About this Resource

The Stewardship and Sustainability Framework for U.S. Dairy (Framework) was developed by the Innovation Center for U.S. Dairy® (Innovation Center) to support dairy cooperatives, processors, manufacturers and milk marketing organizations that choose to voluntarily track and communicate sustainability progress.

Retailers and other U.S. dairy customers can use the Framework to track their suppliers' continuous improvement on the sustainability measures that matter most.

The Innovation Center, in partnership with dairy farmers and businesses across the industry, intends to continually update the Framework to reflect the latest scientific information and generally-accepted best practices. Because the Framework is ever-changing, it is the user's responsibility to refer to the most updated version.

THE INFORMATION AND INDICATORS PROVIDED IN THIS FRAMEWORK DOCUMENT ARE BASED ON STAKEHOLDER INPUT AND STATISTICAL ESTIMATES, AND NOT ON AN ACTUAL ASSESSMENT OF A DAIRY FARM'S OR DAIRY COMPANY'S BUSINESS NEEDS. AS SUCH, THE INFORMATION AND INDICATORS SHOULD NOT FORM THE BASIS FOR DECISIONS WITHOUT FIRST OBTAINING APPROPRIATE PROFESSIONAL, SCIENTIFIC, ENGINEERING AND / OR LEGAL ADVICE SPECIFIC TO THE BUSINESS.

IN NO EVENT WILL THE INNOVATION CENTER FOR U.S. DAIRY OR DAIRY MANAGEMENT INC. BE LIABLE FOR ANY LOSSES OR DAMAGES, INCLUDING WITHOUT LIMITATION, INDIRECT OR CONSEQUENTIAL LOSS OR DAMAGE WHATSOEVER ARISING FROM LOSS OF PROFITS FROM THE USE OF THE INFORMATION AND INDICATORS PROVIDED HEREIN.
Table of Contents

Chapter 1: About the Framework  1
   Introduction
   Framework Alignment
   U.S. Dairy Indicators at a Glance

Chapter 2: Field Indicators  4
   Feed Impact

Chapter 3: Dairy Farm Indicators  5
   Energy Intensity
   Greenhouse Gas Intensity
   Water Quantity
   Nutrient Management
   Resource Recovery and Feed Management
   Animal Care
      FARM Program Participation

Chapter 4: Dairy Processor and Manufacturer Indicators  12
   Energy Intensity
   Greenhouse Gas Intensity
   Water Quantity and Quality
      Water Use
      Water Efficiency
      Water Discharge and Quality
      Water Recycling and Reuse
   Resource Recovery
      Waste Diversion
      Throughput Efficiency
      Resource Utilization
   Employee Investment
      Employment Opportunities
      Employee Benefits
      Employee Retention
      Employee Engagement in Health and Safety Management
      Days of Restricted Work Activity or Job Transfer
   Community Contributions
      Community Volunteering and Capacity Building
      Monetary and Product Donations
      Educational Opportunities
Introduction

Dairy has a unique and important role in contributing to a sustainable food system. Customers, meanwhile, increasingly seek assurance that the products they buy come from suppliers who protect the environment, promote community well-being and care for their animals.

With leadership and support from over 100 organizations, the Innovation Center for U.S. Dairy (Innovation Center) provides the forum through which the dairy community can advance a long-standing commitment to social responsibility, economic viability and environmental stewardship.

Framework Defined

The Stewardship and Sustainability Framework for U.S. Dairy (Framework) is voluntary and contains relevant indicators and corresponding metrics to track, measure and credibly communicate dairy sustainability. The Framework was developed with input and guidance from stakeholders including dairy farmers, manufacturers, retailers, brands, scientists and environmental nonprofits.

The Framework defines U.S. dairy’s sustainability measures, provides context as to the importance and relevance of each measure, and references applicable tools and resources the dairy community can use to identify improvement opportunities and proactively report progress.

A Unified Approach

The Framework provides a single, unified approach to stewardship and sustainability for the dairy supply chain from farm to table.

As dairy customers develop sustainable sourcing strategies, they are encouraged to use the Framework as a credible, consistent resource that can be used by dairy farmers, cooperatives, processors and manufacturers. This unified approach mitigates inconsistency and provides clarity as to what is meant by sustainable dairy, which benefits customers, the dairy community and consumers.

Customers Benefit

The Framework provides customers with a science-based approach to measure suppliers’ continuous improvement. Customers can support their sustainability efforts and those of the dairy community by using the Framework and sharing dairy’s story with consumers.

From farm to table, everyone benefits from supporting a socially responsible, economically viable and environmentally sound U.S. dairy community. Learn more at www.USDairy.com/sustainability or contact the Innovation Center at InnovationCenter@USDairy.com.

Dairy Sustainability Measurement Terms

- **Indicator**: An indicator provides a relevant measure to assess sustainability; for example, energy intensity.

- **Metric**: A metric defines how the indicator is measured. For example, energy intensity is calculated as the total amount of energy used per unit of production output.

- **Intensity**: Intensity metrics provide a normalization factor (for instance, units of milk production) to more accurately track progress over time. By dividing absolute impact by units of production, intensity metrics allow the dairy community to measure progress regardless of changes to production volume.

© 2016 Innovation Center for U.S. Dairy. All rights reserved.
Chapter 1: About the Framework

Framework Alignment

The Framework has been developed by the Innovation Center with input and guidance from stakeholders including dairy farmers, manufacturers, retailers, brands and environmental nonprofits. When possible and practical, the Framework aligns with indicators and metrics developed by others to ensure harmonization and prevent duplication.

Field to Market®

- A leader in driving sustainable outcomes for agriculture at the crop production level.
- The Innovation Center is aligning with Field to Market to help dairy farmers answer supply chain questions related to certain aspects of feed production.
- This approach recognizes that an estimated 65 percent of feed is purchased from off-farm sources and is not within the operational control of individual dairy farms (Page 4).

Farmers Assuring Responsible Management™ (FARM)

- Currently used by more than 95 percent of the U.S. fluid milk supply, FARM sets the highest standards for animal care from birth to end of life.
- Open to all U.S. dairy farmers, cooperatives, processors and manufacturers.
- Administered by the National Milk Producers Federation in partnership with Dairy Management Inc.
- Participation in FARM demonstrates U.S. dairy’s long standing commitment to responsible animal care; therefore, the Framework’s animal care indicator is focused on FARM (Page 11).

Global Reporting Initiative™ (GRI)

- Provides a cross-industry framework for corporate sustainability reporting.
- GRI indicators are applicable to processing and manufacturing. When needed, the Framework’s indicators have been tailored to improve relevancy specific to dairy.
- The GRI indicators are less applicable to farming operations; therefore, dairy farm and field indicators in the Framework may differ from GRI indicators.

Carbon Disclosure Project™ (CDP)

- Provides tools and guidance for reporting on environmental risk.
- Participants disclose data around climate change, supply chains, water and forests to provide information to customers, investors and other stakeholders.
- The Framework’s indicators and metrics can help cooperatives, processors and manufacturers prepare a portion of their submission to the CDP.

Dairy Sustainability Framework (DSF)

- Provides an overarching platform to map sustainability programs, identify regional priority topics and measure progress across the global dairy value chain.
- Defines 11 key criteria, (such as soil health, animal care and water use) to direct local efforts toward common, internationally relevant sustainability goals.
- U.S. dairy’s indicators and metrics (including Field to Market metrics) align with DSF at field and dairy levels regarding GHG, soil, waste, water, biodiversity and animal care.
- The Innovation Center is an implementing member of the Global Dairy Agenda for Action’s DSF.
- The Innovation Center will continue to prioritize metrics and measurement tools to meet customer and consumer expectations for sustainability reporting and increase DSF alignment.
# Chapter 1: About the Framework

## U.S. Dairy Indicators at a Glance

### FIELD

<table>
<thead>
<tr>
<th>Topic</th>
<th>Indicator</th>
</tr>
</thead>
</table>
| Feed Impact            | • Field to Market indicators for land use, irrigation, water use, soil erosion, water quality, soil carbon and biodiversity  
                        | • Innovation Center indicators for greenhouse gas and energy intensity |

### DAIRY FARM

<table>
<thead>
<tr>
<th>Topic</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Use</td>
<td>• Energy intensity</td>
</tr>
<tr>
<td>Greenhouse Gas Emissions</td>
<td>• Greenhouse gas intensity</td>
</tr>
<tr>
<td>Water Quantity</td>
<td>• Water use</td>
</tr>
<tr>
<td>Nutrient Management</td>
<td>• Nutrient Management Plan</td>
</tr>
<tr>
<td>Resource Recovery and Feed Management</td>
<td>• By-products in feed</td>
</tr>
<tr>
<td>Animal Care</td>
<td>• Farm animal care</td>
</tr>
</tbody>
</table>

### PROCESSOR / MANUFACTURER

<table>
<thead>
<tr>
<th>Topic</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Use</td>
<td>• Energy intensity</td>
</tr>
<tr>
<td>Greenhouse Gas Emissions</td>
<td>• Greenhouse gas intensity</td>
</tr>
</tbody>
</table>
| Water Quantity and Quality   | • Water use  
                                  | • Water efficiency  
                                  | • Water discharge and quality  
                                  | • Water recycling and reuse                                                               |
| Resource Recovery            | • Waste diversion  
                                  | • Throughput efficiency  
                                  | • Resource utilization                                                                  |
| Employee Engagement          | • Employment opportunities  
                                  | • Employee benefits  
                                  | • Employee retention  
                                  | • Employee engagement in health and safety management  
                                  | • Days of restricted work activity or job transfer                                         |
| Community Contributions      | • Community volunteering and capacity building  
                                  | • Monetary and product donations  
                                  | • Educational opportunities                                                             |
Chapter 2: Field Indicators

Feed Impact

Every stage of the dairy life cycle, including feed production, contributes to dairy’s environmental footprint. For example, 93.5 percent of water used to produce a gallon of milk occurs at the feed production stage. To help understand field-level impacts, the Innovation Center for U.S. Dairy (Innovation Center) is aligning with Field to Market: The Alliance for Sustainable Agriculture (Page 2).

Field to Market® Alignment

Field to Market uses United States Department of Agriculture (USDA) data to calculate the environmental impact of feed production for several key indicators. The scale varies depending upon the availability of appropriate USDA datasets at either the national, state or Crop Reporting District levels.

The dairy community uses these benchmarks in industry reports and tools. Individual companies can work directly with Field to Market to address their own specific supply chain reporting needs.

Using USDA data and Field to Market metrics is an important first step towards capturing stewardship and sustainability efforts and answering key supply chain questions. Because an estimated 35 percent of dairy feed is raised by dairy farmers, this approach recognizes the limitations on the ability to collect primary farm level data for two-thirds of the feed supply. In the future, the Innovation Center aims to find opportunities to address the feed grown on all farms.

Table: Indicators and Metrics

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Field to Market quantitative outcomes for land use, irrigation water use and soil erosion</td>
<td>• The Innovation Center will continue to work with Field to Market through its collaborative process to ensure the indicators and metrics are useful and relevant to dairy farmers and their customers and consumers.</td>
</tr>
<tr>
<td>• Field to Market qualitative indices for water quality, soil carbon and biodiversity</td>
<td>• U.S. Dairy’s Carbon and Water Life Cycle Assessment for U.S. Milk is used to measure the greenhouse gas (GHG) and energy intensity of feed production. These metrics mirror those used at the dairy farm (pages 5, 6) and are reported in aggregate. The Innovation Center will continue to work with Field to Market to determine how best to integrate GHG and energy metrics over time.</td>
</tr>
<tr>
<td>• Innovation Center quantitative outcomes for GHG and energy intensity</td>
<td></td>
</tr>
</tbody>
</table>

Tools and Resources

• Field to Market, www.fieldtomarket.org: Learn about Field to Market membership, see examples of ongoing projects and access resources, including fact sheets and FAQs.

• Fieldprint Calculator, www.fieldtomarket.org/fieldprint-calculator: Learn about the Fieldprint Calculator, an educational tool designed to help growers better understand and communicate how management decisions affect overall sustainability performance and operational efficiency.

---

Chapter 3: Dairy Farm Indicators

Energy Intensity

Fossil fuels, the world’s primary energy source, release greenhouse gas (GHG) emissions into the atmosphere. As is the case for the vast majority of U.S. industries, the dairy community relies on energy, electricity and fuel throughout the value chain: for tractors used in feed production, trucks for distribution of milk and dairy products, lighting and running equipment, milking and milk cooling on farms and pasteurization and cleaning in processing and manufacturing plants. In total, energy use across the dairy supply chain – from feed production to the end consumer – accounts for about 36 percent of dairy’s total GHG emissions.

Managing Energy

As with all businesses, energy consumption affects the farm’s bottom line. Dairy farmers can strategically manage energy use in order to reduce on-farm costs and lessen exposure to price volatility. While energy reduction methods are specific to each operation, renewable energy sources, updated and well-maintained equipment and efficient technology, such as LED lighting, can reduce the risk of volatile energy prices while increasing farm revenue.

U.S. dairy measures energy use per pound of fat and protein corrected milk (FPCM). Based on a comprehensive, peer-reviewed Carbon and Water Life Cycle Assessment for U.S. Milk, the scope of this metric includes energy used in dairy farm and field operations, as well as purchased feed.

### Indicators

- Energy intensity
- Total energy use (converted to MMBTU)/lb. of milk (FPCM)

### Tools and Resources

- **Farm Smart™**, [www.USDairy.com/FarmSmart](http://www.USDairy.com/FarmSmart): Farm Smart was developed as a tool to help dairy farmers assess their farm’s environmental footprint, including energy use intensity. This initiative is now complete. In the coming year, Farm Smart functionality will merge with the FARM Program (page 11) to create a voluntary environmental stewardship module aligned with Framework indicators. Once the new FARM module is released, this document will be updated to reference the integrated platform.


---

4. Because much of the energy in dairy feed is converted to milk solids (fat, protein, etc.), and not all farms produce milk with standard fat and protein composition, we have normalized on-farm production to the average content (4% fat, 3.3% protein). Lactose has little impact on the overall calculation. When kept as a constant, FPCM is the same measurement as energy-corrected milk.
The U.S. dairy industry measures GHG emissions per pound of fat and protein corrected milk (FPCM)\(^5\). Based on the comprehensive, peer-reviewed Carbon and Water Life Cycle Assessment for U.S. Milk, the scope of this metric includes energy used in dairy farm and field operations, as well as purchased feed.

Leading the World in GHG Reduction

U.S. dairy farms have the lowest average GHG intensity of milk production globally. On average, fluid milk produced on U.S. farms has a GHG intensity of 10.6 lbs. CO\(_2\)e per gallon\(^6\), which is nearly half of the world average of 20.4 lbs.\(^7\) Farmers have achieved this through a long history of increasing milk production efficiency as a result of improved cow comfort, cow health and nutrition and breeding. Because of these improvements, in 2007 the carbon footprint of a glass of milk was 63 percent lower than it was in 1944\(^8\).

Additional reductions can be achieved through practices that increase milk yield per cow, reduce enteric emissions, improve manure handling and processing, optimize breeding and enhance cow comfort. The dairy community made a voluntary commitment to reduce GHG emissions for fluid milk by 25 percent by 2020 from a 2007 baseline.

Measuring GHG

The U.S. dairy industry measures GHG emissions per pound of fat and protein corrected milk (FPCM)\(^5\). Based on the comprehensive, peer-reviewed Carbon and Water Life Cycle Assessment for U.S. Milk, the scope of this metric includes energy used in dairy farm and field operations, as well as purchased feed.

Concern over climate change means that reducing greenhouse gas (GHG) emissions is a global priority. Certain agricultural practices emit GHG, so the agricultural industry can play an important role in efforts to mitigate climate change. Moreover, reducing GHG on the farm can indicate improved performance for other environmental attributes such as energy and fuel use, as well as economic benefits through improved efficiency.

Greenhouse Gas Intensity

Because much of the energy in dairy feed is converted to milk solids (fat, protein, etc.), and not all farms produce milk with standard fat and protein composition, we have normalized on-farm production to the average content (4% fat, 3.3% protein). Lactose has little impact on the overall calculation. When kept as a constant, FPCM is the same measurement as energy-corrected milk.

CO\(_2\)e (carbon dioxide equivalent) is a standard unit for measuring carbon footprint. The idea is to express the impact of each different GHG in terms of the amount of CO\(_2\) that would create the same amount of warming.


### Tools and Resources

- **Farm Smart™, www.USDairy.com/FarmSmart**: Farm Smart was developed as a tool to help dairy farmers assess their farm’s environmental footprint, including GHG intensity. Farm Smart functionality will merge with the FARM Program (page 11) to create a voluntary environmental stewardship module aligned with Framework indicators. Once the new FARM module is released, this document will be updated to reference the integrated platform.

- **Considerations and Resources on Feed and Animal Management, www.USDairy.com/CowOfTheFuture**: Provides guidance on GHG emissions reduction opportunities for dairy farmers and feed and animal management consultants.
Chapter 3: Dairy Farm Indicators

Water Quantity

Dairy farmers use water responsibly and generally recycle it multiple times. Clean water is used to wash cows, clean the milking parlor and milking equipment and cool milk storage tanks. That water is reused to flush manure from barn floors and then, finally, recycled and blended with irrigation water to nourish crops grown to feed cows. Because of improved water management and increased milk production efficiencies, in 2007 the water footprint of a glass of milk was 65 percent lower than it was in 1944.

Reducing Water Use

Dairy farmers understand the importance of water resources because their prosperity is directly tied to water access, scarcity and excess. Increasing competition for water resources and concerns over off-farm impacts has heightened the visibility of on-farm water management practices. Measuring on-farm water use can provide farmers with improved information and options for risk management related to water use.

The most basic measure of on-farm water use is efficiency. Farms with improved water efficiency also potentially reduce the impact on local water sources. U.S. dairy measures water efficiency per pound of fat and protein corrected milk (FPCM). Based on the Carbon and Water Life Cycle Assessment for U.S. Milk, the scope of this metric includes drinking, cooling, cleaning and washing for lactating dairy cows.

The largest component of on-farm water use is attributed to feed production rather than the dairy barn. Through U.S. dairy’s partnership with Field to Market, information on feed impacts will be aggregated at an appropriate level and integrated into dairy industry reports, tools and calculators. On average, 65 percent of dairy feed is purchased, therefore, aggregated data is an important first step toward capturing water stewardship efforts. In the future, the Innovation Center for U.S. Dairy aims to find opportunities to address the estimated 35 percent of feed grown on dairy farms.

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy on-farm water use</td>
<td>Gallons of water/lb. of milk (FPCM)</td>
</tr>
<tr>
<td></td>
<td>This metric measures water use for lactating cows. The scope of this metric includes drinking, cooling, cleaning and washing.</td>
</tr>
</tbody>
</table>

Tools and Resources

- **FARM Program Integration, [www.nationaldairyfarm.com](http://www.nationaldairyfarm.com):** In the coming year the FARM Program (page 11) will include a voluntary environmental stewardship module aligned with Framework indicators. Once the FARM module is released, this document will be updated to reference the integrated platform.

---

9Because much of the energy in dairy feed is converted to milk solids (fat, protein, etc.), and not all farms produce milk with standard fat and protein composition, we have normalized on-farm production to the average content (4% fat, 3.3% protein). Lactose has little impact on the overall calculation. When kept as a content, this is the same measurement as energy-corrected milk.
Nutrient management is the practice of efficiently using nutrients to maximize forage and crop growth while safeguarding natural resources. When inadequate nutrients are made available, yield and quality may be compromised. Also, when nutrients are applied in excess or improperly managed, farmers lose money on the wasted inputs and may adversely impact air and water quality.

A nutrient management plan (NMP) helps guide management decisions to ensure nutrients are applied in an economically efficient and environmentally sound manner. For example, a NMP includes steps for testing soil nutrient levels before applying manure or fertilizer to help guide the proper source, rate, timing and placement of additional nutrients.

A nutrient management plan (NMP) is tailored to individual farm considerations so that recommendations meet the operation’s unique needs. In the case of dairy farms, the NMP typically focuses on how manure and wastewater are handled, stored, transferred and applied. Farmers in some parts of the country, especially states with plentiful surface water and participants in certain federal conservation programs, are required to have a NMP. Many others voluntarily develop a NMP.

The standards for developing a NMP vary by state, but are based on guidance from the USDA Natural Resources Conservation Service (NRCS)’s Practice Code 590. Regardless of state level policies, EPA national regulations require all dairy farms with more than 700 cows to have a Comprehensive Nutrient Management Plan, which is a whole-operation conservation plan that includes nutrient management within its scope.
Tools and Resources

- **FARM Program Integration, www.nationaldairyfarm.com**: In the coming year the FARM Program will include a voluntary environmental stewardship module aligned with Framework indicators. Once released, this document will be updated to reference the integrated platform.

- **USDA NRCS Comprehensive Nutrient Management Plans (CNMPs), http://bit.ly/29vuGER**: Animal feeding operations may wish to consult NRCS guidance related to CNMPs, including a manual and technical guide.

- **USDA NRCS State and Local Agencies, http://1.usa.gov/1WIxT7G**: State and local agencies offer nutrient management planning resources specific to farmers in their area. The following are a selection of guidance documents and management tools:
The dairy farm is an important part of a sustainable food system. Working with professional dairy cow nutritionists, dairy farmers feed their cows by-products from the processing of other foods and fibers, such as citrus pulp, distillers grains and cottonseed. Additionally, the manure from cows is recycled as a fertilizer for crops, thus helping to maintain soil fertility by returning nutrients from its feed back into the soil.

Using by-products is a vital resource recovery tool for farmers, but their use must be optimized and economically viable. Great care is taken in selecting ingredients and rations that are healthy for dairy cows. If by-products are fed at the expense of a balanced diet, this will compromise milk yields, the health of the cow and the overall sustainability of the farm. The economic and environmental value of by-product use also varies based on regional and seasonal availability, transportation logistics and distance from feed source to the farm. Because of these variations, a farm- or regional-level measurement for by-products is not necessarily a good indicator of sustainability or a metric that can be tracked for continuous improvement over time.

Despite regional variations, dairy has a strong and positive story of environmental stewardship through by-product use. At a national level, 14 by-products account for 19 percent of a dairy cow’s dry matter intake. This national level data helps cooperatives and others answer supply chain questions as well as inform dairy industry reporting efforts.

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>• By-products in feed</td>
<td>• Percent of food and agricultural by-products of total ration fed to cows</td>
</tr>
<tr>
<td></td>
<td>• Information is reported at a national level. On average, 19 percent of a U.S. dairy cow’s dry matter diet is comprised of by-products.</td>
</tr>
</tbody>
</table>

Tools and Resources

These publications provide guidance and insight on incorporating by-product ingredients into dairy cow diets:

Chapter 3: Dairy Farm Indicators

Animal Care

U.S. dairy farmers are committed to ensuring the well-being of animals in their care. Uniting around the highest standards of animal care and making sound decisions are not only ethical obligations, but are vitally important actions to ensuring the long-term success of the dairy community. Moreover, an animal's health and well-being are essential for a productive herd and critical for the profitability and success of the farm.

FARM Program Participation

More than ever before, today’s consumers and customers are interested in their food — from nutritional value and food safety to farming methods and animal care. Farmers Assuring Responsible Management (FARM) outlines best management practices for animal care. Through the National Dairy FARM Program, U.S. dairy demonstrates a commitment to quality animal care and shows accountability to the highest standards.

In use by over 95 percent of the U.S. fluid milk supply, FARM details animal care guidelines that farmers must follow for every calf and cow. These guidelines continue to evolve with the latest research on quality animal care.

1. The FARM Animal Care Reference Manual and corresponding training videos detail the highest standards for animal care from birth to end of life including criteria for facilities and housing, nutrition, equipment and milking procedures, transportation and animal handling.

2. Trained evaluators visit enrolled farms at least once every three years to assess their animal care program and provide feedback on performance against the FARM criteria. Evaluators may be veterinarians, extension educators, university personnel or a dairy cooperative's field staff member, who have completed and passed the intensive training and comprehensive exam. The evaluation provides the information farmers need to develop action plans for continuous improvement.

3. Finally, the integrity of the program is ensured through third-party verification completed by outside experts. A representative percentage of enrolled farms are inspected each year to verify excellent animal care. The results are published annually.

In the coming year, the FARM Program will include a voluntary environmental module aligned with Framework indicators.

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm animal care</td>
<td>Do you participate in the FARM Program? Yes / No</td>
</tr>
</tbody>
</table>

Tools and Resources

Energy Intensity

Energy intensity gauges the amount of energy used to produce a specific quantity of product. If tracked over time, it can demonstrate the results of processors' and manufacturers' efforts to reduce energy consumption through the introduction of new technologies and/or energy management practices.

Measuring Energy

The use of improved energy practices or technologies can directly reduce a company’s operational costs and future dependency on nonrenewable energy sources. Better energy performance also can be a key strategy for reducing GHG emissions and impacts from the extraction and processing of energy.

Energy intensity should be analyzed in context of the company’s operations and production outputs. An improved intensity ratio is not a direct indication of reduced greenhouse gas (GHG) emissions and therefore, should be analyzed appropriately. Furthermore, this indicator is intended to track continuous improvement within an organization's own operations.

Because inputs, final products and processes vary across manufacturing plants, comparisons between different companies can lead to false interpretations. As such, energy intensity should not be used to benchmark against other companies.

When comparing the energy intensity of plants within the same company, the methods of measurement need to be the same. Some companies may process or produce nondairy products. In that case, the company should indicate whether or not nondairy products were included in the measurement and reporting.

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy intensity</td>
<td>• Total energy use (converted to MMBTU)/unit of production output</td>
</tr>
<tr>
<td></td>
<td>• Unit of production output can include:</td>
</tr>
<tr>
<td></td>
<td>○ Gallon (milk, ice cream or other frozen products)</td>
</tr>
<tr>
<td></td>
<td>○ Pound of product (cheese, butter, etc.)</td>
</tr>
<tr>
<td></td>
<td>○ Pound of milk</td>
</tr>
</tbody>
</table>

Tools and Resources

- EPA’s ENERGY STAR® Performance Indicators, www.energystar.gov: Provides industry-specific benchmarking tools to score a plant’s energy performance and compare it to that of similar plants; includes resources and guidance.

---

The dairy community has made a voluntary commitment to reduce GHG emissions for fluid milk by 25 percent by 2020 from a 2007 baseline.

GHG emissions are generally measured as Scope 1 (direct GHG emission), Scope 2 (GHG emissions from consumption of purchased electricity, heat or steam), and Scope 3 (all other indirect emissions from sources not controlled by the company). GHG reduction opportunities are generally measured by Scopes 1 and 2, which are more readily quantified. This indicator is intended to track continuous improvement within an organization’s own operations. Because inputs, final products and processes vary across manufacturing plants, this indicator should not be used to compare companies.

When comparing the GHG emission intensity of plants within the same company, the methods of measurement need to be the same. Some companies may process or produce nondairy products. In that case, the company should indicate whether or not nondairy products were included in the measurement and reporting.

---

**Indicators**

- GHG intensity

**Metrics**

- Total GHG emissions (metric tonnes CO$_2$e, Scope 1 and 2)/unit of production output
- Unit of production output can include:
  - Gallon (milk, ice cream or other frozen products)
  - Pound of product (cheese, butter, etc.)
  - Pound of milk

---

**Tools and Resources**

- **Processor Handbook, www.USDairy.com/framework**: Includes comprehensive guidance on the information and measurements needed to calculate this metric.
- **The Carbon Disclosure Project, www.cdp.net**: Works with some of the largest corporations worldwide to help them ensure that an effective carbon emissions/reductions strategy is made integral to their business.
- **EPA, www3.epa.gov/climatechange**: Includes comprehensive insights on the impacts of GHG emissions on climate change and guidance on GHG reduction.

---

CO$_2$e, or carbon dioxide equivalent, is a standard unit for measuring carbon footprints. The idea is to express the impact of each different greenhouse gas in terms of the amount of CO$_2$ that would create the same amount of warming.


www.ghgprotocol.org/calculation-tools/faq.
Water Quantity and Quality

Water is a finite resource under increasing pressure from human activities as well as changing climates. Water use is directly linked to other local, regional and national sustainability concerns. For example, water availability and quality have implications to human health, the economy, food security and ecosystem health. As a result, water management has become a key issue for many food companies.

Showing Water Efficiency

The availability of water differs throughout the United States. Using water efficiently is a good general practice. However, in areas where water becomes scarcer, optimal water management becomes increasingly important for the dairy community and other users of water.

Water recycling is one of several strategies dairy processors can use to reduce their impact on stressed water sources. Proper water management includes a variety of practices to reduce the volume of water used and impacts on water quality.

Dairy processing plants can track water consumption and identify production efficiency opportunities through the use of meters. In addition, dairy plants must monitor water leaving the plants to ensure water quality meets or exceeds environment regulations.

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Water use</td>
<td>• Percentage of total water withdrawn and consumed by source</td>
</tr>
<tr>
<td>2. Water efficiency</td>
<td>• Total water consumed/unit of production output. Unit of output production can include:</td>
</tr>
<tr>
<td></td>
<td>○ Gallon (milk, ice cream or other frozen products)</td>
</tr>
<tr>
<td></td>
<td>○ Pound of product (cheese, butter, etc.)</td>
</tr>
<tr>
<td></td>
<td>○ Pound of milk</td>
</tr>
<tr>
<td>3. Water discharge and quality</td>
<td>• Do you have a policy, program or monitoring system that ensures routine compliance with industrial or storm water permit parameters?</td>
</tr>
<tr>
<td>4. Water recycling and reuse</td>
<td>• Percentage and total volume of water that is recycled and reused</td>
</tr>
</tbody>
</table>

Tools and Resources

- **Processor Handbook, www.USDairy.com/framework:** Includes comprehensive guidance on the information and measurements needed to calculate these metrics.
- **EPA Case Studies and Guidance, http://1.usa.gov/1ZEBou0:** For both water and energy use efficiency.
- **ISO 14046, www.iso.org/iso iso14046_briefing_note.pdf:** An international standard which helps organizations identify and define their water footprint.

---

Resource Recovery

Resource recovery is the selective extraction of disposed materials (waste) for a specific next use, such as new materials, compost or energy. The aim of resource recovery is to extract the maximum practical benefits from products, delay the consumption of virgin natural resources and generate the minimum amount of waste. Additionally, dairy processing plants can implement waste management plans, which help reduce waste before it is ever created (avoided waste). Resource recovery may also be extended from processing to the dairy farm through opportunities such as using by-products from food processing as animal feed and sending organic food waste to on-farm anaerobic digesters.

Optimizing Recovery

A range of compelling reasons exist for dairy processors and manufacturers to optimize their material efficiency and resource recovery efforts. From an economic perspective, reducing materials consumed and increasing efficiencies in the manufacturing process relate directly to lowered operational costs. Also, repurposed waste, such as recyclable products, can become added sources of revenue. As such, resource recovery and avoided waste can be some of the easiest sustainability wins within a plant’s operations.

From an environmental perspective, the case for resource recovery is apparent. Faced with a growing population and a finite resource base, there is a clear need to do more with less. Furthermore, food waste is a significant contributor to GHG emissions, and comprises over 20 percent of what is hauled to landfills. Resource recovery options include recycled packaging, reused wastewater and repurposed organics/food waste. Of these, food waste is a priority issue for agricultural products. In the U.S., one in three calories is wasted, and 40 percent of food goes uneaten. At the same time, one out of every six Americans lacks a secure supply of food.

It is critical, therefore, to maximize efficiencies in the U.S. food system and minimize waste in the journey to consumers plates.

EPA Waste Management and Food Recovery Hierarchies provide guidance to prioritize actions to prevent and reduce waste and inform dairy’s resource recovery indicators. The illustration below merges these two hierarchies to aid processors in waste stream accounting and metric calculations. The scope of the resource recovery indicators includes waste produced from a manufacturing facility during normal manufacturing processes. The boundary of the indicators is the point where a recycling, treatment or disposal facility accepts a processing plant’s waste.

Resource Recovery
### Resource Recovery, continued

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Metrics</th>
</tr>
</thead>
</table>
| 1. Waste diversion         | • Percent by weight total waste stream (lbs.) diverted from landfill OR incineration without recapturing energy  
                              • Calculation: the merged EPA hierarchy defines each category:  
                                All Waste in Categories 2-3 (by weight, lbs.)  
                                All Waste in Categories 2-4 (by weight, lbs.)  
                              • Source reduction is not included in the waste diversion metric, as it is not part of existing waste streams. However, having no waste to begin with is the most preferred method of waste reduction. Processors are encouraged to communicate their source reduction efforts. Source reduction is also fundamental to improving throughput efficiency in the throughput efficiency indicator. |
| 2. Throughput efficiency    | • Total waste stream/unit of production output (lbs.)  
                              • Calculation: the merged EPA hierarchy defines each category:  
                                Waste in Categories 2-4 (by weight, lbs.)  
                                Unit of Production Output  
                              • Due to the breadth of dairy products and manufacturing processes across processing plants, throughput can't be used for benchmarking or comparison. This is intended for use by processors as an internal operational indicator.                                                                                     |
| 3. Resource utilization    | • Food donated or repurposed as animal feed AND non-food recycled or composted/total waste stream  
                              • Food repurposed for industrial uses or compost AND non-food repurposed for energy recovery/total waste stream  
                              • Waste sent to landfill or incineration without recapturing energy/total waste steam  
                              • Calculation: the merged EPA hierarchy defines each category:  
                                All Waste in Categories 2, 3 or 4 (by weight, lbs.)  
                                All Waste in Categories 2-4 (by weight, lbs.)  
                              • Food donations are not specifically reported in the resource utilization metric, as they are captured in the Dairy Processor Indicators as monetary and product donations (page 18).                                                                                                                                 |

### Tools and Resources

- **Processor Handbook, www.USDairy.com/framework:** Includes comprehensive guidance on the information and measurements needed to calculate these metrics.
- **EPA’s Food Recovery Hierarchy, www.epa.gov/sustainable-management-food/food-recovery-hierarchy:** Includes definitions for each tier of the hierarchy.
- **Comprehensive Guidance for Sustainable Materials Management, www.epa.gov/ismm**
Employee Investment

Labor management is closely watched by external stakeholders to help ensure employee safety and worker livelihoods. Processors and manufacturers monitor labor management not only to ensure employee health and safety, but also because employee satisfaction and productivity are essential to profitability and business success.

Measuring Labor Management

In the United States, the production of dairy products creates an estimated 1.58 million jobs either directly (farming and processing) or indirectly (farm inputs, machinery). This does not include the many jobs required to distribute, market and sell dairy products in their final form\(^2\). As such, the sustainability of the dairy industry depends upon the availability and retention of quality employees.

The scope of the labor management indicators for processors and manufacturers includes employment opportunities, employee benefits, such as housing and health care, employee engagement in health and safety management and employee retention. Days of Restricted Work Activity and Job Transfer (DART rate) provides an important metric for workplace safety. It is a mathematical calculation that describes the number of employees who have been involved in a recordable injury or illness.

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Employment opportunities</td>
<td>• Total number of jobs supplied</td>
</tr>
<tr>
<td></td>
<td>• This metric includes full time employees, part time employees and consultants</td>
</tr>
<tr>
<td>2. Employee benefits</td>
<td>• Number of indirect and non-monetary benefits received by employees</td>
</tr>
<tr>
<td></td>
<td>• This metric includes health insurance, retirement plans, housing and other applicable benefits for both part-time and full-time employees.</td>
</tr>
<tr>
<td>3. Employee retention</td>
<td>• Total number employed during the past year and percentage of employees who have been employed for 5, 10 and 20 years</td>
</tr>
<tr>
<td>4. Employee engagement in health and safety management</td>
<td>• Number of opportunities for workers to participate in, and percentage of employees who participated in developing, implementing and managing health and safety initiatives; also, the levels in the corporation at which these programs operate</td>
</tr>
<tr>
<td>5. Days of restricted work activity or job transfer</td>
<td>• Days of restricted work activity or job transfer (DART rate)</td>
</tr>
</tbody>
</table>

Tools and Resources

- **Processor Handbook, [www.USDairy.com/framework](http://www.USDairy.com/framework)**: Includes comprehensive guidance on the information and measurements needed to calculate these metrics.

---

\(^2\)National Milk Producers Federation, [www.nmpf.org](http://www.nmpf.org).
Community Contributions

Dairy companies and their employees contribute to local communities and regions in ways that can be obvious to consumers and stakeholders, such as direct economic support, local taxes paid and as a source for local employment opportunities. Other impacts may be less obvious including: community involvement by employers and employees in service organizations, churches and schools, charitable contributions and general contributions and capacity building to support the overall vitality of many rural communities.

Investing in Local Communities

Employees of dairy processors and manufacturers play crucial leadership roles in their communities. For instance, employees may serve on local government, fire departments and school boards, and may participate in community and youth programs. Many processors and manufacturers also offer scholarships for college students, provide grant funding to local community projects and get involved in community volunteering and charitable efforts.

The indicators for community contributions focus on the impact dairy processors and manufacturers have on sustaining vibrant local communities. They include time and financial contributions such as volunteering, donations and educational opportunities, which are provided in the form of tours and informational events.

If they have access to the necessary information, this category of educational opportunities is an indicator that processors and manufacturers are encouraged to complete and communicate in their sustainability reports.

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Community volunteering and capacity building</td>
<td>• Volunteer activities performed by all paid employees</td>
</tr>
</tbody>
</table>
| 2. Monetary and product donations | • Monetary and product donation activities  
º Provide a narrative description of product donations for the past year. |
| 3. Educational opportunities | • Describe educational events per year and the total number of participants. |

Tools and Resources

• Processor Handbook, www.USDairy.com/framework: Includes comprehensive guidance on the information and measurements needed to calculate these metrics.


• Examples of Community Contributions by Dairy Companies:

Acknowledgments

The Innovation Center for U.S. Dairy® gratefully acknowledges contributions made by the following:

Farms, Farmers and Cooperatives

- Agri-Mark Cooperative
- Alliance Dairies and Alliance Grazing Group
- Blue Spruce Farms, VT dairy farmers
- Bob Foster, Foster Brothers Farms, VT dairy farmer
- Brian Medeiros, Medeiros & Son Dairy, CA dairy farmer
- Chris Kraft, CO dairy farmer
- California Dairies, Inc.
- Dairy Farmers of America, Inc.
- Darigold, Inc
- Doug Young, Spruce Haven Farms
- Eldorado Dairy, NM dairy farmers
- Everett Williams, GA dairy farmer
- Foremost Farms USA
- Freund's, CT dairy farmers
- Gallo Legacy Farms
- Holsum Dairies, LLC
- Horizon Dairy
- Jacques Parent, VT dairy farmer
- Jerry Truelove, GA dairy farmer
- Jill Hauser, MD dairy farmer
- Jim Boyle Dairy, AZ dairy farmer
- Jim Werkhoven, WA dairy farmer
- Kevin Moore, FL dairy farmer
- Land O'Lakes, Inc.
- Laurelbrook Dairy, CT dairy farmers
- Lorraine Merrill, NH dairy farmer
- Lou Brown, OH dairy farmer
- Mary Kraft, CO dairy farmer
- Maryland and Virginia Milk Producers
- McCarty Family, KS dairy farmers
- Michigan Milk Producers Association
- Mike Miller, LA dairy farmer
- Myles Payne, NC dairy farmer
- Organic Valley/CROPP
- Paul Rovey, AZ dairy farmer
- Prairie Farms Dairy
- Randy Burnham, FL dairy farmer
- Ray-Lin, CA dairy farmers
- Sarah Lloyd, WI dairy farmer
- Select Milk Producers, Inc.
- Steve Graybeal, PA dairy farmer
- United Dairymen of Arizona
- Wholesome Wisconsin Dairies
- Zach Myers, NC dairy farmer

Processors, Retailers and Brands

- C.F. Burger Creamery
- Cabot Creamery
- Crystal Creamery
- Danone
- Dean Foods
- General Mills, Inc.
- Glanbia Foods Inc.
- Hilmar Cheese Company
- Kemps
- The Kroger Company
- Leprino Foods Company
- McDonald's
- Sargento Foods Inc.
- Schreiber Foods Inc.
- The Starbucks Company
- Unilever
- Walmart

Associations and Government

- Florida Dairy Farmers
- Idaho Dairymen's Association
- International Dairy Foods Association
- Midwest Dairy Association
- National Milk Producers Federation
- New Hampshire Department of Agriculture
- Southern United Dairy Industry Association
- United States Department of Agriculture
- Washington State Dairy Federation
- Washington State Dairy Products Commission

Community

- California Dairy Cares
- California Dairy Research Foundation
- Environmental Defense Fund
- Manomet, Inc.
- New Mexico State University
- Pennsylvania State University
- University of California, Davis
- University of Wisconsin-Madison
- Water Stewardship Inc.
- World Wildlife Fund

NOTE: This report represents a collaborative effort and, as such, its content may not reflect the perspective of each individual contributor.
About the Innovation Center for U.S. Dairy®
The Innovation Center for U.S. Dairy (Innovation Center) provides a forum for dairy companies to work pre-competitively to address barriers to and opportunities for innovation and sales growth. The Innovation Center aligns the collective resources of the industry to offer consumers nutritious dairy products and ingredients, and to promote the health of people, communities, the planet and the industry.

The Innovation Center was established in 2008 under the leadership of America’s dairy farmers through Dairy Management Inc.™, the nonprofit organization that manages the producer checkoff program. Learn more at www.USDairy.com.

www.USDairy.com • InnovationCenter@USDairy.com