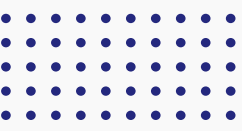




Accelerating Action

U.S. DAIRY NET ZERO INITIATIVE UPDATE





U.S. DAIRY NET ZERO INITIATIVE

Status Update

America's dairy industry, including about 28,000 dairy farmers and dairy companies, supports healthy people, healthy communities and a healthy planet by providing nutrient-rich, responsibly made products. For generations, dairy farmers have reduced the environmental impact of dairy farming by caring for their animals and managing their air, land and water resources. Dairy processing companies continually strive to work collaboratively to contribute to dairy's social responsibility journey. In 2020, dairy farmers and dairy processing companies took their commitment to responsible production a step further by working through the Innovation Center for U.S. Dairy to set industry-wide environmental stewardship goals. **(see sidebar).**

DAIRY IS LEADING THE CHARGE

To support the industry in reaching these goals, U.S. dairy has embarked upon an ambitious and groundbreaking on-farm effort. The U.S. Dairy Net Zero Initiative (NZI) is a learning journey that serves as an essential first phase to produce the foundational research, on-farm pilots, local and regional networks and economic drivers that are key to unlocking dairy's true potential to address GHG emissions, water efficiency and water quality on-farm and in field. The work of U.S. dairy through this initiative is helping the entire dairy industry to learn, establish and validate the pathway to meet the climate change and environmental challenges head-on through a holistic approach to responsible stewardship of natural resources. NZI was initially established by six national dairy organizations that represent a large swath of the industry, recognizing the need to bring together different areas of the sector, from strategy to policy to practice, in order to support action on the ground. Despite launching in October 2020, in the middle of the COVID-19 pandemic and during a nationwide lockdown, U.S. dairy has made strides through NZI toward developing the resources and knowledge that will support farmers on their journey. Nestlé and Starbucks, two of NZI's initial launch partners, were essential to bringing the initiative to life. Additional partners have joined the effort in the last two years (see page 28) bringing the necessary resources and expanding progress to set U.S. dairy on the critical pathway toward sustainability.

ENVIRONMENTAL Stewardship Goals

U.S. dairy recognizes the integral role it plays in addressing the world's climate crisis. The dairy industry is committed to making even more progress through the industry-wide 2050 environmental stewardship goals, which address the areas where the collective industry can have the greatest impact. The 2050 goals reflect ambitions across the field, farm and processor levels in the dairy industry. They were built out of the Innovation Center for U.S. Dairy, comprised of representative leadership across the dairy value chain, including farmers, cooperatives, processors, retailers and other stakeholders, and included an extensive stakeholder and public comment period.

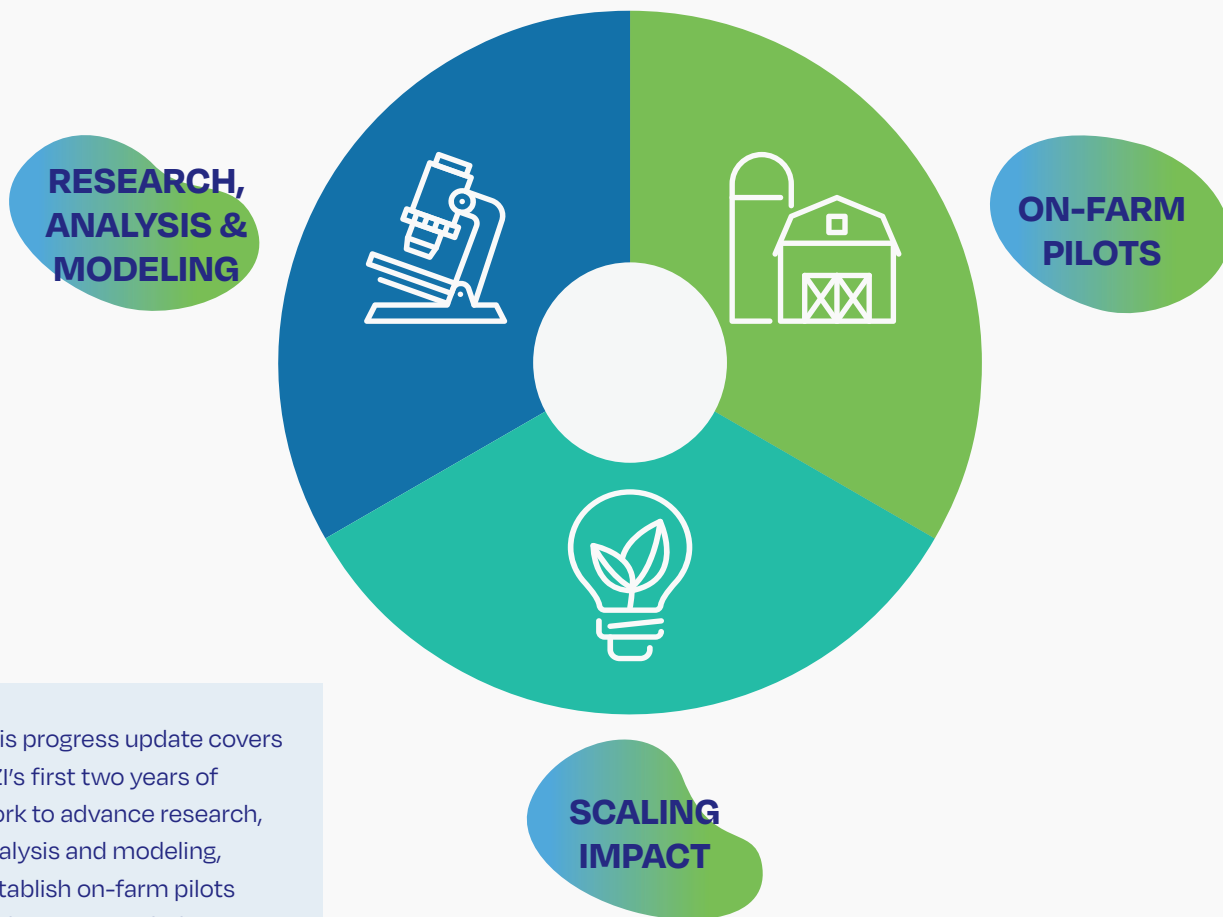
THE GOALS ARE:

- **Achieve greenhouse gas (GHG) neutrality***
- **Optimize water use while maximizing recycling**
- **Improve water quality by optimizing the utilization of manure and nutrients.**

**U.S. dairy is working collectively to balance GHG emissions with reductions and removals, as defined by the Intergovernmental Panel on Climate Change.*

NZI'S THREE FOUNDATIONAL TRACKS

NZI has three foundational tracks: (1) research, analysis and modeling; (2) on-farm pilots; and (3) scaling impact. These tracks reflect U.S. dairy's commitment to sound science and a recognition that environmental progress comes with economic viability for farmers. This also reflects an understanding that it is only through collaboration that opportunities are revealed and barriers are overcome. Through this integrated approach, NZI makes technology and best practices more accessible and affordable to farms of all sizes and geographies.



This progress update covers NZI's first two years of work to advance research, analysis and modeling, establish on-farm pilots and support scaled impact to propel industry-wide change. This initiative builds the critical pathways toward the 2050 goals.

As a research and promotion program, authorizing legislation prohibits the influencing of legislation or government policy.

U.S. DAIRY NET ZERO INITIATIVE BY THE NUMBERS

Since launching in October 2020, NZI has:

**\$40
million**

Leveraged **\$40 million in support** from partners

**26
projects**

Initiated and supported **26 projects** spanning **338 farms** across **19 states**

**66
partnerships**

Partnered with more than **66 institutions** including corporations, land grant and research institutions, governmental and non-governmental organizations, and other dairy community stakeholders



Achieved recognition by national and international organizations, including the [Agriculture Innovation Mission \(AIM\) for Climate](#) and [U.S. Nature 4 Climate](#)

**94
presentations**

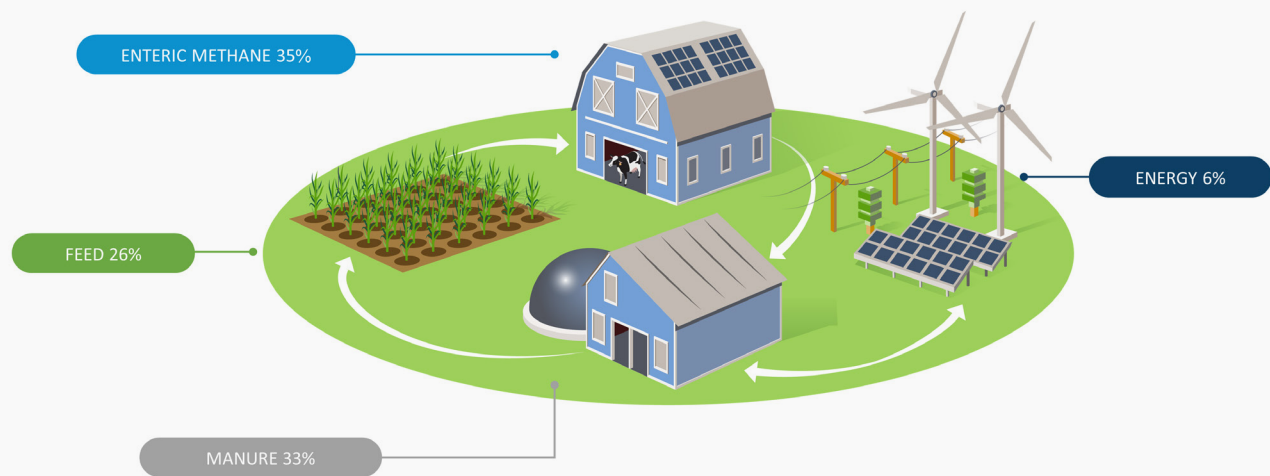
Led 94 presentations for national and international webinars, panels and forums

**238
articles**

Appeared in **238 articles** and highlighted accomplishments through coverage in Forbes, USA Today, National Public Radio and more

MITIGATING DAIRY'S ON-FARM ENVIRONMENTAL FOOTPRINT

U.S. dairy is addressing its on-farm environmental footprint in four key areas: enteric methane, feed production, manure management and energy. The projects described in this update examine GHG impacts in the four key areas as well as water use efficiency and water quality impacts from feed, farmstead/barn and manure management. Together, these projects help U.S. dairy identify priorities, guide action, harness economic drivers, inform measurement and build the pathways for accelerating industry progress.



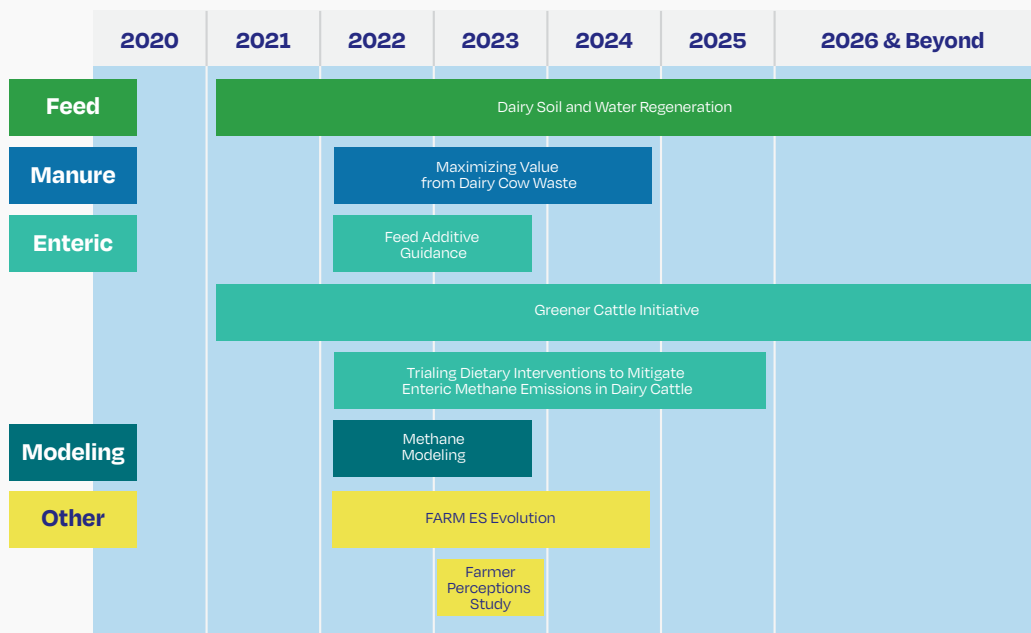
Adapted from Thoma 2013, [*Regional Analysis of greenhouse gas emissions from USA dairy farms. A cradle-to-farm-gate assessment of the American dairy industry, circa 2008*](#)



U.S. DAIRY NET ZERO INITIATIVE

Research, Analysis and Modeling

RESEARCH, ANALYSIS & MODELING TIMELINE



U.S. dairy is working to close knowledge gaps and advance innovative solutions across dairy production. Through research, the dairy industry is identifying the most promising solutions, practices and technologies that will accelerate progress toward its 2050 environmental goals.

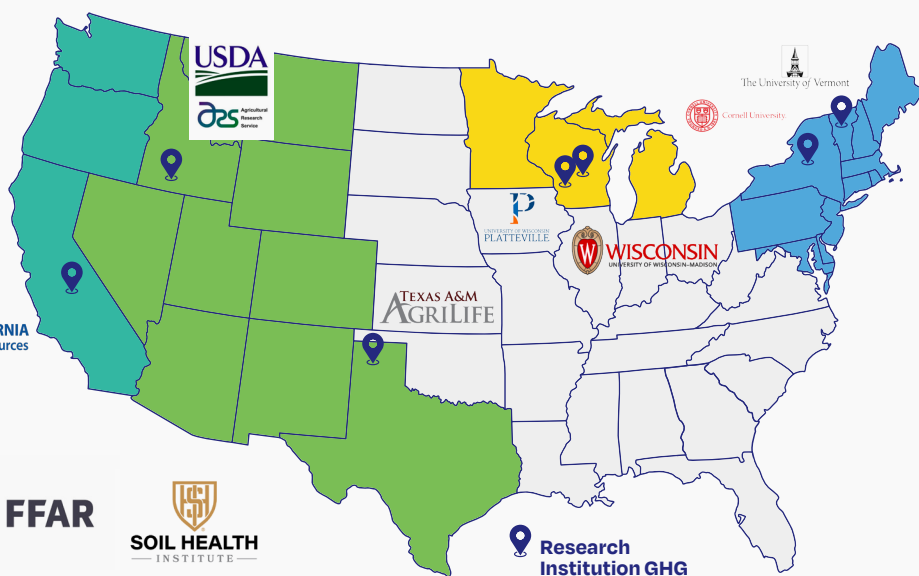
DAIRY SOIL AND WATER REGENERATION

The Dairy Soil and Water Regeneration (DSWR) project is the largest soil health research project on working dairies in the U.S. Over six years, DSWR research will address data and research gaps around feed production emissions and water quality impact by measuring how various management practices impact soil health, improve water quality and potentially reduce GHG emissions under varying climate and water management regimes. Dozens of dairy farms representing climates and soils in four major milk production regions are participating in a baseline survey of soil health and carbon storage. Additionally, 11 farms, including six commercial dairies, three university research dairies, one U.S. Department of Agriculture (USDA) research farm and an almond farm, are participating in the project.

The Foundation for Food & Agriculture Research (FFAR) awarded a \$10 million grant to support the DSWR project, which will be matched by financial contributions from the dairy checkoff and in-kind support for a total value of \$21.5 million. Research and implementation are conducted by the Soil Health Institute (SHI) and leading dairy research institutions, including Cornell University, University of California Agriculture and Natural Resources, University of California Davis, Texas A&M AgriLife Research, University of Wisconsin-Madison, University of Wisconsin-Platteville, University of Vermont, and USDA Agricultural Research Service (ARS) Northwest Irrigation and Soils Research in Kimberly, ID. This work also leverages the ongoing investment of U.S. dairy and partners including Nestlé, Starbucks, Newtrient and more.

Four dairy regions ~80% of U.S. milk production

The project components of DSWR are split into three tasks:



- **Task 1:** General assessment to provide a scientific baseline on soil carbon sequestration and soil health on dairy farm fields across a range of cropping practices
- **Task 2:** Field research to measure the environmental benefits of field manure use and soil health practices
- **Task 3:** Communications with farmers and engagement with policymakers, modelers, researchers, NGOs and the general public*

To date, 87 farmers have been engaged in this research and 271 samples have been collected to provide a general baseline on soil health. These samples are more time-intensive and require more comprehensive analysis than typical soil samples. Researchers will use that baseline to evaluate the potential benefits of reducing tillage and adding cover crops and new manure-based products in large-plot and field-scale trials. The unique nature of the project allows researchers to use real cropping systems on working dairy farms to evaluate carbon sequestration, emissions and water quality impacts with the goal of enabling ecosystem services markets for dairy farmers.

**Note: Activities funded by the dairy checkoff are subject to approval of USDA. No checkoff funds will be used for the purpose of influencing governmental policy or action.*



THE GREENER CATTLE INITIATIVE

Actionable options to reduce livestock enteric methane emissions begin with effective research. The Greener Cattle Initiative (GCI) is a five-year, public-private collaboration to drive new research from experts around the world and provide effective, scalable and commercially feasible solutions to mitigate enteric methane emissions. This is a unique, global consortium bringing together the Innovation Center for U.S. Dairy, FFAR and industry leaders from beef and dairy, including ADM, the Council on Dairy Cattle Breeding, Elanco, Genus, National DHIA, Nestlé, the New Zealand Agricultural Greenhouse Gas Research Centre and JBS. It focuses on five research areas: dairy cow nutrition, rumen microbiome, dairy cow genetics, sensing and data technology and socioeconomic analysis. GCI has already proven to be an effective leveraging mechanism to address research gaps. In 2022, the first request for research proposals was announced, and GCI received more than 100 letters of intent, which preceded the full application proposals. Thus far, GCI has awarded three initial grants:

- Alexander Hristov, distinguished professor of dairy nutrition at Penn State, received \$758,776 to conduct research to determine the efficacy and feasibility of enteric methane inhibitor compounds in cows and work to identify and optimize dietary conditions required to maximize enteric methane emissions reductions.
- Roderick Mackie, professor in the Department of Animal Sciences at the University of Illinois Urbana-Champaign, received \$2,494,394 to lead an international research study on how diets and different additives affect hydrogen production and utilization in the rumen of both beef and dairy cattle and how these changes in hydrogen dynamics affect the amount of enteric methane produced. The University of Illinois is contributing additional funding for a total \$3,221,254 investment.
- Francisco Peñagaricano, assistant professor in the Animal and Dairy Sciences Department at the University of Wisconsin–Madison, received \$2,301,499 to conduct research combining interventions that address selective breeding, data on milk composition, and rumen microbes to reduce enteric methane emissions. His research focuses on evaluating cattle genome for methane traits, including those for methane production and residual methane production. The Council on Dairy Cattle Breeding (CDCB) is contributing additional funding for a total \$3,301,496 investment.

The GCI is currently awarding **more than \$7.2 million total in research grants** focused on innovation and technology to decrease enteric methane in the dairy and beef industries.

TRIALING DIETARY INTERVENTIONS TO MITIGATE ENTERIC METHANE EMISSIONS IN DAIRY CATTLE*

To better support farmers, it's essential to take mitigation options from theory to practice. The Trialing Dietary Interventions to Mitigate Enteric Methane Emissions in Dairy Cattle is a Conservation Innovation Grant (CIG) awarded by the USDA Natural Resources Conservation Service (NRCS) to The Nature Conservancy, with additional support from the Innovation Center for U.S. Dairy and the Institute for Feed Education and Research. The project will take place over three years across up to 10 farms in Michigan and Wisconsin, and the long-term objective is to increase the use of [Feed Management Conservation Practice Standard 592](#) on dairy operations of all sizes to reduce enteric methane emissions. Its immediate goals are to evaluate the adoption of enteric methane mitigation options at the farm level while maintaining cow health, milk production and quality; understand barriers to adoption; and make recommendations to stakeholders and NRCS programming to address the barriers. This is an example of how government, businesses and NGOs can work together to improve government-led conservation programs that aim to improve environmental outcomes on farms.

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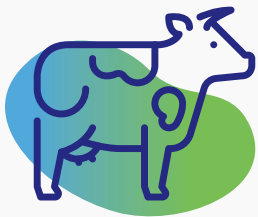
MAXIMIZING THE VALUE FROM DAIRY COW WASTEWATER

Anaerobic digesters are expanding across the U.S., powering everything from homes to universities to delivery trucks and even electric cars. But these state-of-the-art systems come with substantial and often prohibitive costs. Reducing those costs, or improving profitability, can enable more farmers to install these much-needed systems. The Maximizing the Value from Dairy Cow Wastewater project, underway with Arizona State University, is a two-year project exploring processes that are designed to increase biogas output from anaerobic digestion and may offer an alternative to traditional anaerobic digesters. This system is modeled to have a significantly smaller footprint and capital cost than traditional anaerobic digesters. The goal is to develop a blueprint for a pilot program that a third party can then build and commercialize, ultimately creating an opportunity for a much larger cohort of dairy farms to participate in both anaerobic digesters and nutrient recovery. In addition, the project will investigate a pre-treatment technology that uses pulsed-electric fields (PEF) to increase biogas production in both the new system and traditional anaerobic digesters.



FARMER PERCEPTIONS SURVEY

The success of dairy environmental progress starts with farmers and relies on a system that is poised to support the necessary changes, both on farm and throughout the value chain. Because of this, it is essential to understand the current landscape of farmer considerations of climate change and barriers to implementing practices. Farmer Perceptions of Climate Change and Attitudes Toward Sustainability Practices is a nationwide survey of U.S. dairy farmers, led by University of Vermont researchers in partnership with Colorado State University and the University of California, Davis, with support from the dairy checkoff. The survey seeks to understand how the farmers are thinking about climate change, preparing for new weather and implementing climate-friendly practices on their farms by asking questions about:



Farm and herd characteristics and management



Current and intended implementation of climate-friendly strategies for herd, manure and feed management



Perceptions of how weather and climate are impacting the farm, cows and milk yield



Barriers to implementing new practices or participating in incentive programs

The survey findings will be shared with farmers and industry members through written briefs, infographics and summary presentations. Information gathered through the survey will also be used by university partners to develop a K-12 curriculum. Ultimately, understanding farmer perceptions will help identify needs and provide support to improve the implementation of climate-friendly practices.



METHANE MODELING

Beyond the discrete research projects listed above, NZI also offers additional pathways for the necessary data collection and modeling to inform a landscape assessment of what's possible and what's needed to inform economically viable farmer action.

Researchers generated a cover and flare white paper to review the projected impact of combusting/flaring the captured methane from covered manure storage. This technology option can be deployed by small- and mid-size dairies to shrink their environmental footprint through methane mitigation. An Intergovernmental Panel on Climate Change (IPCC) model was used to estimate the methane reduction impact of covering manure storage to capture and flare the resulting methane. The total potential methane mitigation opportunity, by region and nationally, was estimated by integrating the projected methane reductions with the National Agriculture Statistics Service (NASS) 2017 Census data for the Midwest, Northeast and Southeast.

Based on the analysis, if 100% of Midwest, Northwest and Southeast dairy operations within the NASS categories of 100-199, 200-499 and 500-999 milking cows were to adopt this cover and flare technology, the total magnitude of methane reduction would be approximately

6.4 – 11.6 MMT CO₂e/year.

Other modeling work is also underway to support a landscape understanding of needs, barriers and potential impact. Researchers are working to estimate the potential for anaerobic digester adoption over the next five years and the resulting methane reductions, under status quo conditions and when adoption barriers are removed. Economic estimates for the status quo and opportunity case will also be included.

Finally, regional modeling across seven regions will account for geographic context and management differences, enabling an industry-wide view of strategies the diverse U.S. dairy industry can employ to achieve GHG neutrality and where more innovation and research are needed. Together, these modeling efforts will inform industry progress and help identify the biggest areas of opportunity moving forward.

U.S. DAIRY NET ZERO INITIATIVE

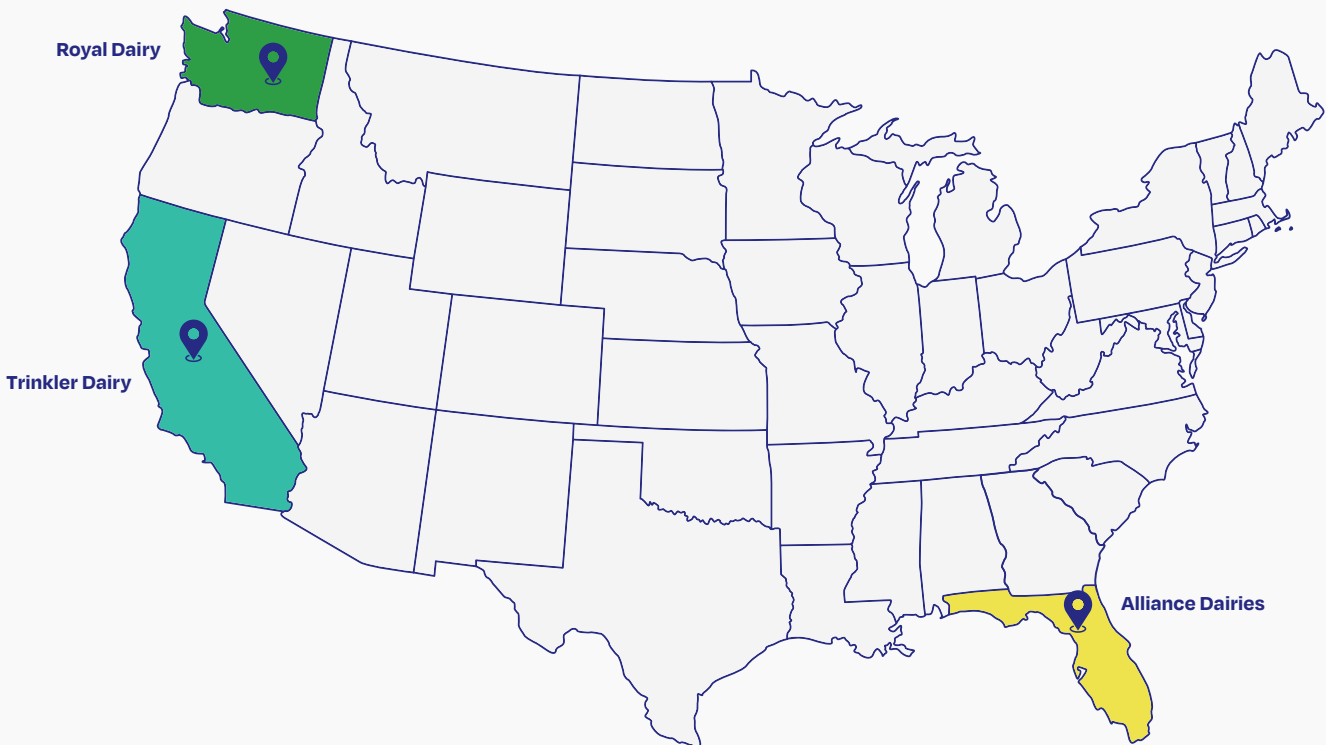
On-Farm Pilots

DAIRY SCALE FOR GOOD

Dairy farms hold extraordinary potential to provide environmental solutions that are not yet realized. As researchers seek to identify opportunities and model outcomes, on-farm pilots demonstrate and verify interventions through practical applications. The Dairy Scale for Good (DS4G) project seeks to demonstrate how a dairy farm can reach GHG neutrality in an economically viable way. The DS4G project selects pilot farms that reflect the diversity of the industry, focusing on working farms in various regions of the U.S. The farms apply the latest research, models and innovations to test and establish best practices and technologies across the farm's environmental footprint. Outcomes from the demonstration farms will be shared across the dairy industry.

The DS4G project currently has pilot farms located in Florida, California and Washington, each representing a diversity of management styles, geographies and infrastructure, to close the gap between scientific research and on-farm application across the industry. These farms are leading with science and data to unlock unique opportunities that can be tailored to each farm's personalized business plan.

Dairy Scale for Good Pilot Farms



TRINKLER DAIRY, CALIFORNIA

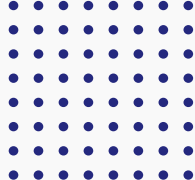
Trinkler Dairy Farm, a supplier to Nestlé Carnation in Modesto, CA, was announced as the first DS4G pilot farm in June 2021. In partnership with Nestlé, Trinkler Dairy is pursuing its environmental sustainability journey by upgrading infrastructure and better managing manure. These efforts will convert manure into usable byproducts, explore feed ingredients that reduce methane emissions and capture carbon from the atmosphere through regenerative practices that protect and restore soil.



As part of the DS4G pilot, Trinkler Dairy worked with Sustainable Conservation, Netafim and Nestlé to install a Subsurface Drip Irrigation (SDI) system. With increasing environmental pressures and competition over water in California, the SDI system offers significant sustainability benefits. Estimated impacts of the installation include increased crop yield, a 36% reduction in water use, a 45% reduction in nitrogen use and a 70–90% reduction in irrigation-related GHGs. Additional feed and forage trials are currently underway.

Worms can be a surprising potential solution for addressing manure-based emissions. Using their powerful digestive system, worms can help remove contaminants and odor from wastewater while also reducing methane emissions. The DS4G team conducted a feasibility analysis of a worm-based system to treat liquid manure at Trinkler Dairy. While this system was not chosen for implementation at Trinkler Dairy, the analysis led to the system being installed at a different dairy in Modesto. This work provides a great example of how to tailor solutions to the unique needs of a farm, as every intervention may not be the correct choice for every farm.





ALLIANCE DAIRIES, FLORIDA

Alliance Dairies in Trenton, FL, was selected as the second DS4G pilot farm through a partnership with Starbucks in November 2021. Building on the farm's strong record of sustainable practices, they are exploring new technologies to illustrate how farms can recover nutrients and improve water use while significantly reducing GHG emissions.



As part of the DS4G pilot, Alliance Dairies is installing solar panels with the capacity to generate

2 megawatts of energy, providing critical savings and environmental benefits.

U.S. dairy has gained valuable insights into the challenges for solar power to become an industry-wide solution, such as negotiations with power providers and navigating state regulations. One of the major factors driving the installation of solar panels is the aim to create a renewable energy ecosystem for the dairy, converting other key processes to electric power. Additionally, considerable opportunities have arisen for renewable energy, including a 30% Investment Tax Credit and Rural Energy for America Program (REAP) grants covering up to 50% of the installation costs, capped at \$1 million.

Alliance Dairies is installing a state-of-the-art feeding center, which will dramatically reduce feed shrinkage and mixing inconsistencies, resulting in substantial GHG reductions and a significant economic impact for the dairy. The electric feed mixers will integrate seamlessly with the renewable energy provided by the solar installation. The transformative experience of Alliance Dairies serves as an illustrative guide for other dairy operations to examine their feed shrinkage levels, providing a unique opportunity to realize both environmental and economic advantages through sustainable technological advancements.

The DS4G team is also conducting a feasibility study on the pyrolysis of separated fiber from Alliance Dairies. Pyrolysis, the thermal decomposition of organic material in the absence of oxygen, can transform separated fiber into biochar, a stable form of carbon that can be used as a soil amendment. If found to be viable, this solution would have major implications for the dairy's GHG footprint, positively impacting numerous systems on the dairy, creating economic benefits, streamlining the manure management system and adding significant carbon sequestration potential.

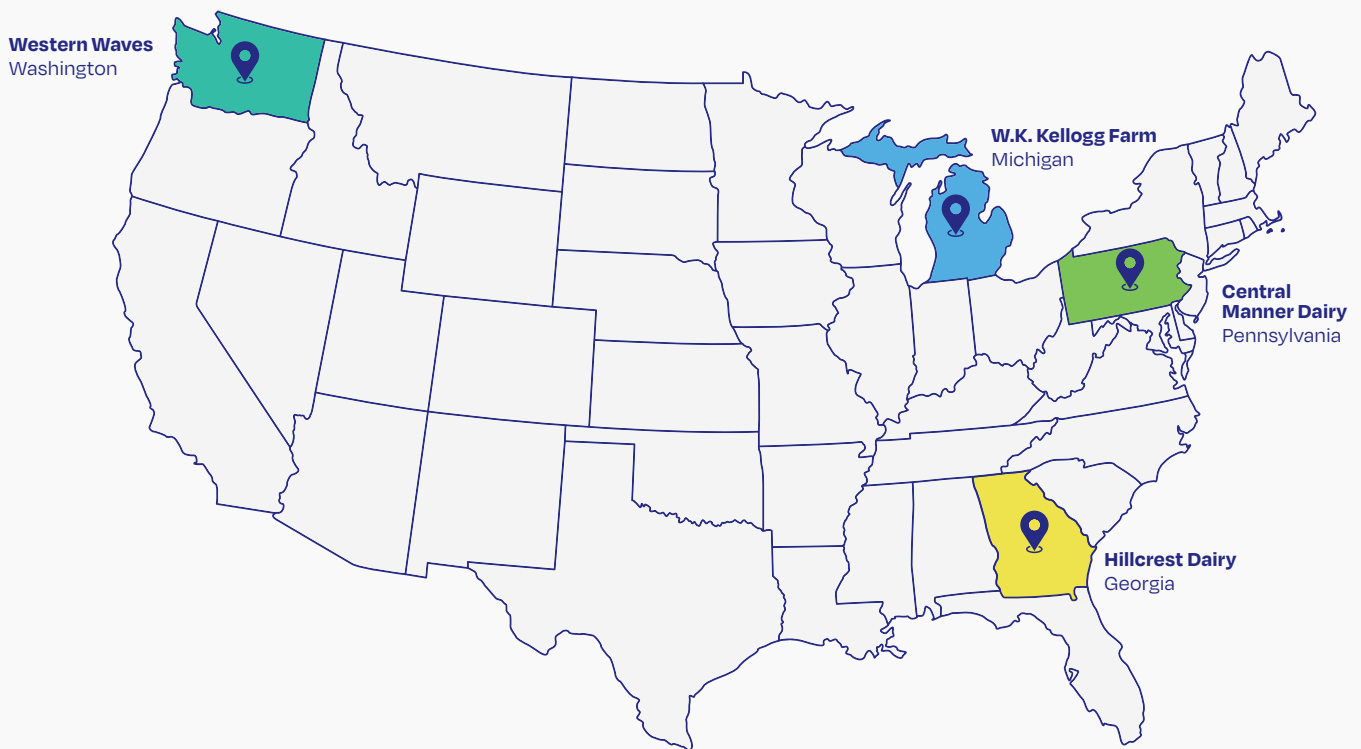
Economically viable solutions for reducing enteric emissions are a focus area for DS4G, and more research is needed on feed additives to understand the impacts on emission reduction and milk production. As part of the DS4G project, work is happening on-site at the University of Florida Dairy Research Unit to evaluate feed additives through the use of GreenFeed systems. These automated head-chamber systems monitor GHG emissions from the breath of ruminant animals such as dairy cows. When a dairy cow visits the system to feed, a sample of air is pumped into sensors that support continuous measurement of GHG concentrations, including methane. This system will measure the GHG fluxes from dairy cows given a control diet or a diet supplemented with feed additives. Results from this work will ensure that enteric mitigation practices are safe, efficacious and economical in a controlled research environment.

ADDITIONAL PILOT FARMS

In June 2023, a new DS4G farm was announced in Washington. Nestlé Health Science established a partnership with Royal Dairy to support innovation in the areas of feed production, manure management, renewable energy and regenerative agriculture. Two additional farms may be announced later in 2023.

SMALL FARM CASE STUDIES

In partnership with Michigan State University, Dairy Management, Inc. (DMI) developed small farm case studies by modeling the GHG footprints of small- to mid-sized commercial dairies in the U.S., highlighting their achievements and pathways to GHG neutrality. Researchers utilized [FARM Environmental Stewardship](#), [USDA COMET](#) computer models and soil carbon samples to quantify the GHG footprint of farms. For each dairy, they identified three to six practices or technologies that could aid in GHG reduction based on the needs of the individual dairy farm, along with an estimation of the potential GHG emission reduction and associated implementation costs.

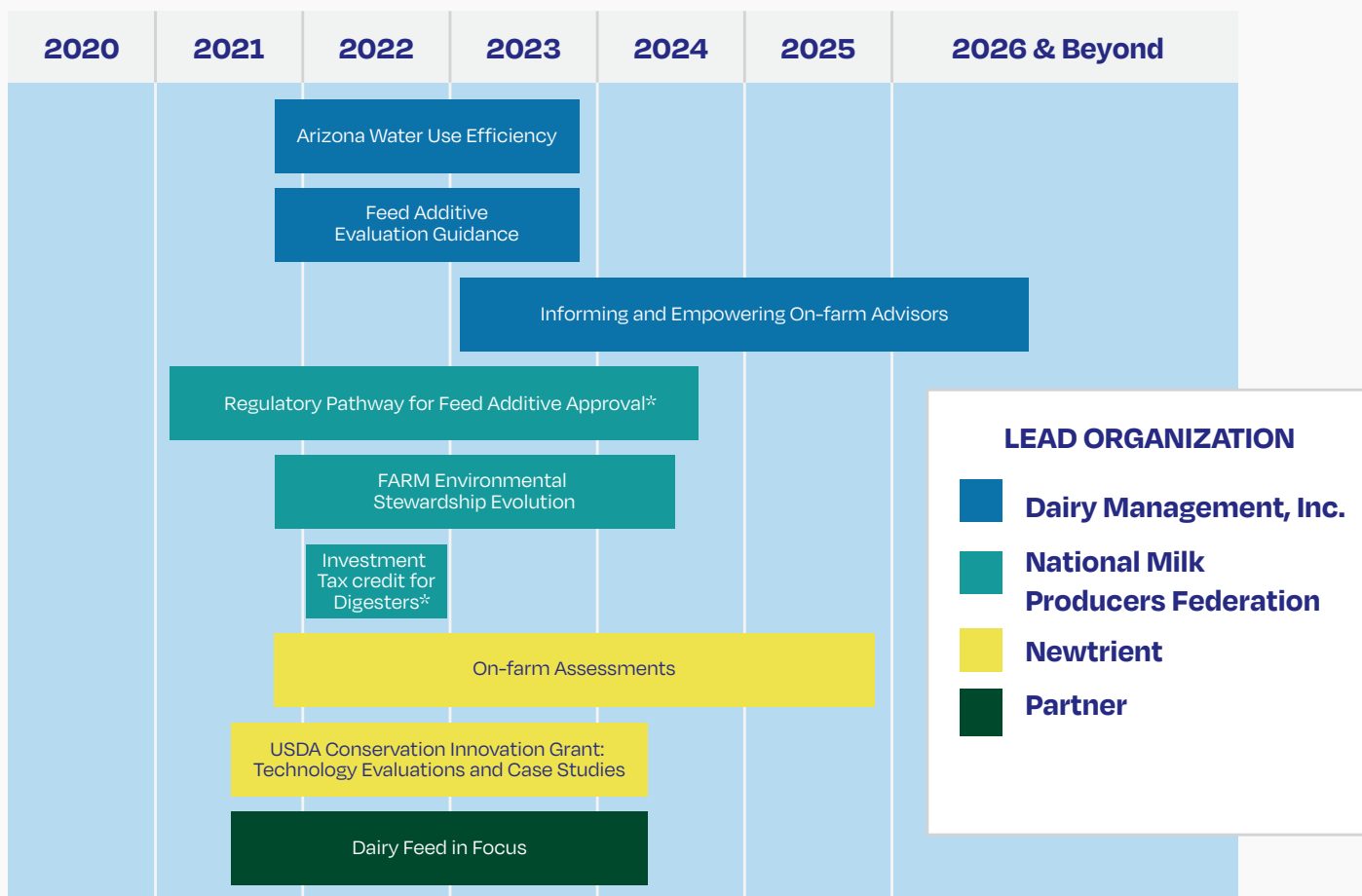


A video series captured each farm's innovative practices and technologies, lessons learned and progress, showcasing the diversity of the U.S. dairy industry and the range of sustainability efforts led by dairy farmers. While every dairy farm doesn't need to achieve GHG neutrality for the industry to achieve its goal, these case studies highlight compelling stories of success, innovation and commitment to environmental sustainability. Farm locations include the Northeast, Pacific Northwest, Midwest and Southeast, with farm sizes ranging from less than 200 head to less than 1,000. Each case study examines practices to help lower GHG emissions, enhance soil health, improve water resilience and increase biodiversity. The case studies and videos will be shared with dairy farmers to demonstrate the diverse approaches to reducing dairy farms' environmental impact in economical ways. These videos will also support the development of consumer-facing messages, building trust that U.S. dairy is responsibly produced.

U.S. DAIRY NET ZERO INITIATIVE

Scaling Impact

The U.S. dairy industry is working collectively to take the culmination of knowledge and insight gained from research, analysis and on-farm pilots to support widespread farmer adoption of environmentally sustainable practices and technologies. The dairy supply chain is working together to share critical data and guidance to support the broad use of the most effective practices and technologies. There are a variety of initiatives that fall under the category of Scaling Impact, including tools and informational resources, supply chain implementation projects and advocacy work. Together, these contribute to providing more information, increasing technical assistance and addressing economic challenges for accelerating voluntary adoption.



*Note: Activities funded by the dairy checkoff are subject to approval of USDA. No checkoff funds will be used for the purpose of influencing governmental policy or action.

LED BY

Dairy Management, Inc. & The Innovation Center for U.S. Dairy

FEED ADDITIVE EVALUATION GUIDANCE

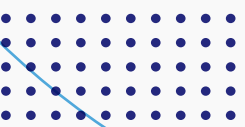
A [feed additive evaluation tool and guidance](#) were developed to help dairy value chain stakeholders and farmers make informed decisions about using feeding additives to mitigate enteric methane emissions. The project examined the “wish list” of desired attributes that are important for implementing feed additives through a series of facilitated conversations and meetings with industry experts across the value chain. The guidance summarizes lessons learned into 12 insights that were used to develop a tool to assist dairy farmers, their trusted advisors and other dairy value chain stakeholders with asking the right questions to evaluate the use of feed additives for enteric methane mitigation. For example, some

feed additive attributes, such as safety for cows and consumers, are non-negotiable. But some trade-offs and benefits, such as milk’s economic attributes and the value of methane reduction, need to be addressed. The guidance also highlights barriers to broad adoption, existing best practices and opportunities for the dairy value chain to develop new best practices. This tool and guidance provide a critical first step to helping the value chain establish clear and standardized criteria to empower decision-making.



ARIZONA WATER USE EFFICIENCY

In September 2022, DMI, Dairy Management West and United Dairywomen of Arizona secured a grant from the Walton Family Foundation to support the first phase of a project on Arizona Water Use Efficiency, assessing currently available water use efficiency technologies and strategies to scale economically viable solutions across Arizona dairies. The project team will develop a Roadmap to Water Conservation on Arizona Dairies that outlines gaps in data and producer knowledge, barriers to adoption and a framework for addressing knowledge gaps and scaling the adoption of water use efficiency practices and technologies. The project team will use science-backed guidance from the report to inform the development of a Phase II proposal that will fund research and assistance programs with the goal of increasing water use efficiency on Arizona dairies. The project will also establish an Arizona Dairy Farmer Advisory Committee to support current and future projects by providing in-depth information regarding existing on-farm water use and perspectives on theoretical water efficiency improvements.



INFORMING AND EMPOWERING ON-FARM ADVISORS

DMI has formed a partnership with the American Society of Agronomy (ASA) to empower certified crop advisors and enhance their ability to assist dairy farmers in adopting conservation practices. This collaboration aims to create an online agronomy training program that enables certified crop advisors to facilitate voluntary action on farms, leading to reduced environmental impact by promoting sustainable practices and technologies. Five online educational modules will be released in 2023. Furthermore, through the [Decode 6 Platform](#), DMI is supporting ASA in developing carbon and ecosystem services and educational content specifically designed for in-field advisers, conservationists, agricultural retailers and other advisors serving dairy farmers. The platform will contain 65 written articles, 18 podcasts and five videos. These resources will provide clear answers regarding sustainability practice selection and implementation, carbon and ecosystem services and markets.



LED BY THE

Innovation Center for U.S. Dairy,

*with support from International Dairy Foods
Association and National Milk
Producers Federation*

CEO TASK FORCE ON GHG ACCOUNTING

The Innovation Center for U.S. Dairy commissioned a CEO-level Task Force (Task Force) on GHG Accounting at the end of 2022 in response to the dynamic and evolving nature of the GHG accounting and reporting landscape. The Task Force is comprised of 10 CEOs and executive leaders from across the dairy federation and Innovation Center Board of Directors.

The Task Force's goal is to create a favorable environment for dairy farmers to invest in GHG reductions on-farm and ensure that U.S. dairy can successfully demonstrate its positive impact in reducing GHG emissions as a category. The strategies underlying this goal are twofold:

- Ensure top leadership alignment, direction and support for U.S. dairy's approach and ability to impact GHG accounting protocols and expectations.
- Inform and seek support from key stakeholders of the U.S. dairy industry GHG accounting framework for reporting environmental progress, including toward the 2050 GHG neutrality goal and within the value chain.

The [Greenhouse Gas Protocol \(GHG Protocol\)](#), the world's most utilized and accepted GHG accounting standard, conducted a survey in early 2023 to gather stakeholder feedback on needed updates to existing standards and guidance. Realizing the opportunity, the Task Force quickly assembled a Working Group of GHG accounting subject matter experts from across U.S. dairy to inform the survey response. Specifically, the Working Group identified key challenges and limitations for U.S. dairy created by the current standards and developed aligned principles by which accounting standards should abide. These challenges and associated principles communicated in the survey indicate the importance of enabling climate action, enhancing transparency, reducing complexity, and having a seat at the table to inform future standards development.

Since the submission of the GHG Protocol survey in March 2023, the Task Force directed the Working Group to continue convening to develop aligned solutions to the challenges and limitations identified, to ensure U.S. dairy is prepared to collaborate with key GHG standards bodies to revise current methodologies. The Working Group recommended three solutions for Task Force consideration, which were approved, and are currently undergoing final refinement. Once complete, these solutions will inform a strategy co-led by IDFA and NMPF to engage key GHG standards bodies and other like-minded agricultural sectors to insert U.S. dairy into the GHG accounting narrative and ensure methodologies do not hinder climate action going forward.



LED BY THE

National Milk Producers Federation

REGULATORY PATHWAY FOR FEED ADDITIVE APPROVAL*

To establish a regulatory path for feed additive approval, the National Milk Producers Federation (NMPF) and industry partners worked together to submit comments to the U.S. Food and Drug Administration (FDA) regarding the use of existing legal authority to modernize its regulations and allow for faster approval of feed additives. In the November 2022 comments to the FDA, NMPF urged the streamlining of bureaucracy to allow feed additives to be treated as foods rather than as drugs. NMPF noted that through this pathway, the U.S. can maintain and advance its global leadership in sustainability.

EVOLVING THE FARMERS ASSURING RESPONSIBLE MANAGEMENT ENVIRONMENTAL STEWARDSHIP MODULE

NMPF manages the [Farmers Assuring Responsible Management \(FARM\) Program Environmental Stewardship \(ES\)](#) platform in partnership with DMI. FARM ES is the U.S. dairy industry's unified platform to track and report on-farm environmental metrics, with a suite of tools and resources for dairy farmers to measure and improve their footprint. Dairy cooperatives and processors representing 80 percent by U.S. milk volume currently participate in FARM ES and over 3,800 farm assessments have been completed.

NMPF and the DMI are collaborating to update the model that powers FARM ES to support progress toward the 2050 environmental stewardship goals, to stay current on the latest scientific advancements in agricultural GHG modeling, and to be responsive to farmer needs and feedback. With the evolution of FARM ES coming in 2024, the program will transition to a "process-based" model through work with [Ruminant Farm Systems \(RuFaS\)](#) – a next-generation, open-source whole-farm model that simulates dairy farm production and environmental impact. Process-based models are more comprehensive than the empirical models that FARM ES and other livestock greenhouse gas accounting tools in use today.

The evolution of FARM ES includes significant stakeholder input with bi-monthly working group meetings that dive into each module of RuFaS and piloting on more than 30 farms across the U.S. to ensure the evolution of FARM ES will work on farms of all sizes, management systems and regions. Shifting to a process-based model offers several benefits for offering more insights to farmers and FARM participants, including:

- A more robust and accurate model, while remaining practical and easy to use
- Farm-level environmental and economic insights through scenario analyses to support informed decision-making about the adoption of practices and technologies
- Increased functionality to enable farmers, cooperatives and processors to work with supply chain customers interested in investing in on-farm interventions and GHG reductions through:
 - Ability to quantify the benefits of field-level practices and interventions
 - Ability to run basic "what-if" scenarios at the cooperative or processor level (e.g. what if X% of farms adopted XYZ practice), in addition to the more sophisticated scenarios at the farm level
 - Continued ability to use aggregate data for Scope 3 greenhouse gas reporting, as currently offered in FARM ES

INVESTMENT TAX CREDIT*

Last year, NMPF secured the inclusion of an investment tax credit to cover a portion of the upfront costs of anaerobic digesters in the Inflation Reduction Act (IRA) which became law in August 2022. Digesters had previously been eligible for an investment tax credit but only for limited uses, so this new provision will cover their broad array of uses including for renewable natural gas. NMPF will work to ensure that this new credit is extended in subsequent legislation.

RURAL ENERGY FOR AMERICA PROGRAM (REAP)*

NMPF supported the establishment in the IRA of a REAP Underutilized Technology Fund, which is meant to support underserved technologies like methane digesters. The fund includes \$144.5 million for renewable energy technologies that comprised less than 20% of the REAP project pool in the two years prior to the application year.

USDA NATURAL RESOURCES CONSERVATION SERVICE (NRCS) PROGRAMS*

NMPF works with USDA and Congress on an ongoing basis to ensure USDA conservation programs effectively support dairy farmers in advancing sustainability efforts. For example, NMPF advocated for the new 'climate smart ag' conservation funding included in the IRA, which included \$8.45 billion for the Environmental Quality Incentives Program (EQIP) spread out over four fiscal years. In this context, NMPF has urged USDA to use the new EQIP funding to emphasize manure management, including technologies that may be less costly than methane digesters and thus better able to fit under program funding limitations. NMPF has also supported greater use and development of relevant USDA NRCS conservation practice standards to support U.S. dairy sustainability. In September 2023, USDA added important practice standards like feed management, roofs and covers, and waste separation facility to the department's Climate-Smart Agriculture and Forestry Mitigation Activities List to prioritize the distribution of IRA funding.

CONSERVATION INNOVATION TRIALS*

NMPF secured in the IRA a doubling in funding for Conservation Innovation Trials, which support farmers as they test innovative practices and systems, from \$25 million to \$50 million annually over four fiscal years. In recognition of dairy's support, the law requires USDA to target this new funding toward initiatives that use feed management to reduce enteric methane emissions from livestock. The fiscal year 2023 notice of funding for this program was recently announced, and the dairy industry plans to seize this key opportunity.

**Note: Activities funded by the dairy checkoff are subject to approval of USDA. No checkoff funds will be used for the purpose of influencing governmental policy or action.*



LED BY THE

Global Dairy Platform

with support from International Dairy Foods Association

Two recent materials were produced from the results of a GHG accounting and reporting-focused working group, a collaboration between several Global Dairy Platform (GDP) members, including the International Dairy Foods Association (IDFA). These two items help increase knowledge about GHG accounting opportunities and challenges for the global dairy sector.

The first is a report titled, *Scope 3 Accounting in the Dairy Value Chain*, produced by Quantis for GDP, was published in Spring 2023 to provide a valuable third-party perspective about current GHG accounting activities and future needs in dairy. The report underscores the need for the global dairy sector to work with key stakeholders such as GHG Protocol to prioritize the promotion of clear GHG accounting approaches which support credible farm-level mitigation, calling attention to areas where guidance is not aligned, unclear or not yet considered. The report shares recommendations that will help unlock farm-level mitigation and ensure the dairy sector can navigate and effectively engage with the standards that underpin credible climate action.

In September 2023, GDP produced the second product, a mass balancing position paper targeted at sharing dairy's viewpoints with the GHG Protocol's Technical Working Group for their Land Sector & Removals Guidance. Working together through industry groups like GDP and IDFA, global dairy sector stakeholders proposed an approach to carbon abatement traceability called "Mass Balance Plus Plus" (MB++). By proactively considering the needs and realistic challenges of measurement, monitoring, reporting, and verification (MMRV) within dairy value chains, the MB++ approach for dairy will encourage appropriate MMRV safeguards are integrated into a mass balance accounting approach. This is intended to manage the needs for reasonable assurance in carbon accounting/reporting and operational efficiency. Together, the dairy sector urged the GHG Protocol and members of its LSRG Technical Working Group to allow mass balancing in commodity agriculture supply chain GHG accounting.



LED BY

Newtrient

ON-FARM ASSESSMENTS

One of the biggest barriers to farmer adoption of on-farm technologies and practices is access to technical resources and expertise to incentivize sustainable projects and investments. Since the fall of 2022, Newtrient has been contracted to conduct more than 70 on-farm assessments including technical assistance and tailored expert recommendations for each farm. Newtrient's Farm-Specific Assessments provide dairy farmers with a comprehensive GHG baseline assessment of their farm, using FARM ES and other models. Newtrient's cost-effective analysis helps farms of all sizes measure their total GHG footprint – from enteric methane, manure and energy use – to better understand their carbon reduction potential. With this information, dairy farmers can access more markets and leverage their carbon reduction potential to create long-term sustainability. Newtrient's assessments are a first step toward incentivizing the voluntary adoption of climate-smart practices in the dairy industry.

CONSERVATION INNOVATION GRANT: TECHNOLOGY EVALUATIONS

Newtrient has been awarded a USDA Conservation Innovation Grant to assess the effectiveness of 15 technologies and practices implemented on farms across the country on their ability to reduce GHG emissions and improve water quality. Newtrient also received funding outside of the CIG from the New York Farm Viability Institute to study an N2 Applied unit on a New York dairy for its ability to retain ammonia and nitrates; maintain usable nutrients, including phosphorous; and reduce greenhouse gas emissions during manure storage. With these critical evaluations, Newtrient is helping to incentivize action, implement practices on a wider scale and reduce environmental impact on farms across the U.S.



LED BY

U.S. Dairy Export Council

U.S. Dairy Export Council (USDEC) President and CEO Krysta Harden and DMI Chair Marilyn Hershey co-lead a high-level U.S. delegation to the 2022 UN Climate Change Conference (COP27) in Sharm El Sheikh, Egypt, to highlight U.S. dairy's critical contributions to global climate and food security goals. USDEC convened a panel called Climate Smart and Sustainable Dairy Production where it presented results and positive impact of NZI efforts to increase awareness of the climate actions, sustainable initiatives and progress made by the dairy sector at global, regional and national levels.

Building on its engagement at COP27, USDEC has since received provisional accreditation to the UN Framework Convention on Climate Change (UNFCCC), the official UN body that hosts the UN Climate Change Conference. UNFCCC oversees the negotiations that drive national commitments and policies. Through USDEC, U.S. dairy will now have an official seat at the table of these negotiations and at the COP convenings going forward*. In October of 2022, USDEC was granted official "observer status" by the United Nations Environment Programme (UNEP) in recognition of U.S. dairy's commitment to sustainability. Through its accreditation, USDEC directly engages in UNEP processes to advocate for U.S. dairy's role in a sustainable food system and promote U.S. dairy as an environmental solution.

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LED BY

Partners

DAIRY FEED IN FOCUS

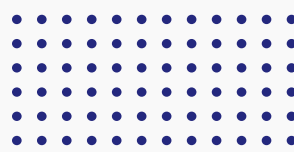
Collaboration is key to driving climate solutions on the ground. Dairy Feed in Focus is a shared effort to help incentivize and implement best practices in feed and forage production and feed efficiency. Partners for this project – including Syngenta, The Nature Conservancy, Foremost Farms, Michigan Rotary, Nestlé and the Michigan Milk Producers Association – have helped enroll 32 farmers managing 9,889 acres in Wisconsin and Michigan. The ultimate objective is to develop a replicable program and toolset to facilitate the adoption of best management across dairy farms of all sizes throughout the U.S.

To achieve these goals, the program provides funding for equipment, infrastructure, supplies and planning, as well as technical assistance, monitoring, reporting and verification. In addition, the project has streamlined and refined a model for future pilot projects. Partners have also pledged additional investment to enable the Feed in Focus program to expand to other states, helping more farmers adopt soil saving and GHG sequestering practices.

FiF Implementation Progress 2023 (WI & MI)

Farms Under Contract/Contract Pending:	32
Acres Implemented/Pledged:	9,889
Acres Influenced/Total Farm:	42,071
Dairy Cows Implemented/Pledged:	17,138
Dairy Cows Influenced/Total Farm:	23,011
Incentives Disbursed/Pledged to Farmers:	\$434,030*

*Numbers do not reflect 2022 implementation in WI/MI or Rotary contributions



NZI'S ROLE IN

Trust-Building and Reputation

ADVOCATING FOR OUR COMMITMENTS

Storytelling has driven critical awareness and advocacy for U.S. dairy's key sustainability commitments, and NZI plays a key role in enhancing reputation and building trust across audiences. The work of NZI has already been leveraged as proof points in communications to farmers, thought leaders, consumers and other stakeholders.

EFFORTS IN THE UNITED STATES

Across the United States, the impact of NZI has been shared with diverse audiences. The Economist featured the work of U.S. dairy through NZI during a mainstage panel discussion on Building a Sustainable Supply Chain in the Food Industry during the 2023 Economist Sustainability Week U.S. Two Economist Insight Hours also featured NZI: a [May 2022 webinar](#) focused on reducing dairy's methane emissions, while a [May 2023 webinar](#) spotlighted opportunities for regenerative agriculture to cut climate pollution and feed the world. U.S. dairy also engaged with tens of thousands of thought leaders across tech and sustainability at the 2022 GreenBiz VERGE conference, where multi-faceted engagement included a booth activation, a standing room only panel discussion and several articles on the [GreenBiz website](#). Finally, U.S. dairy also hosted the first ever stakeholder roundtable featuring several of the foremost thought leaders and organizations plugged into the global dialogue. The candid, two-way dialogue helped inform the methane strategy and opened doors for further engagement and support.

Dairy Feed in Focus has been recognized through the [U.S. Nature 4 Climate Building Ambition Through Action campaign](#), which showcases a diverse display of innovative and successful programs that implement Natural Climate Solutions throughout the United States. These programs are supported by government, corporate and tribal funding and their lessons learned outline a pathway for broader adoption.



INTERNATIONAL PROGRESS AND RECOGNITION

NZI projects and programs have already earned international attention and acclaim. Ahead of the first-ever Food Systems Summit in 2021, the UN named NZI a "game-changer" - an initiative that has the potential to bring about positive change - fueled by the ingenuity of thousands of visionary dairy farms and underpinned by the U.S. Dairy Stewardship Commitment and its 2050 environmental stewardship goals. The Greener Cattle Initiative and the Dairy Soil and Water Regeneration project have earned designations as [Agriculture Innovation Mission for Climate \(AIM for Climate\) Innovation Sprints](#). AIM for Climate is a joint effort from the United States and the United Arab Emirates to address climate change and global hunger by uniting participants to significantly increase investment in, and other support for, climate-smart agriculture and food systems innovation over five years. U.S. dairy is also a supporter of [Pathways to Dairy Net Zero](#), led by Global Dairy Platform, which is an international movement to help reduce the global dairy sector's impact on the planet by amplifying the initiatives already in place, optimizing efforts and reducing emissions to safeguard nutrition security and sustain livelihoods.

NZI IN THE MEDIA

Selected media includes:

- **Crops & Soils Magazine**, "[The Race to Reduce Greenhouse Gas Emissions in U.S. Dairy Through Improved Soil Health](#)"
- **Dairy Herd Management**, "[Come to the Table](#)"
- **Forbes**, "[The Water Crisis is Here. Is Your Business Prepared?](#)"
- **GreenBiz**, "[Unlocking the dairy cow's potential to combat climate change](#)"
- **Hoard's Dairyman**, "[Dairy is investing in emissions research](#)"
- **The Nature Conservancy**, "[Dairy Industry Aims for GHG Neutrality](#)"
- **Progressive Dairy**, "[Feed additive evaluation tool for enteric methane mitigation gets thumbs up in beta test](#)"
- **Sustainability Magazine**, "[\\$10m grant for dairy industry in net-zero push](#)"
- **TIME Magazine**, "[Cows Are The Unlikely Heroes In The Fight Against Food Waste](#)"
- **USA Today**, "[Can Cows Help Fight Climate Change? The Answer May Surprise Some](#)"
- **Washington Post**, "[Changing the Way the World Views Dairy](#)"
- **World Wildlife Fund**, "[Tackling Scope 3 Emissions and Reaching Net Zero in Dairy](#)"

While NZI projects and programs have been successful in empowering farms to reduce their environmental impact, progress toward breaking down barriers is only just beginning. Partner engagement and investment have been instrumental in supporting projects that accelerate change in an economical way. Through industry collaboration, NZI partners and projects identify science-based options for sustainable actions on farm and unlock opportunities to scale those actions and address the barriers to accelerating progress. This type of industry collaboration is critical to forging sustainable progress for generations to come.

U.S. DAIRY NET ZERO INITIATIVE

Supporting Partners

Thank you to our NZI supporting partners for their engagement and support of dairy farmers, which helps to strengthen and accelerate results-oriented action. As NZI moves forward, diverse partnerships and collaboration across both private and public sectors will continue to grow. For more information on these advancements or to be part of this initiative, contact innovationcenter@usdairy.com.

