farm Energy Audit Program.



SaveEnergy Tool: The Innovation Center worked with USDA Natural Resources Conservation Service and USDA Rural Development to develop the SaveEnergy tool. Launched in September 2011, the online resource promotes the value of farm energy audits and brings together a collection of resources, energy-efficiency improvements and recommended practices, along with a directory of state and local financial assistance programs for energy audits and incentives for equipment retrofits. The SaveEnergy tool is available at USDairy.com/SaveEnergy.

Education Outreach Campaign: The team engaged with dairy producers through national outreach with a local focus. An outreach pilot in New York increased awareness of opportunities to reduce energy usage and costs on the farm. Case studies, tip sheets and webinars promoted on-farm energy efficiency and audits.

Working with NRCS

NRCS has continued to be a valued partner to advance the goals of the Farm Energy Efficiency project. The NRCS commitment to conserving our nation's valuable natural resources has led to the following achievements:

- > Information and training for NRCS staff was crucial to ensure delivery of energy efficiency activities for producers. In 2011, the project team and an NRCS liaison provided training and support to 280 NRCS state and field staff in 28 states.
- > In 2010, the project received a Conservation Innovation Grant from USDA to train 60 data collectors in 10 states. Through 2011, we have conducted four training sessions in Pennsylvania, New York, Minnesota and Idaho, resulting in 32 trained individuals ready to work with dairy producers in those states.
- > With funding from NRCS, we were able to develop and launch the SaveEnergy website. With support from NRCS Chief Dave White, the website was promoted within the agency as an effective energy efficiency outreach tool for NRCS staff to use to educate and engage dairy producers about the benefits of energy efficiency.

“[The SaveEnergy tool] will help farmers find and implement proven energy conservation programs. The website is designed to be a one-stop shop for everything farmers need to know about energy efficiency.”

Dave White
Chief of the Natural Resources Conservation Service

What's Next

In 2012, outreach efforts will extend to five additional states to develop new relationships with key stakeholders and will include the release of additional resources for dairy producers to increase participation, energy reductions and cost savings.

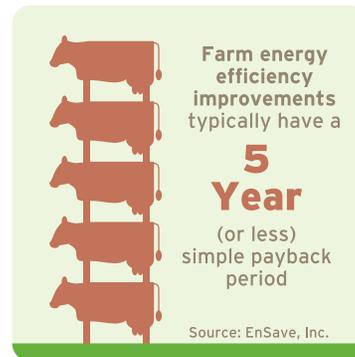
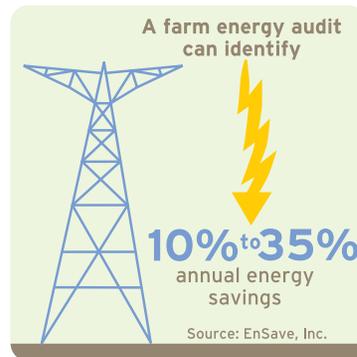
Call to Action

If you are an organization that works directly with dairy producers, we encourage you to take advantage of the materials and resources we have developed on the importance of energy efficiency. Contact InnovationCenter@USDairy.com or visit USDairy.com/SaveEnergy for more information and materials.



ENERGY CHAMPION

By making changes to lighting and his farm's laundry facility, Louie Kazemier of Portland, Ore., saved **\$13,337 per year** based on a reduction of **214,850 kilowatt hours (kWh) of electricity** and a savings of **874 therms of natural gas**.⁴⁰



Dairy Power™/Biogas Capture and Transport™

2020 Goals

- > Develop 1,300 methane digesters on U.S. dairy farms
- > Reduce GHG emissions for fluid milk by 1,800,000 metric tons
- > Increase business value to dairy producers by \$38 million

Stakeholder Contributions

Number of Stakeholders: 249

2011

Est. Hours 4,934

Est. Value \$567,353

Values are reported for project members other than Innovation Center staff and consultants.

Manure is one of the largest sources of on-farm GHG (methane) emissions, second only to enteric methane emissions. The Dairy Power/Biogas Capture and Transport project, initially defined as two separate projects, is focused on realizing the significant potential of anaerobic manure digester systems to reduce emissions and produce new sources of revenue for the dairy farm.

A renewable source of energy, manure-derived methane can be used to generate on-farm electricity, heat and hot water, or it can be transported to a central facility for processing and sale as natural gas to run vehicles and heat our country's homes and businesses. Manure digester systems also remove pathogens, moisture and odor from manure, creating a nutrient-rich, fibrous byproduct that can be used or sold as soil amendment to replace peat moss or animal bedding – and generates additional business value for dairy producers. Learn more about anaerobic digester systems on page 32.

Progress

In 2009 and 2010, the project team worked with USDA to build understanding of USDA-backed manure digester grants and loan guarantees. The collaboration between USDA and the Innovation Center is designed to accelerate the adoption of methane digesters for all sizes of dairy farms, making it easier to connect digesters to electricity grids and help digester operators capture potential carbon offset payments.

KEY 2011 RESULTS⁴¹

- 176 U.S. dairy digesters in operation at year-end 2011 (est.)
- 15 new U.S. dairy digesters brought online in 2011
- 541 million kilowatt hours generated
- 1.2 million metric tons CO₂e emissions destroyed
- 301,000 metric tons CO₂e emissions avoided



In 2011, the team looked to the wind and solar industries as models for successful financing packages, and researched successful cooperative digester models. The result is a finance model that includes manure digester performance guarantees, long-term feedstock contracts and long-term off-take agreements to sell digester-sourced electricity, biogas, carbon credits, waste heat, compost, fiber and fertilizer for the term of the debt service. An example of this model is illustrated in the Big Sky West project description on page 33.

The team completed a mapping project that identified regions with the greatest potential for manure digester development. The most promising locations have a large concentration of dairy farms, easy access to energy transmission and distribution hubs, and state- and utility-level jurisdictions that support strong renewable portfolio standards needed to encourage renewable energy development.

Piloting Biogas Capture and Transport

Manure-derived biogas can be processed into compressed natural gas (CNG) for use as a renewable vehicle fuel, which costs less than diesel and can save fuel costs for long-haul truckers. In 2011, the project team completed an economic feasibility assessment for the capture and transport of biogas, and developed cooperative partnerships that include long-haul milk truckers.

One such partnership involves Fair Oaks Farms, a 30,000-head dairy farm located in Indiana, and Ruan Transportation Management Systems, Inc., a subsidiary of Ruan Transport Corporation and one of the largest privately-owned transportation services companies in the United States. This project demonstrates the use of

CNG from the Fair Oaks Farms biogas processing facility on a fleet of 42 long-haul trucks that will transport raw milk from Fair Oaks Farms dairy facilities to processing centers across the Midwest. The long-haul CNG-fueled fleet, which will be one of the largest of its kind in the country, is expected to save more than 1.5 million gallons of diesel fuel per year, reducing fuel costs and lowering air emissions.

What's Next

In 2012, the team will work with CAES to estimate the financial impact, market potential, estimated job creation and overall costs and benefits of deploying 1,300 manure digesters across the United States. Findings will be published in 2012.

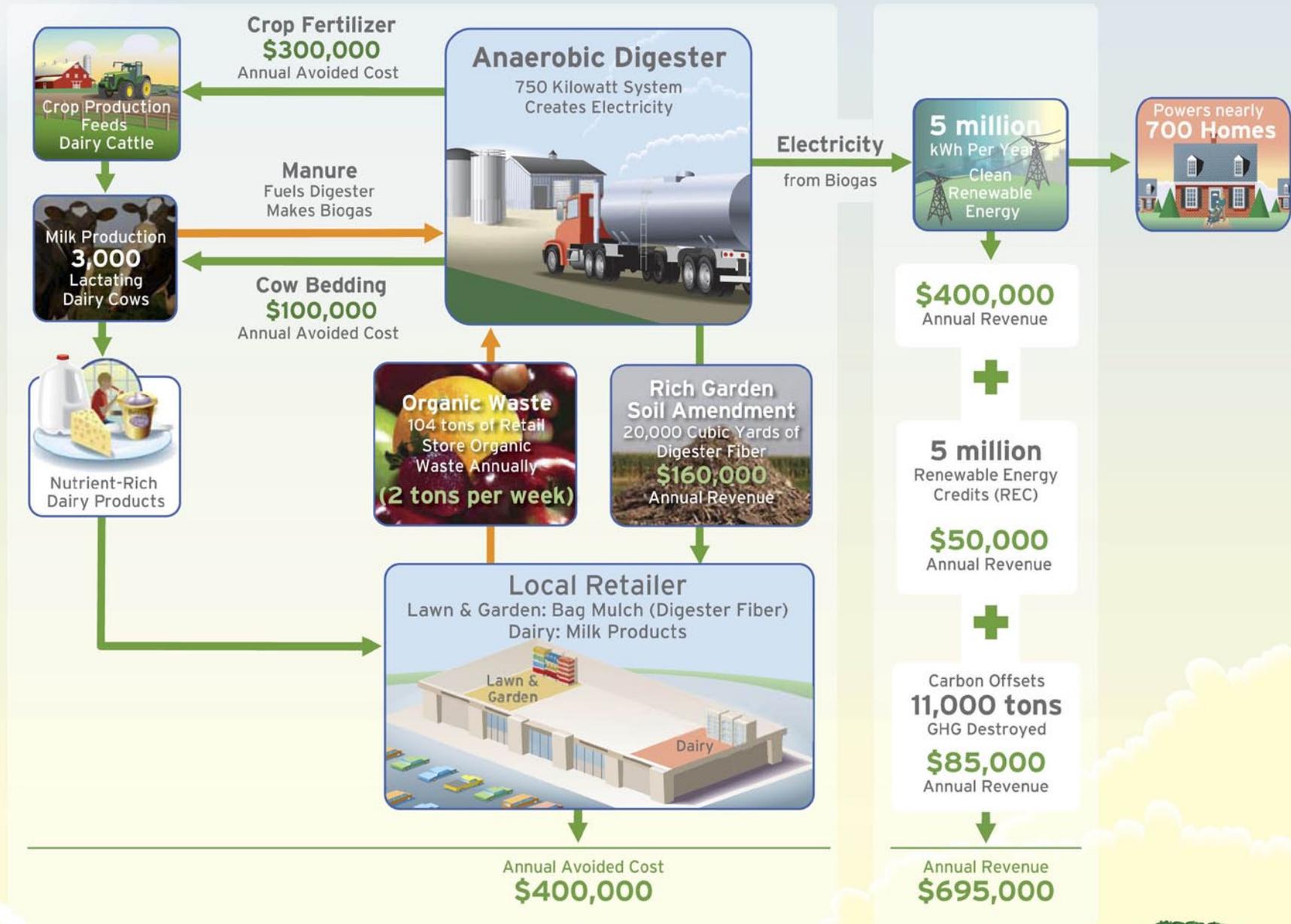
“By managing manure in digester systems, you improve environmental performance and capture methane, reducing greenhouse gas emissions and providing a source of local, clean energy.”

Chris Voell
National Program Manager for U.S. Environmental Protection Agency's AgSTAR

USDA SUPPORT FOR RENEWABLE ENERGY FROM DIGESTERS

- > In 2011, the USDA's Rural Energy for America Program (REAP), provided more than \$20 million in assistance for manure digesters, and leveraged more than \$110 million in project development funds. In late 2011, USDA announced a REAP initiative to fund anaerobic digester products in eight states. To date, REAP has assisted 9,600 recipients, creating or saving an estimated 15,000 jobs, saving 13.4 billion kWh of electricity and reducing GHG emissions by almost 14.5 million metric tons.⁴²
- > In late 2011, USDA Agriculture Secretary Tom Vilsack announced the Bioenergy Program for Advanced Biofuels, which provides stimulus payments to support the growing advanced biofuels industry. The program provided a \$12.8 million loan guarantee for NOVI Energy's development of the Fremont Community Digester, an anaerobic digester in Michigan that will convert more than 100,000 tons of regionally sourced organic and agricultural material, including manure, into 3 megawatts of clean, renewable energy each year. The digester will also produce liquid fertilizer and compost for sale to regional agri-businesses. One of the first and largest commercial-scale digesters in the country, the facility broke ground in the summer of 2011 and is expected to begin operation in late 2012.
- > The USDA's Value-Added Producer Grant Program and Environmental Quality Incentives Program offer additional financial and technical assistance to encourage widespread adoption of digester technology.

A BUSINESS MODEL FOR SUSTAINABLE DAIRY DIGESTER SYSTEMS



PARTNERSHIP HIGHLIGHT: Center for Advanced Energy Studies

“This collaboration with the Innovation Center will facilitate technology-based economic development, which is a priority of the U.S. Department of Energy. CAES will serve as a model for other U.S. Department of Energy labs in the advancement of sustainability research and the transfer of technology to the broader industry.”

Dr. Harold Blackman
Director of the Center for Advanced Energy Studies

In 2011, the Innovation Center, the Dairy Research Institute and the Center for Advanced Energy Studies (CAES) announced a partnership focused on enhancing the economic viability of dairy farms and rural communities. CAES is a research and education partnership among the Idaho National Laboratory, the U.S. Department of Energy and the state of Idaho (through its research universities).

The partnership will advance the science and management practices of renewable energy, environmental stewardship and life cycle analysis of dairy systems and processes.

Along with facilitating technology-based economic development, the partnership’s key goals are 1) to help identify best practices in nutrient and manure management; 2) to identify renewable-energy production opportunities and better practices for dairy farms of all sizes; 3) to characterize the U.S. utility grid infrastructure, electric rates and renewable energy incentives that apply to dairy farms; and 4) to identify ways to boost research funding for all of these areas.

CAES/Idaho National Laboratory has also partnered with the Innovation Center to sponsor the Award for Outstanding Achievement in Energy, which recognizes dairy farms and processors for significant energy conservation and/or production of renewable energy. Read more about the program on page 8.



BIG SKY WEST CASE STUDY⁴³

The Big Sky West project exemplifies the successful three-part finance model for sustainable digester systems – feedstock agreements, technology agreements and off-take agreements. After three years in operation, the project has impressive, audited results, and private-sector investors are noticing.

Big Sky West is a 4,700-cow dairy farm in Idaho. On-farm manure is recycled through two anaerobic digesters that produce 1.2 megawatts of electricity each year. The digesters extract methane gas, which is piped to an on-farm powerhouse. The energy generated is sold to the Idaho Power Company.

The project generates just under \$1 million in annual business value, making the simple payback period for its capital investment approximately six years. Using the Big Sky West project as a baseline, rough figures indicate an estimated market potential of \$2 billion and an internal rate of return of 15 to 20 percent. The digester system also provides intangible value through nutrient management and improved air and groundwater quality.



2011 DIGESTER FINANCE SUMMIT

In September 2011, the U.S. Environmental Protection Agency’s AgSTAR, USDA, WWF and the Innovation Center hosted the 2011 Digester Finance Summit. Recognizing that the enormous potential for dairy-sited anaerobic digester systems will be realized only with new financing and business models, the group held the summit to raise awareness of funding opportunities, share

knowledge and resources, and spark discussion regarding the financial and institutional barriers to widespread digester adoption on dairy farms.

The summit championed the message that to succeed on a national scale, dairy-sited digester projects must be profitable for all involved parties – host farms, project developers, lenders and investors – while reducing the financial risks to producers, compared with conventional models. New business models, including the one described on page 32, are expected to open up investment sources previously inaccessible to digester developers.

AgSTAR, a collaborative effort between EPA and USDA, is an outreach and education program to promote the recovery and use of methane from animal manure.

BEYOND-THE-FARM PROJECT

Dairy Plant Smart™

2020 Goals

Dairy Plant Smart

- > Reduce GHG emissions for fluid milk by more than 160,000 metric tons
- > Reduce energy costs by \$45 million to \$50 million
- > Improve system reliability and operations cost control

Stakeholder Contributions

Number of Stakeholders: 93

2011

Est. Hours 4,765

Est. Value \$547,975

Values are reported for project members other than Innovation Center staff and consultants.

“I was impressed by the enthusiasm shown by dairy processors in the development of the ENERGY STAR guide; their support and inputs were invaluable.”

Eric Masanet

Author of Energy Efficiency Improvement and Cost Saving Opportunities for the Dairy Processing Industry



This project encourages identification and adoption of energy management best practices in milk processing plants to reduce costs and GHG emissions. The project also includes Next-Generation Cleaning, a project originally managed separately, which promotes identification and adoption of reduced-temperature cleaning technologies that have the potential to reduce costs and GHG emissions.

Progress

Following a successful opening project phase of gathering and disseminating recommended practices and case studies, the team focused on new tool development, promotion of a dairy processor-specific program within EPA's ENERGY STAR program and pilot testing for reduced-temperature cleaning technologies.

Dairy Plant Smart Tools: The team developed two software tools to help processors make data-driven decisions about management practices:

- > Carbon footprint benchmarking tool enables plant managers to calculate their carbon footprint in accordance with the industrywide LCA and to benchmark their performance.
- > Fluid milk plant simulation tool helps processors model their plants' current performance and identify next steps to reduce emissions, energy use and costs.

Dairy Processing Focus: The team continued to promote participation in the Dairy Processing Focus, a partnership established in January 2010 between the ENERGY STAR program and the International Dairy Foods Association (IDFA) to improve energy efficiency at dairy processing plants. One of the main components of the partnership is the ENERGY STAR Challenge, a call to action for the dairy processing sector to reduce its energy intensity [British thermal units (Btu) per pound of dairy product produced] by 10 percent in five years. Learn more at idfa.org/files/ChallengeIndustry.pdf.

Dairy is the leading sector for taking the ENERGY STAR Challenge: 147 dairy companies have signed up since 2010. Seven processors have already achieved the reduction goal, saving enough energy to power 27,000 homes for one year and reducing greenhouse gas emissions by almost 65,000 metric tons.⁴⁴

To support the efforts of dairy processors, EPA released **Energy Efficiency Improvement and Cost Saving Opportunities for the Dairy Industry: An ENERGY STAR Guide for Energy and Plant Managers**, along with information on draft models for testing energy performance indicators in fluid milk and ice cream processing plants.

“For years, dairy plants have been working to reduce energy and setting – as well as achieving – goals in line with the ENERGY STAR Challenge, so the partnership with EPA made a lot of sense to us. We're very proud of dairy's participation; it demonstrates what can happen when government and industry team up to meet a common goal.”

Clay Detlefsen
*IDFA Vice President
of Regulatory Affairs*



2020 Goals

Next-Generation Cleaning

- > Further reduce GHG emissions for fluid milk by nearly 65,000 metric tons
- > Reduce cleaning-specific energy use by 15 percent for an average savings of nearly \$40,000 per plant and total industry savings of nearly \$12 million



DARIGOLD INC. CASE STUDY

Through a company-wide commitment to sustainability, Darigold, Inc., in Seattle has empowered its employees to work together to reduce use of water,

fuel and energy, as well as waste. Darigold improved water usage by more than 13 percent (water gallons per unit). It recycles 50 percent of its waste, and has seen nearly a 50 percent improvement in fuel usage per unit, equal to more than 216,000 gallons of diesel fuel annually. They have completed more than 20 sustainability-driven packaging redesigns, reducing cost by more than \$1 million and greatly reducing corrugated and plastic usage. Darigold was selected as the winner of the Outstanding Dairy Processing & Manufacturing Award in the inaugural year of the U.S. Dairy Sustainability Awards.

Next-Generation Cleaning: Pilot tests of reduced-temperature cleaning technologies were completed in 2011. Although the tests demonstrated excellent promise—energy consumption dropped as much as 50 percent in some cases – the team found that the cost of the required chemicals could create a difficult tradeoff for processors. The team is currently reevaluating options for further study.

What's Next

As part of the release of the carbon-footprint benchmarking and fluid milk simulation tools in 2012, the team will launch communication efforts to encourage pilot testing and use of the new tools.

Next-Generation Processing: UV™

2020 Goals

- > Reduce GHG emissions for fluid milk by nearly 285,000 metric tons
- > Reduce energy costs by \$30 million to \$35 million

Stakeholder Contributions

Number of Stakeholders: 52

2011

Est. Hours	18,840
Est. Value	\$2,166,600

Values are reported for project members other than Innovation Center staff and consultants.

This project explores UV illumination as an adjunct to pasteurization to produce safe and nutritious milk products with a longer shelf life, while reducing energy costs.

Progress

In 2010, the team completed a first round of extensive testing. A proposal was submitted to the National Conference on Interstate Milk Shipments (NCIMS) in early 2011 to include UV illumination in the Grade “A” Pasteurized Milk Ordinance (PMO). Developed by the U.S. Public Health Service, Food and Drug Administration (FDA), states, municipalities and research institutions, the PMO is a national standard for milk and dairy products to ensure consistent milk sanitation and safety across state lines.

The NCIMS recommended that a study committee be formed to review the use of UV illumination as an adjunct to thermal pasteurization to increase product shelf life. As part of the NCIMS decision, additional comprehensive



biochemical analyses were also required and are expected to be completed in 2012.

ENSURING OPEN-SOURCE COLLABORATION TO ADVANCE SUSTAINABILITY



Recognizing the value of life cycle assessments in developing sustainable agricultural practices, the U.S. Department of Agriculture launched a project in cooperation with the University of Washington, the University of Arkansas, the USDA National Institute of Food and Agriculture (NIFA), and the USDA National Agricultural Library to build a virtual, linked library of LCA-relevant data from publicly funded programs. The LCA Digital Commons Project involves a network of independent but linked databases, all of which comply with data standards and conventions established by the project – making the data easy to incorporate into LCAs.

The Innovation Center is working closely with the LCA Digital Commons Project and anticipates uploading data from our GHG LCA for Fluid Milk in the first part of 2012, which will be the first national-level dataset of its type to be publicly registered. USDA provided crop production data, and recipients of NIFA grants will be required to contribute their relevant project data. Representatives from USDA and the University of Washington demonstrated a prototype at the LCA XI conference in October 2011; researchers expect to release the tool in the spring of 2012. Learn more at lcacommons.gov.

BEYOND-THE-FARM PROJECT

Dairy Fleet Smart™

The goal of Dairy Fleet Smart is to accelerate the adoption of transportation and distribution practices that reduce fuel consumption, costs and GHG emissions. The project combines education on better management practices with science-based decision-making tools to create continuous efficiency improvements among shippers and carriers.

Progress

During 2011, the project team focused on the development and beta-testing of an online benchmarking and modeling tool for dairy transportation companies. The tool combines two aspects of the Dairy Fleet Smart project: the EPA SmartWay program and better management practices for fuel efficiency.

The team has been promoting participation in SmartWay, which was launched in 2004 to help long-haul fleets and professional drivers reduce their fuel consumption through a range of advanced technologies, such as on-board electronic recorders, financing programs and driver best practices.

The Dairy Fleet Smart tool builds on the benchmarking capabilities of SmartWay by providing recommended management practices and improvement strategies to assist with decision-making and goal setting. The team developed the tool to determine GHG emissions reduction goals that consider current efficiency levels and align with business strategies, as well as to communicate improvement results. Beta testing of the initial version of the tool in a Microsoft Excel® format and development of an online version will occur in 2012.

Also in 2011, the team hosted webinars to communicate opportunities for fuel savings through efficiency programs, as well as the potential for electronic on-board recorders to collect detailed operational data.

INDUSTRY SPOTLIGHT: RUAN TRANSPORT CORPORATION



Ruan Transport Corporation is actively involved in the Dairy Fleet Smart program; it is an official partner in SmartWay, and its senior vice president and general manager, Jim Mulvenna, serves as project team captain. Ruan understands that fewer trucks traveling fewer miles, while delivering more milk and dairy products, reduces energy use and costs.

"We continuously propose more efficient transportation solutions to our customers. One pending proposal we have developed with some of our valued dairy clients will reduce total transportation spending by \$1 million and take up to 20 percent of the transportation assets off the street. Additionally, the remaining fleet will be capable of hauling over 3 percent more product, further reducing the number of trips required by the fleet."

Jim Mulvenna
Senior Vice President and General Manager
Ruan Transport Corporation

What's Next

The project team plans to release the online benchmarking tool for dairy transportation companies by early 2012. Education and communication efforts will continue in 2012.

2020 Goals

- > Reduce GHG emissions for fluid milk by more than 542,000 metric tons
- > Reduce fuel costs by nearly \$58 million

Stakeholder Contributions

Number of Stakeholders: 16	
2011	
Est. Hours	3,952
Est. Value	\$454,480

Values are reported for project members other than Innovation Center staff and consultants.



Understanding Dairy's Water Profile



WALTON FAMILY FOUNDATION GRANT

The Walton Family Foundation's Freshwater Conservation Initiative provides grants to help grantee and partner organizations foster healthy and resilient human and ecological systems along the Colorado and Mississippi river basins. In late 2010, the Walton Family Foundation awarded \$250,000 to support the dairy industry's efforts to understand, measure and analyze the impacts of nutrient runoff from the Mississippi River Basin to the Gulf of Mexico. Pilots occurred on two farms including Saxon Creamery featured in this photo.

Water is a top issue for most industries and organizations worldwide. According to the United Nation's Food and Agriculture Organization (FAO), water use has grown at twice the population growth rate over the last century. By 2025, the FAO projects that two-thirds of the world's population could live under water-stress conditions. Water scarcity is expected to present significant risk to agriculture and society in general. For this reason, water is not just an environmental concern; the social and economic impacts of water will also be key challenges for the coming decade and beyond.

Dairy's Water Footprint

Water is a topic that should be analyzed with care. Analysis of the water footprint of a farm operation or processing plant must take into account local water availability and sources, water stress, and quality of water source. Soil conditions, weather, seasonal changes and management practices add to the mix. The combination of these factors paints a complex water profile that is unique to each facility.

The Innovation Center is leading efforts to help the industry understand its water-related risks and opportunities, and to deliver best management practices to help producers, processors and manufacturers manage their water footprints.

In parallel, with funding support from the Walton Family Foundation, the Innovation Center and its research affiliate, the Dairy Research Institute, began a water assessment to examine water availability, quality of water sources and impacts for dairies across the United States. As part of the Comprehensive LCA for Fluid Milk discussed on page 22, the research team developed a water footprint for crop production and on-farm activities, evaluating both water quantity and quality:

Concerns about global climate change and the ability to feed a growing population are causing some stakeholders to request life cycle-based sustainability data on products, companies and industries. In addition to carbon footprinting, water footprinting is emerging as an important indicator for the agriculture and food sectors.⁴⁵

- > **Water quantity** is associated with the general availability of water or with the water intensity of a given practice. Uses of water include irrigation of crops for dairy feed, providing water for dairy cows and dairy farm operations, such as cleaning.
- > **Water quality** is associated with nutrients and sediment found in water discharged back to ground or surface waters. Manure and feedstock fertilizer represent dairy's greatest impacts to watersheds. Both return nitrogen and phosphorous to the watershed through ground and surface water runoff that drains from the dairy farm back to the local water supply. If not managed properly, these nutrients can over-stimulate aquatic plant growth and impact aquatic ecosystems, a process known as eutrophication.

Together with WWF and other stakeholders, we have started to analyze the initial results of the water assessment in context and to identify better management practices and opportunities for improvement.

What's Next

Given the variability of water impacts across the industry, we will build on our 2011 water assessment by reviewing beyond-the-farm aspects of water, including processing, packaging, distribution and retail points on the dairy value chain. The Comprehensive Processing and Packaging LCA and the Comprehensive LCA for Cheese, both completed in 2011, will contribute to these efforts. Findings will be published in 2012 and incorporated into the water assessment project. They will also support the development of tools, such as the Farm Smart toolkit described on page 27. In addition, the Innovation Center will work with stakeholders to identify a suite of better management practices to help the industry improve its water impacts.

The project team also plans to develop models to validate the data gathered in the water assessment, and to reach out to producers and processors as team members continue to build, validate and beta-test a water assessment toolkit to help producers and processors manage and improve their water profile.



Globally, approximately 70 percent of the world's freshwater withdrawals are for agricultural use (crop irrigation, livestock, etc.).⁴⁶

UNDERSTANDING DAIRY'S AIR QUALITY IMPACTS

Animal feeding operations generate a range of air emissions which can impact air quality. The National Air Emissions Monitoring Study (NAEMS) was designed to obtain the best possible scientific measurements of ammonia, particulates, hydrogen sulfide and volatile organic compounds, which are federally regulated air emissions. The study, funded by industry and overseen by the EPA Office of Air Quality Planning and Standards, was led by Purdue University, with seven other academic research universities participating. Over a two-year period, researchers continuously monitored, collected and measured levels of the four regulated air pollutants at 24 monitoring sites across nine states, including five dairies. In 2012, EPA is expected to use the NAEMS data to develop science-based on-farm standards, as well as a process-based model to help producers remain within the boundaries of the EPA's Clean Air Act. Findings are expected to be released in 2012 and will be discussed in future reports.



CEDAR GROVE CHEESE CASE STUDY

As a Wisconsin Master Cheesemaker, Bob Wills is committed to environmentally sound production practices. Wills is the head of Cedar Grove Cheese, a specialty and traditional cheese company in Plain, Wis. His commitment extends beyond cheese production to onsite recycling programs as well as energy-reduction and water recycling practices. In 2000, Wills installed an earth-friendly and cost-effective way to

handle the 7,000 gallons of wash water used daily in his specialty cheese factory. Located in an onsite greenhouse, the elaborate wastewater treatment facility mimics the water cleansing properties of wetlands by utilizing microorganisms and plants. At the end of the complex treatment process, wastewater is filtered into clean water and returned to the ecosystem via nearby Honey Creek, a small pristine waterway in the Wisconsin River Basin that winds through Sauk County's rich dairy land.

"The natural process of treating our wastewater helps us remember that what goes down the drain matters," Wills says.

"For Prairieland Dairy, sustainability isn't just good environmental stewardship. It is about serving people, cows and our community."

Dan Rice
Producer and General Manager
Prairieland Dairy



SOCIAL

Social Impacts and Opportunities

The dairy industry is an integral part of the social and cultural heritage of our nation: from the role that nutritious dairy products play in our diet, to the strong ties between dairy businesses and their employees, families and communities. Now that our efforts to measure and reduce the industry's environmental impacts are gaining traction, we are looking more closely at assessing and communicating the social dimension of the dairy industry.

As part of the Sustainability Measurement and Reporting Framework for U.S. Dairy described on page 16, work is under way to identify indicators and metrics to measure social impacts and performance. The Framework Task Force is considering how measures typically applied at an organizational or corporate level can be applied to understand the real, often complex impacts of the dairy industry in these areas, especially on the farm. Initial social topics for development within the framework include community contributions, working conditions and animal care.

In addition, the industry has various projects and research activities related to food safety, health and nutrition, which will be considered for inclusion in the framework after 2012. Reflecting these ongoing efforts, this section provides a general overview of these topics through case studies and industry-level data, and highlights a few specific industry and company initiatives.

Community Contributions

Dairy industry businesses and their employees are active in the communities in which they operate. They contribute at the local, national and international levels through donations of time, resources and funds to promote education and rural economic development; support charity events; and raise awareness of healthy lifestyle choices that help to combat issues such as malnutrition and obesity. While the industry's overall contributions are

too numerous to fully cover in this report, the following examples highlight ongoing efforts in the area of hunger relief, a serious and growing problem that the dairy industry is dedicated to help address.

> During a Dairy Month campaign in June 2011, Dairy Farmers of America, Inc. (DFA), a dairy producer-owned milk marketing cooperative, delivered nearly 100,000 meals to the hungry nationwide. DFA members and staff gave nearly 700 hours of volunteer time, donated more than 7,700 pounds of food, and sorted and packaged another 65,000 pounds of food to provide the meals.⁴⁷

> Kraft Foods Inc. is currently fulfilling a 2009 pledge of \$4.5 million to Feeding America's Mobile Pantry Program, which brings food to families in need.⁴⁸

> In 2011, Land O'Lakes, Inc. donated 118,800 pounds of sliced American cheese, 80,000 pounds of cheese sauce, 113,400 pounds of macaroni and cheese, one million eggs, 60,000 pounds of margarine and 20,000 pounds of butter to a variety of hunger-relief programs in 2011, along with \$655,750 in cash contributions.⁴⁹

> Tillamook County Creamery Association has been a presenting sponsor of a food drive in Oregon for the past five years, to which it donates a penny per pound of Tillamook cheese sold in Oregon and southwest Washington. In 2011, it made a \$30,000 donation directly to the Oregon Food Bank.⁵⁰

> In 2010, Hilmar Cheese Company donated 7,000 pounds of cheese and thousands of cans of food to local food banks and hunger-relief organizations.⁵¹

As part of the development of the Sustainability Framework for U.S. Dairy, project teams are currently assessing existing indicators, metrics and practices related to community contributions across the industry to identify how to best measure and communicate our performance.

Workforce



RECOGNIZING EXEMPLARY SAFETY

For the past eight years, the International Dairy Foods

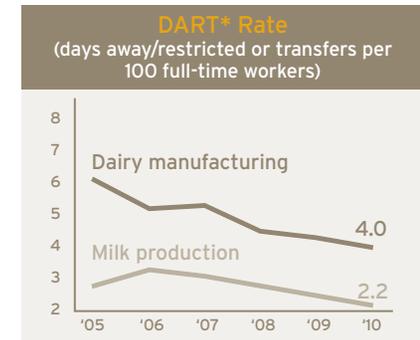
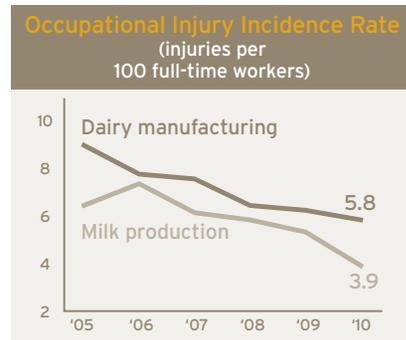
Association (IDFA) has promoted and recognized worker safety through the IDFA Dairy Industry Safety Recognition Awards and Achievement Certificates program. The program highlights outstanding worker-safety records of U.S. dairy companies in both processing facilities and trucking operations. In 2011, 144 dairy companies received awards and recognition, based on specific 2010 Occupational Safety and Health Administration (OSHA) performance. Thirty-two facilities received the Plant Safety Award, and 24 received Achievement Certificates for having no injury cases that resulted in lost time away from work. IDFA also recognized 88 trucking operations, more than twice the number in 2010, for having a Zero DART rate (days away from work, restriction or job transfer). For a list of award winners, visit: idfa.org/news--views/news-releases/details/6415/.

Employees along the entire value chain are the strength of the industry and its success, and many are members of farm families. As part of the Framework development under way, we are initially identifying indicators related to a broad range of aspects like employee retention, safety, training and benefits to better understand challenges and opportunities. For example, one of the challenges that dairy producers face is the availability of workers. The dairy industry is increasingly relying on foreign workers, but it's often difficult for dairy producers to find enough legal workers in their vicinities. In efforts to address this challenge, National Milk Producers Federation (NMPF) is leading the industry's support for a federal visa program that provides access to a legal labor supply in a workable, efficient manner. The outcome of these efforts will have an impact on dairy farms today and in the future. To learn more about this labor challenge, refer to *The Economic Impacts of Immigration on U.S. Dairy Farms*, a study conducted by NMPF and available at [nmpf.org/files/file/NMPF Immigration Survey Web.pdf](http://nmpf.org/files/file/NMPF%20Immigration%20Survey%20Web.pdf).

Worker safety: The dairy industry is committed to employee safety and wellness. Organizations across the value chain foster a culture of safety, quality and training to ensure the well-being of their employees. Dairy businesses need specially trained workers, as discussed in the case study on page 43. On the farm, workers need to be trained to work with large machines, equipment and live animals. In processing facilities, workers operate specialized machinery and trucks. Technological and design improvements on dairy farms have reduced the risk of work-related injury by cattle and machinery, the two leading causes of dairy injuries.^{52,53,54} Artificial insemination of cows has significantly reduced the number of bulls on farms, thus reducing the dangers associated with handling them. In addition, safety trainings are common practice throughout the industry. In 2010, dairy production and manufacturing represented 1 percent of the total occupational fatalities, with 41 in milk production and 6 in dairy manufacturing.⁵⁵

WORKER SAFETY STATISTICS

Dairy product manufacturing (NAICS code 3115). Dairy cattle and milk production (NAICS code 11212), excludes farms with fewer than 11 employees.



Source: U.S. Department of Labor Bureau of Labor Statistics

*The DART rate is based on trending over 200,000 hours based on those injuries and illnesses severe enough to warrant days away/restricted and job transfers.

CASE STUDY: ATTRACTING AND RETAINING A QUALITY WORKFORCE ON DAIRY FARMS



Despite technological progress and mechanization in the U.S. dairy industry, on-farm workers are as vitally important today as they have always been. While dairy producers have a deep-rooted commitment to the people who work their farms and tend to their cows, maintaining a quality workforce is more challenging than ever before.

According to a 2009 study commissioned by the National Milk Producers Federation, U.S. dairy producers employ about 138,000 full-time equivalent workers a year.⁵⁶ Forty-one percent of those, or 57,000 workers, are foreign born.⁵⁷ These workers perform a wide variety of on-farm jobs, including cultivating crops; feeding, watering and milking cows; mixing feed rations; cleaning milking parlors; assisting with calf birthing; and operating and maintaining equipment.

“Dairy workers must come to the job with a respect for animals and a desire to be around them,” Hardie says.

Many of these are skilled jobs. For example, crop equipment and milking machines are more sophisticated than ever, requiring skilled operators and experienced mechanics. Milking must be done correctly to keep cows healthy.

Finding good employees – those already skilled or willing to learn – is not easy, in part because many dairy workforce needs are unique to the industry. For example, unlike their counterparts in the horticultural sector, dairy workers need to know the basics of animal husbandry. According to Robert Foster, a dairy producer who milks 400 cows on a fifth-generation family farm in Vermont, this makes finding new employees particularly challenging. “Dairy workers must be able to recognize when a cow is sick, help deliver calves and maintain a routine for the cows,” Foster says. “There is a lot of responsibility, and that can stress people.”

Equally important, dairy employees must show compassion toward the cows. According to Skip Hardie who milks more than 1,000 cows in New York, both the quantity and quality of the labor pool is critical. “Dairy workers must come to the

job with a respect for animals and a desire to be around them,” Hardie says. “That alone limits the number of people interested in applying for work.”

In addition to working with animals and developing unique skill sets, long hours and physical work in the natural elements also are part of working on a dairy farm. Cows need to be tended to around the clock. They must be milked every day without exception, and most are milked three times a day. As a result, workers often work night and weekend shifts in good and bad weather. These conditions can contribute to employee turnover in the dairy industry.

Hardie typically must hire three people for every two positions. “Thirty percent of the people we hire either don’t develop the skills we need or the work just isn’t what they expected. Working on a dairy farm isn’t for everyone,” Hardie says. Foster explains it this way: “The average person has an idealistic view of what it’s like to be a farmer, but when it comes down to it, very few people are willing to do the hard work and put in the long hours that it actually entails.”

Dairy producers are working hard to attract and retain quality employees through a combination of competitive wages and benefits. According to the Bureau of Labor Statistics, farm workers on ranches and animal farms, including dairies, earned a median income of \$10.56/hour and as much as \$16.71/hour in 2010. This is \$1.58 to \$4.30 more per hour than their counterparts working in the crop, nursery and greenhouse sectors.⁵⁸



Traditional benefits such as health and retirement plans, paid vacation and performance-based bonuses are offered, along with benefits more specific to the farm. For example, Steve Maddox, who milks about 3,500 cows at his California dairy farm, provides housing for half of his 64 full-time employees. Paul Broering, a dairy producer in Ohio who milks 200 cows, pays for employees to attend local farm shows and conferences as a way of rewarding good work while also

investing in employee education. Dairy producers also rotate the night and weekend shifts so that workers can spend time with their families. These employee benefits help dairy producers be more competitive in the agricultural job market.

Animal Care

“We hire workers who are responsible and reliable, and who genuinely care about our cows: compassion for animals is a requirement for this kind of work.”

Paul Broering
J & P Broering Farms

Breed Composition of the U.S. Dairy Cattle Herd⁵⁹

Percentages of population attributed to breeds for females born in 2005

Breed	All	Purebred	Crossbred
Holstein	90.8	92.4	37.1
Jersey	6.3	5.9	17.8
Other	1.9	1.5	13.4
Unknown	0.9	0.0	30.3
TOTAL	99.9	99.8	98.6

Data shows percentages by breed contribution from the full female pedigree file, including crossbreds. Results are for females born in 2005, the most recent breed profile data. Other comprises Brown Swiss, Guernsey, Ayrshire and Milking Shorthorn.



The livelihood of dairy producers relies upon the health and well-being of their cows. From good nutrition and health to handling and milking processes, animal care is a daily priority for dairy producers.

To assure consumers that dairy cows are treated well, the dairy industry established a voluntary, third-party verified animal care and quality program. In the fall of 2009, NMPF, with the support of Dairy Management Inc., launched the National Dairy FARM Program: Farmers Assuring Responsible Management™ (FARM), a comprehensive program to educate dairy producers, provide on-site farm evaluations and ensure third-party verification of better management practices at participating dairies. Counseled by the multi-stakeholder National Dairy FARM Advisory Panel, the FARM program establishes consistent practices for on-farm animal care and milk production and enhances consumer confidence and trust.

Since enrollment in the FARM program opened in September 2010 through December 2011, approximately 3,500 on-farm evaluations have been conducted, and approximately 30 percent of the nation’s milk supply now comes from dairy producers and cooperatives participating in the program.⁶⁰ From September to December 2011, Validus Ventures, LLC, an ISO 9001:2008-certified auditing and verification company that specializes in on-farm animal care, conducted audits at 84 randomly selected farms to verify the application of FARM program guidelines. Verification results will be analyzed in 2012 to demonstrate the integrity and validity of the program.

Together with NMPF, the development team for the social category of the Sustainability Measurement and Reporting Framework for U.S Dairy will identify how best to include measurement and reporting recommendations for animal care within the framework. Learn more about the FARM program at nationaldairyfarm.com.

Nutrition and Health

The nutritional value of foods is integral to a sustainable food system, intersecting with social, economic and environmental aspects of sustainability. The foods we eat provide nutrients that are essential for individual health and the overall wellness of the population. A healthy lifestyle that includes a balanced diet with nutrient-rich foods, such as low-fat and fat-free dairy products, fruits, vegetables and whole grains, is important for reducing the risk of chronic disease,⁶¹ which, in turn, may help reduce the economic burden for health care.^{62,63} The U.S. dairy industry provides affordable and nutritious dairy foods while continuing its long history of environmental stewardship. The GHG reduction projects under way and ongoing efforts across the dairy industry, for example, are minimizing the environmental footprint of dairy foods.

Food choice can influence the nutritional quality and healthfulness of a diet. Consumers are increasingly seeking a back-to-basics approach to healthy food choices, incorporating more fresh, wholesome foods. They are also looking for health and wellness attributes when buying food. Dairy is inherently nutritious; the majority of its nutrients do not come from fortification. Milk and dairy products such as natural cheese, which is made from just four basic ingredients, provide essential nutrients with minimal processing.

To meet consumer needs, lifestyles and tastes, dairy processors turn the milk delivered by producers into a wide range of products in ever-increasing varieties. Dietary recommendations for Americans to lower their intake of fat, sodium and added sugar have influenced product development and retail offerings across all food categories. In the dairy category, for example, more than 200 lower-fat cheeses have been introduced at retail outlets since 2007,⁶⁴ and low-fat and/or fat-free milk has been offered in more than 90 percent of schools since 2007.⁶⁵



There is a focus from government and health authorities to reduce sodium in the food supply to help lower sodium in the U.S. diet. Although cheese contributes just 8 percent of sodium to the American diet,⁶⁶ cheese manufacturers have formulated reduced-sodium processed cheeses and blended cheeses for school and commodity use, with just 200 to 300 milligrams of sodium per 28-gram serving.⁶⁷

Flavored milk contributes only 3 percent of added sugar and 2 percent of calories on average to the diets of children ages 2 to 18.⁶⁸ Since 2006, the dairy industry has reduced added sugars in chocolate milk offered in schools by an estimated 38 percent.⁶⁹ About 95 percent of flavored milk available to schools is estimated to be 150 calories or less.⁷⁰ In addition, lactose-free milk and dairy products are increasingly available for lactose-intolerant consumers.

“It’s hard to find any other single food that will give you the levels of nutrients you get in dairy.”

*Dr. Robert P. Heaney
Professor of Medicine
Creighton University School of Medicine*

In 2011, 2,399 new dairy drink, cheese and yogurt claims were introduced to provide more consumer choice: 17 percent of those claims were labeled with low calorie, low fat, no trans fat, low sodium, low sugar, no added sugar and/or sugar free.⁷¹

Nutrition and Health



NUTRITIONAL LABELING:

Nutrition-conscious consumers often rely on food labels and nutrition claims about the benefits of dairy foods to inform their choices. Compliance with regulations relating to labeling and marketing claims is a priority for the dairy industry. Marketing messages and claims promoted through multiple channels have oversight by FDA and the Federal Trade Commission, as well as USDA for certain environmental-related claims.

The potential healthcare cost savings from three to four daily servings of dairy has been estimated at more than \$200 billion over a five-year period.⁷²

Dairy's Nutrient Profile:

Dairy foods (milk, cheese and yogurt) are valuable sources of many essential nutrients that promote good health, including calcium, potassium, vitamins A, D and B12, protein, phosphorus,

riboflavin, magnesium and zinc. More than half of the calcium and vitamin D that Americans get from the foods they eat is from dairy, and about one-fourth of the vitamin A, vitamin B12, phosphorus and riboflavin from foods is from dairy. In addition, milk is the number one food source of calcium, vitamin D and potassium,⁷³ which are nutrients of public health concern.⁷⁴ Still, 85 percent of Americans are not consuming the recommended amounts of milk and milk products.⁷⁵ The *2010 Dietary Guidelines for Americans* (DGA) recommend three daily servings of low-fat and fat-free milk and milk products for individuals nine years and older; two and a half daily servings for four to eight year olds and 2 daily servings for two to three year olds.⁷⁶

On average, Americans consume 1.7 dairy servings a day.⁷⁷ Increasing dairy consumption to three daily servings can help people meet the recommended intakes of many essential nutrients.⁷⁸ An increasing body of evidence highlights dairy's potential to lower the risk of certain diseases, including osteoporosis, hypertension, type 2 diabetes and cardiovascular disease.⁷⁹ For example, a recent study of post-menopausal women reported that a diet higher in low-fat dairy products and yogurt was associated with a decreased risk of type 2 diabetes.⁸⁰

More consumers are recognizing that dairy products can be a valuable source of high-quality protein. In fact, dairy contributes 18 percent of the protein in the American diet.⁸¹ A diet higher in protein can promote

satiety⁸² – feeling full after or between meals – which may contribute to eating fewer calories and help with weight management.⁸³

Aspects beyond nutritional content also contribute to dairy's valuable role in a healthy diet. Emerging research using food pattern models and national dietary survey data shows that replacing dairy foods with recommended alternate calcium-containing foods would require a significant shift in usual diet patterns and would affect the overall nutritional profile of the diet.⁸⁴ In addition to being nutrient-rich, dairy foods are affordable and readily available at grocery and convenience stores, schools and restaurants, and are not easily replaced without trade-offs. For example, one serving of low-fat milk costs approximately 25 cents and provides at least 10 percent of the Daily Value for nine essential nutrients at about 100 calories. By comparison, ten 20-cent servings of raw spinach provide the same amount of calcium also for about 100 calories but do not provide vitamin D, protein and other essential nutrients found in a serving of milk. The Dietary Guidelines Advisory Committee noted in its 2010 report, "the amount of many potential alternatives [to milk and milk products] to provide sufficient calcium would provide too many calories and/or be a large amount to consume daily" and the "bioavailability of the calcium in vegetable products has not been addressed and could pose a concern."⁸⁵ Research examining the impact of replacing dairy with commonly consumed foods on diet quality, affordability, calories, amounts of foods needed, calcium bioavailability, protein quality, acceptability and accessibility will continue to emerge.

Children's Health: Because dairy foods play an important role in child growth and development, the dairy industry supports broad-based child health and wellness initiatives, such as the Alliance for a Healthier Generation, a nonprofit organization that works to address childhood obesity.



Another initiative is the *Fuel Up to Play 60* program, created by the National Dairy Council® and the National Football League in cooperation with USDA, to promote at least 60 minutes of daily physical activity and a healthy diet of nutrient-rich foods (including low-fat and fat-free dairy products, fruits, vegetables and whole grains). America's dairy producers have pledged \$250 million over five years to this program. Visit FuelUpToPlay60.com to learn more.

Food Safety: U.S. milk and milk products are among the safest and most highly regulated foods in the nation. Of all foodborne illnesses recorded in 2009, less than 1 percent was attributed to pasteurized milk and milk products.⁸⁶ Across the dairy value chain, a network of stringent regulatory and voluntary food safety controls ensures that safe, high-quality milk and milk products reach consumers.

On the federal level, FDA oversees the nationally regulated Pasteurized Milk Ordinance, which safeguards the nation's milk supply. Voluntary best practice guidelines and control procedures, such as Good Manufacturing Practices, jointly developed by FDA and the dairy industry, and Hazard

Analysis and Critical Control Points, ensure the quality and safety of milk and milk products at every step in the dairy value chain.⁸⁷

The industry is committed to maintaining confidence in the quality, safety and wholesomeness of dairy foods from farm to fridge. Through the Innovation Center, dairy plant food safety workshops are being offered to help dairy plants meet stringent regulations that are part of the FDA Food Safety Modernization Act. The workshops focus on pathogen-control guidelines, principles, techniques and approaches for dairy plants, and cover food-safety fundamentals on sanitation, sanitary design, standard operating procedures, environmental monitoring techniques and case studies.

Meeting the Nutritional Needs of Vulnerable Populations Worldwide

U.S. Dairy Export Council® (USDEC) is a nonprofit independent membership organization founded by Dairy Management Inc. in 1995. Two USDEC programs – Food Aid and Dairy for Global Nutrition – tackle issues of malnutrition and food security for the world's most vulnerable populations. USDEC Food Aid works with governmental organizations, NGOs and voluntary nonprofit aid groups to provide nutrient-dense, easily digestible, complete, high-quality protein in the form of powdered skim milk and whey protein to those in need. Dairy for Global Nutrition fosters ongoing scientific research of dairy's benefits for vulnerable populations such as pregnant and nursing mothers, small children and those with HIV/AIDS.

Moderate evidence shows that intake of milk and milk products is linked to improved bone health, especially in children and adolescents. Moderate evidence also indicates that intake of milk and milk products is associated with a reduced risk of cardiovascular disease and type 2 diabetes and with lower blood pressure in adults.

2010 Dietary Guidelines for Americans

Exercise Recovery: Research shows that milk, including chocolate milk, is an effective post-exercise and rehydration beverage to help refuel and rehydrate after intense exercise due to its fluid content, high-quality protein, carbohydrates, electrolytes and other essential nutrients.

“The U.S. dairy industry is a vital part of our nation’s food system and contributes thousands of jobs, income and vitality to communities across the country. In my community the dairy industry has preserved family wage jobs and provides a measure of economic stability in this unsettled economy.

Shawn Reiersgaard
*Director of Environmental and Political Affairs
Tillamook*



ECONOMIC

Economic Impacts and Opportunities

In addition to providing and distributing nutritious dairy products, the entire supply chain generates substantial economic benefits at the local, regional and national levels through employment, local tax revenues and purchases of related products and services. Jobs follow milk as it moves from farm to processing, distribution and retail. Jobs also are created within the supply and service sectors that support the industry. Dairies support the economic well-being of rural America; every dollar spent locally by a dairy producer creates a multiplier effect of more than two and a half times the original dollar spent.⁸⁸ A 250-cow dairy farm in Wisconsin spends, on average, approximately \$675,000 per year at local businesses and suppliers.⁸⁹ In Pennsylvania, one in-state job is created for every nine dairy cows.⁹⁰

A 2004 analysis of the direct and indirect economic impact (or multiplier effect) of U.S. dairy farming through processing was estimated to be \$140 billion in economic output, \$29 billion in household earnings and more than 900,000 jobs.⁹¹ Based on 2010 and 2011 production and processing trends, the impact is expected to be even greater today, contributing to regional and national economic recovery.

The project teams working on the Sustainability Measurement and Reporting Framework for U.S. Dairy described on page 16 have begun to examine the direct and indirect economic contributions of the dairy industry as they develop relevant performance indicators and metrics. Initial topics under review are local economic impacts and product differentiation. This section provides industry data to highlight some economic trends relating to dairy producers and processors.

Dairy Production

Dairy is the fourth largest agricultural commodity in the United States, with revenues of \$31.4 billion at the farm level contributing 10 percent of total receipts from sales of agricultural commodities.⁹² Globally, the U.S. is the largest producer of cow's milk, producing 192,819 million pounds in 2010, followed by India (110,893 million pounds), Russia (70,327 million pounds) and China (64,155 million pounds).⁹³ In recent decades, productivity of the U.S. dairy industry has increased significantly, as described on page 6.

Dairy is the number one agricultural product by income in 11 states: California, Wisconsin, New York, Pennsylvania, Idaho, Michigan, New Mexico, Arizona, Vermont, Utah and New Hampshire.⁹⁴ California, the top-producing dairy state, produces more than 20 percent of the U.S. milk supply,⁹⁵ generating \$5.9 billion in receipts.⁹⁶ The California dairy industry employs more than 400,000 people.⁹⁷

Economic Challenges

American dairy producers have been under considerable economic pressure since the 2008 recession. Rising feed, fuel and energy costs, and plummeting farm milk prices have strained dairy producers. From 2006 to 2010, overall production costs per hundredweight (cwt) sold increased 19.1 percent.⁹⁸ More significantly, the farm milk price in 2009 dropped to a low of \$11.3 per cwt in July before increasing to end the year at an annual average price of \$12.8 per cwt.⁹⁹ During the economic recession in 2008 and 2009, dairy producers lost nearly \$20 billion in total equity.¹⁰⁰ With the increase in milk prices and other factors, half of that loss was restored in 2010 and 2011.

Top 5 States by Total Milk Production (M lbs.) ¹⁰¹ in 2010	
California	40,385
Wisconsin	26,035
Idaho	12,779
New York	12,713
Pennsylvania	10,734



In California, more workers are employed by the dairy industry than the motion picture/television industry.¹⁰²

Economic Impact

Average Annual Milk Price Compared to Milk-Feed Price Ratio (\$/cwt)



Source: USDA NASS

The average annual farm price of milk returned to \$16.3 per cwt in 2010 and further increased to \$20.1 cwt in 2011.¹⁰³ However, fluctuations in feed costs and milk prices continue to challenge dairy producers. Over the past decades, the milk-feed price ratio, which is an indicator of on-farm profitability, has been decreasing, especially in the past five years. This downward trend occurs when the cost of feed rises faster than the producer's milk price, or when the milk price falls at a greater rate than feed cost. Recent trends indicate that while milk price has increased since 2009, the major crop costs have increased to a greater degree, which may be due to increasing fuel prices, increasing demand for corn and a tighter supply of farmland for all crops.¹⁰⁴ The net impact of a lower milk-feed price ratio is typically a reduction in the production of milk. The overall higher prices can adversely affect the quality of the dairy feed, which often translates into lower milk production per cow.

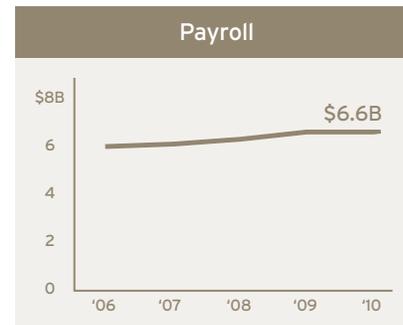
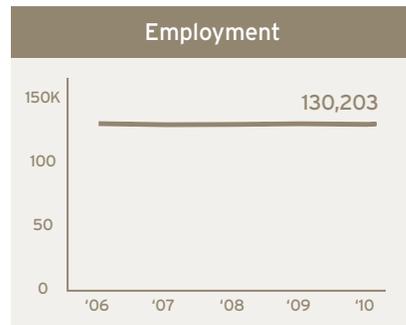
Economic challenges such as decreases in farm equity and rising feed costs can limit dairy producers' ability to invest in new technologies or innovations, because less capital is available. Our sustainability research and projects will keep identifying how dairy producers can reduce costs and find new opportunities that help improve their triple bottom lines (environmental, social and economic) to support ongoing improvements.

Dairy Processing

Dairy processing in the U.S. provides over 130,000 jobs.¹⁰⁵ In 2010, more than 1,200 dairy processing plants nationwide¹⁰⁶ produced approximately 195 billion pounds of dairy products, including fluid milk, cheese and yogurt.¹⁰⁷ In 2010, Americans spent \$109.9 billion on domestic dairy expenditures.¹⁰⁸

DAIRY PRODUCT MANUFACTURING

Employment and Payroll (includes only producers covered by unemployment insurance).



Source: Quarterly Census of Employment and Wages. U.S. Department of Labor, Bureau of Labor Statistics

Triple Bottom Line Benefits for Farm and Society

Some new and emerging business models have the potential to enhance the economic viability of animal agriculture while contributing to the health of the environment and the vitality of the local community. Two examples are described below.



COLLABORATING FOR SUSTAINABLE GROWTH

Converging near Monroe, Wash., just 25 miles from downtown Seattle, the Skykomish and Snoqualmie Rivers have inspired a unique merger: Qualco Energy (a nonprofit that brings together dairy and cattle producers, and salmon conservationists) has joined with the local Tulalip Tribes of the Tulalip Reservation with the common goal of sustainable resource management. An integral member of this alliance is the family-owned and operated Werkhoven Dairy, Inc., which also operates Qualco's anaerobic digester.

Construction of the digester was funded with roughly \$5 million in federal and state loans and grants. In

operation since 2008, the Qualco digester is located about 1.5 miles from Werkhoven Dairy and takes in a combination of manure and pre-consumer waste (fish, cattle and chicken waste; trap grease; expired beer, soda and wine; pulp; and whey). It produces enough methane each day to generate electricity for both farm operations and surplus sale to Puget Sound Energy. The digester also produces Grade A compost and is a rich source of data for researchers at Washington State University – largely in the realm of digester performance and emissions.

By the end of 2012, energy sales plus tipping (waste receipt) fees are expected to enable Qualco to reinvest in more renewable energy and recycling projects, fish and wildlife habitat restoration, and state-of-the-art farming practices. The positive impact of the project cannot be overstated: clean energy generation and waste diversion both benefit the nearby rivers' salmon habitats, the local economy and the surrounding communities. The Qualco partnership, an inaugural award recipient of the U.S. Dairy Sustainability Award for Outstanding Achievement in Energy, demonstrates the solutions that can be achieved when diverse groups focus on their shared goals and values. Learn more at qualco-energy.org.



ECOSYSTEM SERVICES

Benefits that farms provide to society can include soil, air and water purification, pollination of crops, and even recreation. These benefits are often referred to as ecosystem services. To ensure that these benefits continue for future generations, ecosystem services markets attempt to establish a financial value for these services. This market approach can encourage dairy producers to maximize the ecological benefits that their farms provide through improved farm management practices.

One vision for the use of the Farm Smart toolkit, which is described on page 27, is to help dairy producers identify and assess the value of on-farm ecosystem services, such as water quality, reduction of GHG emissions, open space preservation, and plant and animal biodiversity. Using the toolkit, a dairy producer will be able to record and bank future ecosystem services for credit trading within emerging regulatory or voluntary emissions trading. According to Bruce Knight, former chief of Natural Resources Conservation Service, this kind of valuation of ecosystem services of dairy farms can generate revenue or tax credits for dairy producers, increasing their financial and environmental value.

"In the U.S. dairy industry, we have learned that there is incredible power in working together, pre-competitively, through our entire value chain and beyond. This program is a great example of how systemwide collaborative efforts can help dairy secure a bright future, providing healthy products, healthy businesses and a healthy planet to future generations."

Paul Rovey
Arizona Dairy Producer and Chair, Dairy Management Inc.™



ABOUT

About the Innovation Center for U.S. Dairy

The Innovation Center for U.S. Dairy provides a forum for the dairy industry to work together pre-competitively to address barriers and opportunities to foster innovation and increase sales. The Innovation Center aligns the collective resources of the U.S. dairy industry to offer consumers nutritious dairy products and ingredients, and promote the health of people, communities, the planet and the industry.

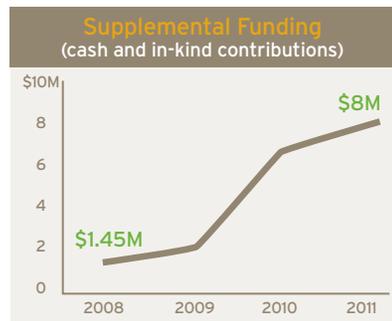
In 2008, the Innovation Center was founded through the dairy producer-funded dairy checkoff program (described on page 54) to work with and through the dairy value chain to overcome barriers and identify opportunities for long-term, sustainable growth. In 2010, the Dairy Research Institute, a nonprofit 501(c)(3), was established under the leadership of America's dairy producers, serving as the research arm of the Innovation Center, to strengthen the dairy industry's access to and investment in the technical research required to drive innovation and demand for dairy products and ingredients globally. The Dairy Research Institute works with and through industry, academic, governmental organizations and commercial partners to drive pre-competitive research in nutrition, products and sustainability.

Organizational Structure and Governance

Dairy Management Inc., headquartered in Rosemont, Ill., staffs the Innovation Center and the Dairy Research Institute. The Innovation Center board of directors is comprised of 32 leaders representing 30 key U.S. dairy producer organizations, dairy cooperatives, processors, manufacturers and brands. Innovation Center board members are listed at [USDairy.com/BoardofDirectors](https://www.usdairy.com/BoardofDirectors).

The board, which meets twice annually, has six operating committees that represent strategic focus areas – Sustainability, Health and Wellness, Research and Insights, Food Safety, Consumer Confidence and Globalization. The Sustainability Operating Committee oversees the Sustainability Council, a multi-stakeholder governing body described on page 12.

Funding and Financial Support: U.S. Dairy Sustainability Commitment



Funding from investors continues to augment dairy producer support from the checkoff program. Supplemental funding includes grants, awards, financial support from key stakeholders and in-kind contributions from formal stakeholder participation.

Financial and intellectual capital fuels our efforts. Stakeholder investments of funds and expertise are critical to the success of our efforts.

Founded, Funded and Supported by Dairy Producers

Our work is inspired, supported and directed by America's more than 53,000 dairy producers and dairy importers through their promotion checkoff program. The dairy checkoff was put into place by dairy producers to increase sales of and demand for dairy products and ingredients by working proactively, and in partnership with leaders and innovators, to increase and apply knowledge that leverages opportunities to expand dairy markets. To that end, in 2008, the dairy producer leaders of the dairy checkoff developed the Innovation Center for U.S. Dairy, in collaboration with other dairy industry leaders, to bring the industry together and work pre-competitively on dairy issues of common interest.

Investing in Sustainability

In 2011, we continued our efforts to augment dairy producer support with funding from other investors. For example, USDA NRCS Conservation Innovation Grants and the Rural Development Rural Energy for America Program support our efforts to help dairy producers lower their energy costs, improve their environmental stewardship and reduce GHG emissions.

Formal stakeholders contributed more than an estimated \$6.2 million worth of time and expertise to sustainability initiatives in 2011.¹⁰⁹ For more information, refer to the Stakeholder Engagement and Collaboration section on page 12.

2011 Funding	Project	Amount
GRANTS / AWARDS		
David and Lucile Packard Foundation, through an arrangement with the MBA-Nonprofit Connection, which helps place business school students and graduates in summer jobs and careers with nonprofits	Dairy Power	\$8,000
USDA NRCS Conservation Innovation Grants	Farm Smart	\$1,160,000
PARTNERSHIPS		
USDA-NRCS Contribution Agreement and Liaison	Farm Energy Efficiency	\$200,000
WWF partnership and shared staff person	General	\$100,000
USDA Rural Development Liaison	Dairy Power	\$200,000
EPA and WWF Digester Finance Summit	Dairy Power	\$50,000
CAES, Elanco and U.S. Dairy Export Council	U.S. Dairy Sustainability Awards Program	\$95,000
Ruan Transport Corporation	Dairy Fleet Smart	\$20,000
TOTAL		\$1,833,000

GRI Reporting Information

Stakeholder Report Feedback

Feedback from stakeholders informed the development of this report. First, we solicited comments on our 2010 report to guide how we could improve the 2011 report by holding informal discussions, conducting an online survey and hosting a meeting with NGOs. In late 2011, we also invited 40 stakeholders to review a draft of the 2011 report and provide feedback.

Topics raised by stakeholders include water, air quality and other environmental impacts beyond GHG emissions, nutrition, workforce and immigrant labor, animal care, and the broader impacts of the economic recession. We have begun to address these topics in this report and will look into expanding upon them in future reports.

GRI Content Index and Coverage Assessment

The Global Reporting Initiative is a network-based organization that produces the GRI Reporting Framework, a comprehensive sustainability reporting framework that is widely used around the world. GRI-based reporting has steadily increased since the GRI framework was introduced in 1999. In the U.S. alone, the number of GRI reports in 2010 increased by 22 percent from 2009. For more information about GRI, visit globalreporting.org.

GRI Application-Level Declaration

This report has been prepared according to the GRI G3.1 Sustainability Reporting Guidelines and is self-declared at GRI Application Level C. Performance indicators were selected from the G3.1 guidelines and the G3 Food Processing Sector Supplement.

Report Boundary

Report boundary refers to the range of entities whose performance is covered in an organization's sustainability report and is typically determined based on the organization's control of or influence on other entities. This organizational focus presents unique challenges for developing an industry-level report. After careful consideration, we defined two reporting boundaries for this report: Innovation Center-led efforts to fulfill the U.S. Dairy Sustainability Commitment, and broader sustainability efforts and performance across the dairy value chain.



We are a registered Organizational Stakeholder of the Global Reporting Initiative and support the mission of the GRI to develop globally accepted sustainability reporting guidelines through a global, multi-stakeholder process.

Report Application Level	C	C+	B	B+	A	A+
Standard Disclosures G3 Profile Disclosures	Report on: 1.1 2.1 - 2.10 3.1 - 3.8, 3.10 - 3.12 4.1 - 4.4, 4.14 - 4.15		Report on all criteria listed for Level C plus: 1.2 3.9, 3.13 4.5 - 4.13, 4.16 - 4.17		Same as requirement for Level B	
G3 Management Approach Disclosures	Not Required		Management Approach Disclosures for each Indicator Category		Management Approach Disclosures for each Indicator Category	
G3 Performance Indicators & Sector Supplement Performance Indicators	Report on a minimum of 10 Performance Indicators, including at least one from each of: Economic, Social and Environmental.	Report Externally Assured	Report on a minimum of 20 Performance Indicators, including at least one from each of: Economic, Environmental, Human rights, Labor, Society, Product Responsibility.	Report Externally Assured	Report on each core G3 and Sector Supplement* Indicator with due regard to the Materiality Principle by either: a) reporting on the Indicator or b) explaining the reason for its omission.	Report Externally Assured

*Sector supplement in final version

GRI Content Index

The following table identifies the GRI standard disclosures reported, the applicable boundary (described on page 55) and the location of the associated responses. Disclosures not listed are not reported.

GRI ID	BOUNDARY		REFERENCE
	INNOVATION CENTER	U.S. DAIRY INDUSTRY	
STRATEGY AND ANALYSIS			
1.1	●		3
ORGANIZATIONAL PROFILE			
2.1	●		1
2.2	●	◐	4, 5, 12, 53
2.3	●		53
2.4	●		53
2.5	●		53
2.6	●		53
2.7		◐	4, 5, 53
2.8	●	◐	4, 5, 49, 50, 53
2.9	●		None
2.10	●		None
REPORT PARAMETERS			
3.1	●		1
3.2	●		1
3.3	●		1
3.4	●		1
3.5	●		16, 19, 41, 51, 55
3.6	●		55
3.7	●		55
3.8	●		Not applicable to industry-level report
3.10	●		No re-statements
3.11	●		No changes
3.12	●		56
GOVERNANCE, COMMITMENTS AND ENGAGEMENT			
4.1	●		53

GRI ID	BOUNDARY		REFERENCE
	INNOVATION CENTER	U.S. DAIRY INDUSTRY	
GOVERNANCE, COMMITMENTS AND ENGAGEMENT, CONTINUED			
4.2	●		Not applicable
4.3	●		Not applicable
4.4	●		53
4.14	●		6, 12-14
4.15	●		6, 12
ECONOMIC			
EC1		◐	49, 50
EC2	●	●	24
EC4	●		54
EC9		◐	49, 50
ENVIRONMENTAL			
EN5	●		25, 28-29
EN6	●		24-37
EN7	●		24-37
EN16	●		25
EN18	●		24-37
EN26	●		10, 25
EN29	◐		20, 25, 37
SOCIAL			
LA7		●	42
PR1		◐	47
PR6		◐	46
FOOD PROCESSING SECTOR SUPPLEMENT			
FP4		◐	41, 45-47
FP6		◐	45
FP9		●	44

Reporting coverage: ● Fully covered | ◐ Partially covered

Endnotes

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