Sustainability Accomplishments and Next Steps for the U.S. Dairy Industry

Chad Frahm
July 14, 2015
Dairy sustainability
About the Dairy Industry

2013 DAIRY SNAPSHOT

Milk production occurs in all 50 states. The top 5 dairy states in 2013 produced ~53% of all milk in the U.S.

- 20.5% CA
- 10.4% WI
- 6.7% ID
- 6.7% MI
- 5.5% NY
- Remaining States 47.1%

~97% FAMILY-OWNED

46,960 LICENSED DAIRY FARMS

9.2 million DAIRY COWS

1,272 DAIRY PLANTS PRODUCED

205.7 billion POUNDS OF DAIRY PRODUCTS.

AVERAGE NUMBER OF MILES FROM FARM TO PROCESSING PLANT IS 275 miles

HOW ALL THAT MILK WAS USED

- Fluid Milk 20.6%
- Cheese 26.7%
- Other Products 52.7%

Includes butter (8%), Hood milk (7%), frozen desserts (4%), and other products such as yogurt and kefir

~15.5% OF DAIRY PRODUCTS WERE EXPORTED (by weight).

Milk and dairy products are distributed to schools and retail outlets ranging from small neighborhood stores to warehouse outlets.

AMERICANS SPENT ~6% OF THEIR 2013 FOOD BUDGETS ON DAIRY PRODUCTS AT HOME.

Milk and dairy foods supply 51% of the calcium and 18% of the protein in the average American diet.

Innovation Center for U.S. Dairy

Healthy People • Healthy Products • Healthy Planet
Innovation Center for U.S. Dairy

- 32 CEOs or Chairmen of companies representing 80% of Milk
- Focused on advancing pre-competitive science, strategy and insights
- 800+ professionals working on sustainability
DMI commitment to sustainability: increased alignment

Build relationships and dialogue

Through sustainability leadership drive trust and sales in dairy

Scientific knowledge

The Stewardship Guide and Tools
Definition of sustainability

Providing consumers with the nutritious dairy products they want in a way that makes the industry, people and the earth economically, environmentally and socially better – now and for future generations.
The U.S. Dairy Industry supports socially responsible, economically viable and environmentally sound dairy food systems that promote the current and future health and well being of:

- **Our consumers** – through access to safe, nutritious, high-quality products.
- **Our communities** – through contributing, participating, and investing where we live and operate.
- **Our cows** – through animal stewardship.
- **Our employees** – through ensuring a safe and respectful workplace.
- **Our planet** – through the stewardship and responsible use of natural resources.
- **Our businesses** – through a focus on long-term economic vitality.
Health and well-being of our consumers

Health and well-being through access to safe, nutritious, high-quality dairy products.

Milk nutrition

USDA dietary guidelines call for more consumption of nutrient dense foods like low-fat or fat-free milk or milk products and foods that supply “nutrients of concern” like Calcium, Potassium, and Vitamin D.

Milk is the No. 1 food source

Milk safety – cow to consumer

• Pasteurized Milk Ordinance
  • Federal/state cooperative program
  • Requirements on farm and at processing
• Food safety training for dairy processors, artisan cheesemakers, ice cream manufacturers, etc.
Health and well-being of our cows

Animal care and stewardship

- **Education, documentation, transparency**
  - Animal Care Manual
    - Animal care guidelines, protocols, and practices for entire lifespan of dairy cattle
  - Herd Health Plan
    - Written in consultation with herd veterinarian, established protocols, and reviewed annually
  - Quick Reference User Guide, Animal Care DVD - all materials available online in English and Spanish

- **On-Farm Evaluation**
  - External review of animal care practices using management checklists

- **Third-Party Verification**

90% of U.S. Dairy Industry Enrolled
FARM observations and participation

- Participation
  - Almost 500 Second-Party Evaluators certified
  - Almost 30,500 on-farm Second Party Evaluations completed
  - Over 370 Third-Party Verifications completed
Health and well-being of our planet

Through the stewardship and responsible use of natural resources, producing a gallon of milk now requires much fewer resources than 1944.

- **Cropland**: 90% less in 2007
- **Water**: 65% less in 2007
- **Carbon**: 63% less in 2007

American dairy farmers’ leadership position

- One of largest producers of milk in the world
  - U.S. produced 201 billion lbs. of milk in 2013
- One of the highest producers of milk per cow per year in the world
  - U.S. dairy cows produce 4 times more milk than the world’s average cow
- U.S. dairy farmers have the smallest impact

GHG footprint for World Dairy Farms

<table>
<thead>
<tr>
<th>Region</th>
<th>CO₂e (lbs/gal milk)</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Dairy farms</td>
<td>10.6</td>
</tr>
<tr>
<td>North America</td>
<td>10.6</td>
</tr>
<tr>
<td>Eastern Europe</td>
<td>12.2</td>
</tr>
<tr>
<td>Western Europe</td>
<td>12.6</td>
</tr>
<tr>
<td>Oceania</td>
<td>12.6</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>13.5</td>
</tr>
<tr>
<td>East Asia</td>
<td>17.2</td>
</tr>
<tr>
<td>Central &amp; South America</td>
<td>28.9</td>
</tr>
<tr>
<td>West Asia &amp; Northern Africa</td>
<td>31.9</td>
</tr>
<tr>
<td>South Asia</td>
<td>39.8</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>64.5</td>
</tr>
</tbody>
</table>

World average = 20.4


Understanding our impact

- U.S. Dairy >2% of U.S. emissions and
- Global Dairy 2.7% of global emissions

Highlighted the need to better understand our environmental footprint
Grounded in science

Click here for LCA Special Issue

Click here for Considerations and Resources Report

Click here for U.S. Dairy’s Environmental Footprint
Environmental impact

U.S. Dairy Carbon Footprint — All Products
Total emissions = 137 MMT (2% of total U.S. GHG emissions)

- **FLUID MILK**: 26% of total GHG emissions (35 MMT CO₂e, 0.5% of US Total)
- **CHEESE & WHEY**: 39% of total dairy GHG emissions (54 MMT CO₂e, 0.75% of US Total)
- **OTHER DAIRY (estimates)**: 35% of total dairy GHG emissions (48 MMT CO₂e, 0.67% of US Total)

Voluntary reduction targets

U.S. Fluid Milk Carbon Footprint: Supply Chain Emissions

- Consumer 4.9%
- Retail 6.5%
- Transport/Distribution 7.7%
- Packaging 3.5%
- Processing 5.7%
- Milk Production 51.5%
- Feed Production 20.3%

Carbon footprint = 17.6 lbs. CO₂e per gallon of fluid milk consumed

2020 Voluntary Goals for Greenhouse Gas Reduction for U.S. Fluid Milk

- Consumer
- Retail
- Transport/Distribution
- Packaging
- Processing
- Milk Production
- Feed Production

Overall goal: 25% CO₂e reduction per gallon

Roadmap to 2020 Goals
What we learned: Management practices matter

- Increasing feed efficiency
- Reducing enteric methane
- Improving manure management

- Reducing electricity usage
- Consolidating distribution network
- Considering alternative packaging materials

- Good truck maintenance
- Better route design
- Reducing long distance milk hauling

The basis for differences is best management practices – not size, region or age.
What is the Stewardship & Sustainability Guide for U.S. Dairy?

A voluntary framework for tracking and communicating progress

- Supports producers, cooperatives and processors who choose to track and communicate their story of continuous improvement
- Defines guiding principles and most relevant topics for assessing dairy sustainability
## Indicator Development

<table>
<thead>
<tr>
<th></th>
<th>Current</th>
<th>In Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Producers</strong></td>
<td>GHG</td>
<td>Resource Recovery</td>
</tr>
<tr>
<td></td>
<td>Energy</td>
<td>Soil Health</td>
</tr>
<tr>
<td></td>
<td>Animal Care</td>
<td>Water</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Biodiversity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Social/Economic</td>
</tr>
<tr>
<td><strong>Processors</strong></td>
<td>GHG</td>
<td>Resource Recovery</td>
</tr>
<tr>
<td></td>
<td>Energy</td>
<td>Air Quality</td>
</tr>
<tr>
<td></td>
<td>Water</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social/Economic</td>
<td></td>
</tr>
</tbody>
</table>
What is the basis for Farm Smart?

- **Life Cycle Assessment**
  - 25 parameters comprise 80-90% of a farm’s environmental footprint
  - Provides a credible estimated environmental footprint using fewer data requirements.

- **Environmental Indicators (Current)**
  - Energy
  - GHG
Farm Smart™ 2.0: Refinements and Added Value

- **Farm Smart 1.5**
  - Provides an environmental footprint of farm
  - Used to measure and report voluntarily
  - Educates on sustainability

- **Farm Smart 2.0**
  - Streamlined and simplified measurement and reporting
  - Aggregation functionality
  - Offers alternative practices and technology options
  - Explore interrelation between financial performance and efficiency
  - Provides information to communicate environmental performance improvements
Farm Smart™

Communicate. Explore.
Farm Smart

Reporting/communicate

![Image of Farm Smart reporting tool](image-url)
Farm Smart™
beta version 2.0

Test drive new features in Farm Smart
Assess your farm’s footprint and explore alternative practices for their estimated financial and environmental value in these areas:

Footprint
Track Performance
Learn More ➤ Get Started

Feed
Improve Feed Efficiency
Learn More ➤ Get Started

Energy
Control Energy Cost
Learn More ➤ Get Started

Nutrient
Reduce Nutrient Loss
Learn More ➤ Get Started

Farm Smart Toolkit
For Dairy Farmers
Find tips and tools for getting started on Farm Smart 2.0. Includes: quick start checklists, frequently asked questions, user’s manual, farmer case studies, and more.
Find out More ➤

Resources
For Crop, Partners & Educators
Learn about Farm Smart 2.0, including benefits to farmers and industry, the development and farmer-facing process, comprehensive dairy research, facts, and more.
Find out More ➤
Assess your farm's environmental footprint

Assess your farm's footprint in the areas of GHG emissions, energy use and water consumption. This information can be used to establish a basis for tracking stewardship and sustainability performance from year to year. Reduce your input time by gathering dairy facility, energy use and production information in advance, with the help of the Footprint Checklist.

<table>
<thead>
<tr>
<th>Production</th>
<th>Energy</th>
<th>Feed</th>
<th>Crop</th>
<th>Manure</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Annual Milk Production (Pounds of milk shipped, used on-farm, or other)</td>
<td>24,000,000 lbs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average milk protein content</td>
<td>3.1%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total annual number of mature cows culled for beef</td>
<td>100</td>
<td>num</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average weight per cow</td>
<td>1,250 lbs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total annual number of calves sold for beef</td>
<td>500</td>
<td>num</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average weight at time of sale</td>
<td>155 lbs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wash water for lactating cows per year (farm total)</td>
<td>400 gal/yr</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooling water for lactating cow per year (farm total)</td>
<td>400 gal/yr</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average weight per cow</td>
<td>1,250 lbs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td></td>
<td></td>
</tr>
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### Production

<table>
<thead>
<tr>
<th>Activity</th>
<th>Estimate (kWh)</th>
<th>Estimate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL annual on-farm ELECTRICITY use</td>
<td>1,200,000</td>
<td>100</td>
</tr>
<tr>
<td>TOTAL annual on-farm DIESEL use</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>TOTAL annual on-farm BIODIESEL use</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>TOTAL annual on-farm FUEL OIL use</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>TOTAL annual on-farm PROPANE use</td>
<td>10,000</td>
<td>100</td>
</tr>
<tr>
<td>TOTAL annual on-farm NATURAL GAS use</td>
<td>5,000</td>
<td>100</td>
</tr>
<tr>
<td>TOTAL annual on-farm GASOLINE use</td>
<td>5</td>
<td>100</td>
</tr>
</tbody>
</table>

### Feed

<table>
<thead>
<tr>
<th>Activity</th>
<th>Estimate (kg)</th>
<th>Estimate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL annual on-farm FEED use</td>
<td>1,000,000</td>
<td>100</td>
</tr>
</tbody>
</table>

### Crop

<table>
<thead>
<tr>
<th>Activity</th>
<th>Estimate (lb)</th>
<th>Estimate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL annual on-farm CROP use</td>
<td>500,000</td>
<td>100</td>
</tr>
</tbody>
</table>

### Manure

<table>
<thead>
<tr>
<th>Activity</th>
<th>Estimate (t)</th>
<th>Estimate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL annual on-farm MANURE use</td>
<td>50</td>
<td>100</td>
</tr>
</tbody>
</table>

### Results

<table>
<thead>
<tr>
<th>Activity</th>
<th>Estimate (t)</th>
<th>Estimate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL annual on-farm RESULTS use</td>
<td>50</td>
<td>100</td>
</tr>
</tbody>
</table>
Assess your farm's environmental footprint

Assess your farm's footprint in the areas of land management and energy use. This information can be used to establish a basis for tracking stewardship and sustainability performance from year to year. Reduce your input time by gathering dairy facility, energy use and production information in advance, with the help of the Footprint Checklist.

### Help

Do you pasture your animals?  ○ Yes  ○ No

<table>
<thead>
<tr>
<th></th>
<th>Lactating</th>
<th>Dry</th>
<th>Young Stock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of weeks per year</td>
<td>12</td>
<td>23</td>
<td>35</td>
</tr>
<tr>
<td>Number of hours per day</td>
<td>150</td>
<td>15</td>
<td>24</td>
</tr>
<tr>
<td>Average Dry Matter Intake (DMI) per head per day for lactating animals (excluding dry cows and young stock)</td>
<td>15,000 lbs</td>
<td>100Calories</td>
<td></td>
</tr>
</tbody>
</table>

Percent make-up (in dry matter): AVERAGE Lactating cow ration:

<table>
<thead>
<tr>
<th>Component</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn grain</td>
<td>15%</td>
</tr>
<tr>
<td>Corn silage</td>
<td>24%</td>
</tr>
<tr>
<td>Wet DGS</td>
<td>0%</td>
</tr>
<tr>
<td>Dry DGS</td>
<td>0%</td>
</tr>
<tr>
<td>Soybeans raw or roasted</td>
<td>0%</td>
</tr>
<tr>
<td>Soybean meal</td>
<td>12%</td>
</tr>
<tr>
<td>Alfalfa hay</td>
<td>3%</td>
</tr>
<tr>
<td>Alfalfa silage</td>
<td>0%</td>
</tr>
<tr>
<td>Grass hay</td>
<td>0%</td>
</tr>
<tr>
<td>Grass silage</td>
<td>1%</td>
</tr>
<tr>
<td>Pasture</td>
<td>0%</td>
</tr>
<tr>
<td>All other feed</td>
<td>13%</td>
</tr>
<tr>
<td>Total of 100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Annual volume of cow milk (water) (lb/mil):

<table>
<thead>
<tr>
<th>Volume</th>
<th></th>
</tr>
</thead>
</table>
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<table>
<thead>
<tr>
<th>Crop</th>
<th>What percent (%) of each feed is self-produced</th>
<th>Average irrigation rate (acre/foot/acre/year)</th>
<th>Average yield</th>
<th>Total acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soybean</td>
<td></td>
<td>0.00 acre/foot/acre/year</td>
<td>0</td>
<td>bu/acre</td>
</tr>
<tr>
<td>Corn grain</td>
<td></td>
<td>0.00 acre/foot/acre/year</td>
<td>0</td>
<td>bu/acre</td>
</tr>
</tbody>
</table>

Convert yields for the following to a 100% Dry Matter basis:

<table>
<thead>
<tr>
<th>Crop</th>
<th>Average irrigation rate (acre/foot/acre/year)</th>
<th>Total acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa hay</td>
<td>0.00 acre/foot/acre/year</td>
<td>ton/acre</td>
</tr>
<tr>
<td>Alfalfa silage</td>
<td>0.00 acre/foot/acre/year</td>
<td>4</td>
</tr>
<tr>
<td>Corn silage</td>
<td>0.00 acre/foot/acre/year</td>
<td>7</td>
</tr>
<tr>
<td>Grass hay</td>
<td>0.00 acre/foot/acre/year</td>
<td>0</td>
</tr>
<tr>
<td>Grass silage</td>
<td>0.00 acre/foot/acre/year</td>
<td>0</td>
</tr>
</tbody>
</table>

Pasture | Average irrigation rate (acre/foot/acre/year) | Total acres |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.00 acre/foot/acre/year</td>
<td>0</td>
</tr>
</tbody>
</table>
Assess your farm’s environmental footprint

Assess your farm’s footprint in the areas of GHG emissions and energy use. This information can be used to establish a basis for tracking stewardship and sustainability performance from year to year. Reduce your input time by gathering data easily, energy use and production information in advance, with the help of the Footprint Checklist.

1. From the pull-down menus below, please select the top three Manure Management Systems (MMS) in use on your farm.
2. Estimate the total percent of excreted manure going to each system. This will be used to calculate the manure footprint.

<table>
<thead>
<tr>
<th>MMS 1</th>
<th>liquid/slurry with natural crust</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[0, 100]</td>
</tr>
<tr>
<td>MMS 2</td>
<td>daily spread</td>
</tr>
<tr>
<td></td>
<td>[0, 100]</td>
</tr>
<tr>
<td>MMS 3</td>
<td>solid storage</td>
</tr>
<tr>
<td></td>
<td>[0, 100]</td>
</tr>
</tbody>
</table>

Total of 100%: 100%

Are anaerobic digester(s) installed on the farm?

Yes [ ] No [ ]

If yes, what is the volatile solids conversion efficiency? (values typically range from 20-55%, 30%)

Percent of electricity generation potential utilized

Percent of heating potential utilized
Assess your farm’s environmental footprint

Assess your farm’s footprint in the areas of GHG emissions, energy use and water consumption. This information can be used to establish a basis for tracking stewardship and sustainability performance from year to year. Reduce your input time by gathering dairy facility, energy use and production information in advance, with the help of the Footprint Checklist.

- **Production**
- **Energy**
- **Feed**
- **Crop**
- **Manure**

**Results**

Your Farm Greenhouse Gas Emissions
lb CO2e / lb milk produced

**Your Footprint:**
- Enteric Fermentation: 0.42
- Feed Production: 0.26
- Fuel Use: 0.08
- Total Manure: 0.11
- Total: 0.87

![Graph showing breakdown of greenhouse gas emissions categories.](chart.png)
Assess your farm's environmental footprint

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Your Farm Energy Use
MBTUs/lb milk produced

<table>
<thead>
<tr>
<th>Your Footprint:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed Production</td>
</tr>
<tr>
<td>On Site Energy Usage</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

![Bar chart showing energy use components]
Sustainability alignment

Field to Market™
The Alliance for Sustainable Agriculture

U.S. SUSTAINABILITY
THIS IS HOW WE GROW

Ingredients | Products | Global Markets

USA

The Global Dairy Agenda for Action

Dairy Sustainability Framework

GLOBAL DAIRY PLATFORM

PLATFOR
115 companies & 184 professionals in the Sustainability Council

We commit to being leaders in sustainability, ensuring the health and well-being of our planet, communities, consumers and the industry.
2015 U.S. Dairy Sustainability Award Winners Announced

Outstanding Dairy Farm Sustainability
- Dorrich Dairy, Glenwood, Minn.
- Oregon Dairy Farm, Lititz, Penn.
- Honorable Mention: Alliance Dairies, Trenton, Florida

Outstanding Dairy Processing & Manufacturing Sustainability
- Hilmar Cheese Company, Hilmar, Calif.

Outstanding Achievement in Resource Stewardship
- Freund’s Farm, East Canaan, Conn.
- Honorable Mention: T-Bar Dairy and White Gold Dairy, Porterville, Calif.

Outstanding Achievement in Community Partnerships
- HP Hood LLC and CleanWorld, Sacramento, Calif.

Farmer winners in Washington DC
Next Steps

1. **Consumers**: consumer-relevant sustainability benchmarks to demonstrate ongoing continuous improvement.

2. **Nutrition and sustainability**: Feeding a growing planet with nutritious, safe and affordable food while continuously improving on the economic, environmental and social impacts.

3. **Partnerships and sustainability alignment**:
   1. Agriculture: Field to Market, Roundtable for Sustainable Beef, etc.
   2. NGOs: World Wildlife Fund, etc.
   4. Marketplace: McDonald’s, Kroger, Walmart

4. **Manure management**: New dairy-farmer owned company will focus on economically viable nutrient management solutions, generation of renewable energy and other solutions.
Save the Date: Next Dairy Sustainability Meeting

Minneapolis, MN
November 18-20, 2015
Cohosted with Field to Market
Thank you!

Chad Frahm
Senior Vice President, Sustainability
Innovation Center for U.S. Dairy
Chad.Frahm@rosedmi.com
Good Business Decisions Increased Dairy Efficiency
Good Business Decisions Reduced Enteric Methane Emissions