

# Dairy's Role in a Responsible and Sustainable Food System

“As we look at feeding an ever-increasing world population, dairy can be part of the solution in meeting global food insecurity,”

Inter-American Institute for Cooperation on Agriculture (IICA) 2021



Dairy's Role in a Responsible and Sustainable Food System by IICA is published under license Creative Commons Attribution-ShareAlike 3.0 IGO (CC-BY-SA 3.0 IGO) (<http://creativecommons.org/licenses/by-sa/3.0/igo/>) Based on a work at [www.iica.int](http://www.iica.int)

IICA encourages the fair use of this document. Proper citation is requested.

This publication is also available in electronic (PDF) format from the Institute's web site: <http://www.iica.int>.

On Wednesday, Aug. 26, 2020, the Inter-American Institute for Cooperation on Agriculture (IICA), in collaboration with the Global Dairy Platform (GDP) and the U.S. Dairy Export Council (USDEC), conducted a webinar titled “Dairy’s Role in a Responsible and Sustainable Food System.” Internationally renowned experts shared the latest information and innovations to help improve global knowledge and understanding of the important role dairy plays in the economic, social, cultural, environmental and nutritional development of the Americas and the world.

By 2050, the global population may near 10 billion people and, in order to feed the world, food production will need to increase by approximately 70%. In 2020, 690 million people suffer from hunger, with children and the elderly disproportionately affected. More than 75% of the world’s poor live in rural areas and are mostly dependent on agricultural production for their subsistence. “As we look at feeding an ever- increasing world population, dairy can be part of the solution in meeting global food insecurity,” said U.S. Secretary of Agriculture Tom Vilsack, who participated in the event in his former role as President and CEO of USDEC. The global dairy industry is uniquely positioned to not only feed people nutritious, wholesome foods, but also create economic opportunity. The Food and Agriculture Organization (FAO) estimates that the global dairy sector is comprised of one billion people, with 600 million living on dairy farms and another 400 million whose livelihoods depend on dairy.

“The issues of food security, sustainability, health, nutrition, innovation, economic productivity and climate change will be front and center as we head towards next year’s global Food Systems Summit hosted by the United Nations (UN),” said Manuel Otero, Director General of IICA. In 2021, the UN will convene a Food Systems Summit to raise global awareness and discuss actions to transform food systems to resolve hunger, reduce diet-related disease and heal the planet. “The UN is calling for us to act in a collective way to radically change the way we produce, process, and consume food,” said Rick Smith, Chair of the GDP Board and President and Chief Executive Officer of Dairy Farmers of America (DFA). The importance of animal agriculture has been questioned and cultural and societal preferences are being given equal standing to scientific, evidence-based facts. In addition, there are discussions occurring around the world about the future of food that do not include any farmers, farm organizations or food companies.

It is important that the global dairy sector work together and be proactive in sharing the significant impacts of the industry while also working to create a more resilient food system. Through nutrition, socioeconomic development, sustainability efforts and the care of livestock, dairy farmers and processors steadfastly serve a growing world population. In addition to providing wholesome products to the world and critical nutrients to at-risk populations “the global dairy industry is capable of providing economic activity and benefits that will help reduce poverty...and I know the industry is committed to doing it in a way where animals are treated well and where the environment is improved.” Vilsack said.



**About IICA:** The IICA board is comprised of Secretaries and Ministers of Agriculture of 34 countries in the Western Hemisphere including 14 member states in the Caribbean. IICA supports the efforts of Member States to achieve agricultural development and rural well-being with the aim of achieving a competitive, inclusive and sustainable agriculture sector. IICA also helps Member States participate in international standard setting bodies such as Codex Alimentarius and the World Trade Organization.



**About GDP:** GDP brings the global dairy sector together on a pre-competitive basis to demonstrate dairy's commitment to a sustainable food system. GDP members, representing dairy companies, associations, scientific bodies and other partners, have operations in more than 150 countries around the world and collectively produce 33% of the world's milk.



**About USDEC:** USDEC is a non-profit, independent membership organization that represents the global trade interests of U.S. dairy producers, proprietary processors and cooperatives, ingredient suppliers and export traders. USDEC represents roughly 110 members who are interested in making sure that the U.S. dairy industry is participating in export opportunities and helping to feed the world.

## Introduction



**Mitch Kanter, PhD,**  
Technical Director,  
Global Dairy Platform

# Dairy's Role in a Sustainable Food System: Nutrition and Health Benefits

It is estimated that by 2050, the global population may reach 10 billion. In order to produce enough food to feed 10 billion people, food production will need to increase by approximately 70% over the next 25 years.<sup>1</sup> Feeding a growing population requires attention to a sustainable food system – a food system that is good for human health as well as the health of the environment. The FAO defines a sustainable food system as one that *delivers food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generations are not compromised.*<sup>2</sup> The four domains of a sustainable food system encompass environmental factors, social factors, economic factors and health factors including nutrition. Foods that are nutrient dense, affordable and efficiently produced are going to be vitally important to creating and maintaining sustainable food systems in the future. Dairy foods are uniquely positioned to play an important role in feeding people particularly during a time of rapid population growth.

# Dairy and Global Dietary Guidelines

Dairy foods contain several of the vitamins and minerals that are considered nutrients of concern in many countries, including potassium, magnesium, vitamin A, vitamin D and calcium.

In the U.S., the Dietary Guidelines for Americans help to inform the development of federal food, nutrition, and health policies and programs. They also provide guidance for the public on nutritional and dietary information to support optimal health. Many other countries around the world produce similar guidelines for their citizens and in virtually every set of these guidelines dairy foods are included. While the recommended amounts and

serving sizes vary from country to country, dairy foods are recommended because they are a nutritious option that contain many of the macro- and micronutrients critical to human health. Dairy foods contain several of the vitamins and minerals that are considered nutrients of concern in many countries, including potassium, magnesium, vitamin A, vitamin D and calcium. These are nutrients that large portions of the population do not get enough of so overall health may suffer as a result of these shortfalls. Since dairy foods naturally contain many of these important nutrients, and others are commonly fortified, there is an obvious rationale for why dairy foods exist as part of the guidelines for virtually every country. Recently, the 2020 Dietary Guidelines Advisory Committee (DGAC) in the U.S. released recommendations that will be used to inform the next iteration of the Dietary Guidelines for Americans. The Committee continues to recognize the important role that dairy foods play in the diets of Americans of all ages. The Guidelines stress the role that dairy plays in bone health and recommend three servings of dairy per day. Additionally, dairy foods play a role in all three food patterns recommended by the DGAC, including a healthy Western diet, a healthy vegetarian diet and a healthy Mediterranean diet.<sup>3</sup>



# The Case for High-Quality Protein

It has been suggested that to subsist on a plant-only vegan diet, an individual may need to eat 20-to-30 percent more protein in order to get an equivalent amount of high-quality protein in their diet as someone eating animal sources of protein.

Protein is an essential nutrient the body needs to build and maintain muscle. It also plays an integral role in the body's structure, functions and regulation of all tissues and organs. The protein in foods is made up of essential and non-essential amino acids. Essential amino acids come solely from food sources and non-essential amino acids can be produced in the body. The Digestible Indispensable Amino Acid Score (DIAAS) assesses the quality of dietary proteins by their ability to supply amino acids for use by the body. When protein-rich foods contain essential amino acids in optimal amounts and they are also easily digested and absorbed into the body, that protein source is considered to be high-quality. The majority of protein-containing foods that are extremely well-absorbed and that are considered very high-quality proteins are animal-sourced proteins such as dairy.

While some plant-based proteins may contain a fairly high quantity of protein, not all of that protein is readily absorbed by the body. Many plant proteins do not contain all of the essential amino acids needed by the body. Additionally, the fiber in plant foods, while beneficial for many aspects of health, may act as an anti-nutrient that interferes with the absorption of plant proteins, among

other nutrients. It has been suggested that to subsist on a plant-only vegan diet, an individual may need to eat 20-to-30% more protein in order to get an equivalent amount of high-quality protein in their diet as someone eating animal sources of protein.<sup>4</sup> This could have implications for weight control since overall calorie ingestion may need to be higher to achieve the same high-quality protein consumption. This also has implications for land use as well because of the greater land needs for crop production if the population were seeking to consume more plant protein.

Protein quality has a demonstrated effect on body composition and muscle function. A study of healthy older men and women examined the effect of dietary protein quality during a period of physical inactivity.<sup>5</sup> The subjects completed seven days of bed rest followed by five days of re-acclimation to physical activity. During the bed rest and re-acclimation periods, the subjects consumed either a mixed macronutrient diet or a higher-quality protein diet supplemented with whey protein. The results demonstrated that the residual impact of muscular atrophy following a period of bed rest was reduced when the diet contained more high-quality protein.

# The New View on Saturated Fat

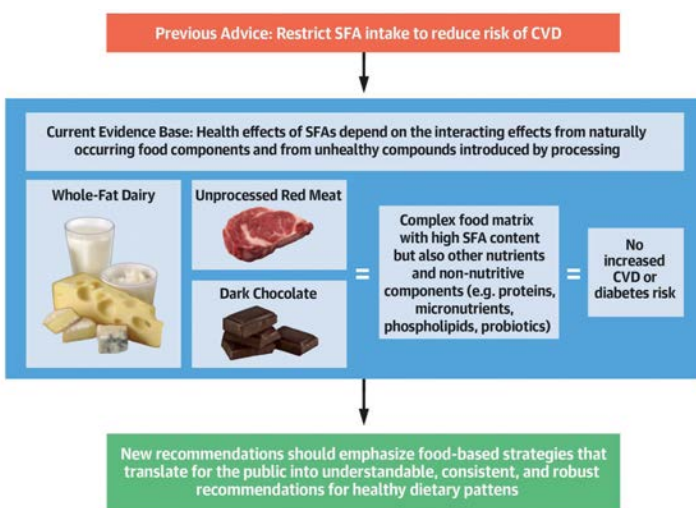
Starting in the 1950s, the nutrition community questioned the potential negative impact of saturated fat on human health and recommended reduced intake of total fat, saturated fat and dietary cholesterol in order to prevent heart disease. As a result, nutrient-dense foods such as whole milk dairy products, eggs and meats were moderated in dietary recommendations. Over the last five-to-ten years, researchers have re-examined the relationship between saturated fat and cardiovascular disease (CVD) risk in light of an abundance of newer research, and results indicate that 50 years of advice to minimize fat intake and increase processed carbohydrate

consumption actually may have been erroneous. A meta-analysis of 21 studies that collectively followed more than 300,000 subjects over periods of five-to-23 years indicated there is no significant association between dietary saturated fat and increased risk of coronary heart disease (CHD) or CVD.<sup>6</sup> In 2014, a systematic review of 32 observational studies concluded that evidence does not support dietary guidelines that limit saturated fats.<sup>7</sup> Subsequent studies have corroborated these results, suggesting a tenuous relationship between saturated fat intake and CVD risk.

These findings have also led several governing bodies to revise dietary guidance recommendations regarding saturated fat intake, including the Canadian Heart and Stroke Foundation and the Academy of Nutrition and Dietetics in the U.S. In fact, a 2014 position paper by The Academy discussed how variations in the structure of several fatty acids may impart different physiological functions – an observation that supports the idea that fatty acids are not a homogeneous entity, and should not be viewed as such.<sup>8</sup> For example, palmitic acid or palmitate, which exists primarily in palm oil, has been shown in several studies to raise heart disease risk. Stearic acid, which exists in dairy and other animal products as well as some grain products like oats, has a neutral effect and doesn't raise or lower risk. A shorter chain saturated fat found in dairy foods, butyric acid, has actually been shown to lower heart disease risk.

Another important factor to consider is the food matrix. A whole food exists as a matrix of macro- and micronutrients that may work synergistically to promote health benefits or detriments; effects that are not easily replicated through enrichment, processing, or creation of novel foods. A review in the *Journal of the American College of Cardiology* examined this concept and concluded that the sum of a foods' nutrients is greater than the individual parts. The authors reiterated that different saturated fatty acids have different biological effects and these are further modified by the food matrix, as well as the overall content of a meal or diet.<sup>9</sup>

## Central Illustration: Shifting From Saturated Fatty Acid-Based to Food-Based Dietary Guidelines for Cardiovascular Health.



Astrup, A. et al. *J Am Coll Cardiol.* 2020;76(7):844-57



# Dairy's Role in Preventing Disease Risk and Promoting Health

## Vascular Health

There is growing evidence that dairy intake may actually help reduce the risk for CVD. Several systematic reviews and cohort studies examined published data and concluded there is an inverse relationship between dairy consumption and heart disease risk, which supports the inclusion of dairy foods regardless of fat level in a healthy

eating pattern.<sup>10,11</sup> In another example, researchers looked at 22 studies comprised of more than 800,000 participants and found that dairy consumption, regardless of fat content, is significantly and inversely associated with the risk of CVD and stroke.<sup>12</sup> A recent addition to this growing body of evidence examined coronary artery calcification (CAC), which is a measure of the natural progression of calcium build-up in the arteries over time, where greater calcification is a strong predictor of cardiovascular disease risk. The researchers completed a 10-year study in which every two years they measured CAC progression of more than 5,000 subjects. Results demonstrated that over the 10-year period, the subjects who consumed the most whole milk had the lowest rate of CAC progression.<sup>13</sup>

## Blood Pressure

In the mid-to-late 1990s, a series of studies called Dietary Approaches to Stop Hypertension (DASH) examined various eating patterns and their impact on blood pressure among adults with hypertension. The



researchers discovered that adding fruits and vegetables to the diet lowers blood pressure, and that adding low-fat dairy foods to a higher fruit and vegetable diet lowers blood pressure even further.<sup>14</sup> Several studies have since been conducted to see why dairy foods might help lower blood pressure. One possible mechanism is the effect of dairy foods on endothelial dysfunction, a measure of vascular tone and stiffness. Studies have demonstrated that dairy consumption may increase vasodilation of the blood vessels.<sup>15</sup> Another more recent study examined the relative effects of acute sodium ingestion from dairy cheese and non-dairy sources on microvascular function. High-dietary sodium impairs endothelial function, particularly in salt-sensitive individuals. These researchers fed subjects moderate and high sodium in the form of cheddar cheese, pretzels or imitation cheese and found that vasoconstriction was increased following sodium ingestion in the form of pretzels or imitation cheese compared to equal amounts of sodium in cheddar cheese, suggesting a food matrix effect.<sup>16</sup>

## Immunity and Anti-Inflammation

Several recent studies have addressed the relationship between dairy foods and inflammation. Inflammation is the body's way of protecting itself in response to conditions such as injury, autoimmune disorders or prolonged exposure to irritants. A new body of evidence suggests that dairy in several forms is not linked to increased inflammation. Further, a study comparing dairy yogurt to soy pudding found that fermented dairy products may actually lower inflammation in the body. Female subjects were fed yogurt or soy pudding and researchers examined markers of inflammation in the bloodstream. The subjects who consumed the yogurt products showed a decrease in markers of inflammation while those who ate the control meal either showed an increase or no change.<sup>17</sup> The researchers suggested that



eating fermented dairy may actually improve gut barrier function which has strong implications for increasing immune function and lowering inflammation. Fermented dairy products contain probiotics that may help normalize a disturbed gut microbiome and improve health. Finally, emerging research is underway to examine the role of bioactive compounds in dairy on inflammation. *In vitro* studies of lactoferrin and lactalbumin, among other dairy components, suggest these compounds may support immune function and decrease inflammation in the body.

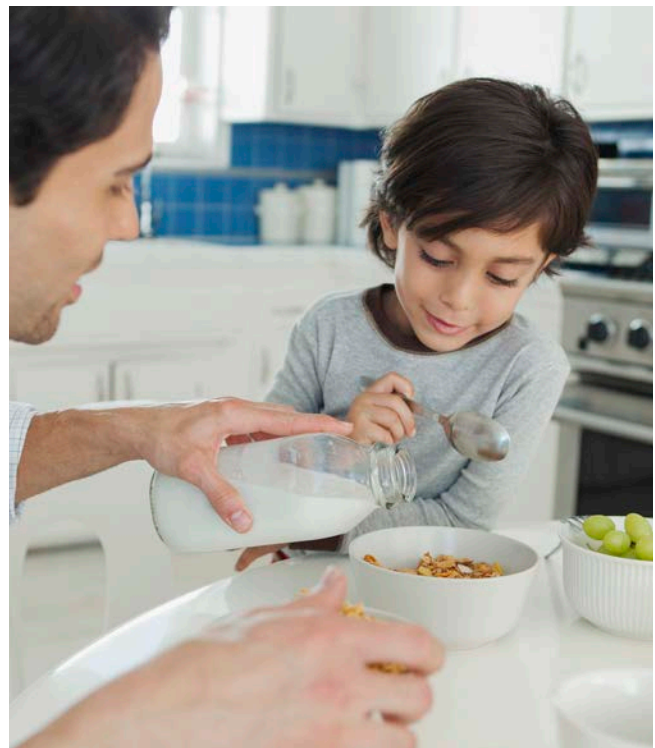
## Dairy and Type 2 Diabetes

Many prospective cohort studies show consistent beneficial associations between greater dairy consumption and lower risk of developing type 2 diabetes.<sup>18,19</sup> The Prospective Urban Rural Epidemiology (PURE) study examined dairy food consumption and its association with risk factors for chronic diseases such as high blood pressure and type 2 diabetes.<sup>20</sup> This prospective observational study examined 147,812 individuals between the ages of 35 and 70 from 21 countries. Dietary intake was assessed using food frequency questionnaires and dairy foods were classified based on food type and fat content. Total dairy and full-fat dairy consumption were associated with a lower prevalence of metabolic syndrome. Further, a greater benefit was seen in those countries with normally low dairy intakes. Consumption of at least two servings a day of total dairy versus no dairy consumption was associated with a 24% lower risk of metabolic syndrome as well as an 11-12% lower risk of high blood pressure and type 2 diabetes. Risk reduction was greater for both health conditions if three daily servings of total dairy were consumed. These findings are particularly interesting because the work was done primarily in developing countries often with lower socio-economic status and fewer opportunities to obtain healthy foods. In developed countries like the U.S., respected diabetes treatment clinics such as Joslin Diabetes Center have updated their guidance to patients regarding dairy intake. Historically, patients at risk for diabetes were told to reduce dairy intake due

to saturated fat concerns. But clinicians now recognize that saturated fat from dairy foods may be acceptable within the total daily caloric intake, and dairy foods are included on lists of recommended foods for individuals with type 2 diabetes.

## Dairy and Musculoskeletal Health

The body of evidence regarding dairy's impact on bone health, particularly the calcium that exists naturally in dairy foods and vitamin D (added to dairy products in several countries), is well-established. Health authorities in various global organizations recommend nutrients in dairy foods to improve bone health, particularly in adolescents, but for adults as well. Guidelines from the American Academy of Pediatrics in 2014 encouraged increased dietary intake of calcium- and vitamin D-containing foods and beverages and specified that



children ages four-to-eight require two-to-three servings of dairy products or equivalent per day while adolescents require four servings per day.<sup>21</sup> The National Osteoporosis Foundation in the U.S. recognize childhood and young adulthood as the bone-building years and recommend these age groups eat a well-balanced diet with adequate calcium-rich foods like milk and yogurt, in addition to 60 minutes of moderate exercise daily. This same organization conducted a review of scientific articles published between 2000 and 2014 that focused on dietary and lifestyle factors related to bone mass and strength in children and adolescents. Grades were given to various dietary and lifestyle factors. Calcium in the diet and physical activity both received a grade of “A” and dairy foods as well as vitamin D received a grade

of “B.”<sup>22</sup> These were the highest scores awarded for any nutrient, food, or lifestyle factor.

Research over the last decade has also shown the important role that dairy proteins, particularly whey, play in increasing muscle protein synthesis and lean body mass, specifically following exercise. The research shows that whey protein increases muscle protein synthesis at a higher rate than soy and casein proteins following resistance exercise<sup>23</sup> and over the long-term whey supplementation results in greater lean body mass following resistance training.<sup>24</sup> Among the elderly, research demonstrated that muscle protein synthesis was enhanced with increasing doses of whey protein but not with a similar amount of soy protein among male subjects.<sup>25</sup>

## Conclusion

Human health, particularly nutrition, is one dimension of an evolving story about global sustainable food systems in the context of a growing population. Dairy can improve human health because it not only contains many shortfall nutrients, but it is also a source of one of the highest-quality proteins in the human diet. Contrary to several earlier reports, consumption of dairy foods, regardless of fat content, have been shown to have no adverse impact on cardiovascular disease risk and may have positive effects on several other health and disease indices. It is imperative to view whole foods, such as dairy, as a matrix of several macro- and micronutrients that interact synergistically to impact health and disease, rather than as a series of individual nutrients in a reductionist manner.

## References

- 1 U.S. Census Bureau, International Database, December 2008 Update
- 2 Nguyen H. editor. Sustainable food systems concept and framework. Agricultural Development Economics Division (ESA), Food and Agriculture Organization; 2018. Available from: <http://www.fao.org/3/ca2079en/CA2079EN.pdf>
- 3 Scientific Report of the 2020 Dietary Guidelines Advisory Committee: Advisory Report to the Secretary of Agriculture and the Secretary of Health and Human Services. USDA, ARS, Washington, DC. Available from: [https://www.dietaryguidelines.gov/sites/default/files/2020-07/ScientificReport\\_of\\_the\\_2020DietaryGuidelinesAdvisoryCommittee\\_first-print.pdf](https://www.dietaryguidelines.gov/sites/default/files/2020-07/ScientificReport_of_the_2020DietaryGuidelinesAdvisoryCommittee_first-print.pdf)
- 4 S. Hodgkinson et al. *J Nutr* 2020; 150(10):2621–2623
- 5 E. Arentson-Lantz et al. *J. Gerontol* 2019; 74(10):1605–1611
- 6 P. Siri-Tarino et al. *AJCN* 2010; 91(3):535–546
- 7 R. Chowdhury et al. *Ann Intern Med* 2014; 160(9):658
- 8 G. Vannice & H. Rasmussen. *J Acad Nutr Diet* 2014; 114(1):136–53.
- 9 A. Astrup et al. *JACC* 2020; 76(7): 844–857
- 10 J. Drouin-Chartier et al. *Adv Nutr* 2016; 7(6):1026–1040
- 11 D. Alexander et al. *Br J Nutr* 2016; 115(4):737–50
- 12 L. Qin et al. *Asia Pac J Clin Nutr* 2015; 24(1):90–100
- 13 S. Ghosh et al. *Eur J Nutr* 2020; Online ahead of print. Available from: <https://pubmed.ncbi.nlm.nih.gov/32583016/>
- 14 L. Appel et al. *NEJM* 1997; 336(16):1117–1124
- 15 D. Machin et al. *AJCN* 2014; 100(1):80–87
- 16 A. Stanhewicz et al. *Br J Nutr* 2016; 116(4): 658–665
- 17 R. Pei et al. *Br J of Nutrition* 2017; 118(12): 1043–1051
- 18 D. Aune et al. *Am J Clin Nutr* 2013; 98(4): 1066–83
- 19 D. Gao et al. *PLoS One* 2013; 8(9)
- 20 Bhavadhahini et al. *BMJ Open Diabetes Research and Care* 2020, 8:e000826
- 21 N. Golden et al. *Pediatrics* 2014; 134(4): 1229e–1243e
- 22 C. Weaver et al. *Osteoporos Int* 2016; 27: 1281–1386
- 23 J. Tang et al. *J Appl Phys* 2009; 107(3):987–92
- 24 J. Volek et al. *J Am Coll Nutr* 2013; 32(2):122–135
- 25 Y. Yang et al. *Nutr & Metab* 2012; 9:57

## Introduction



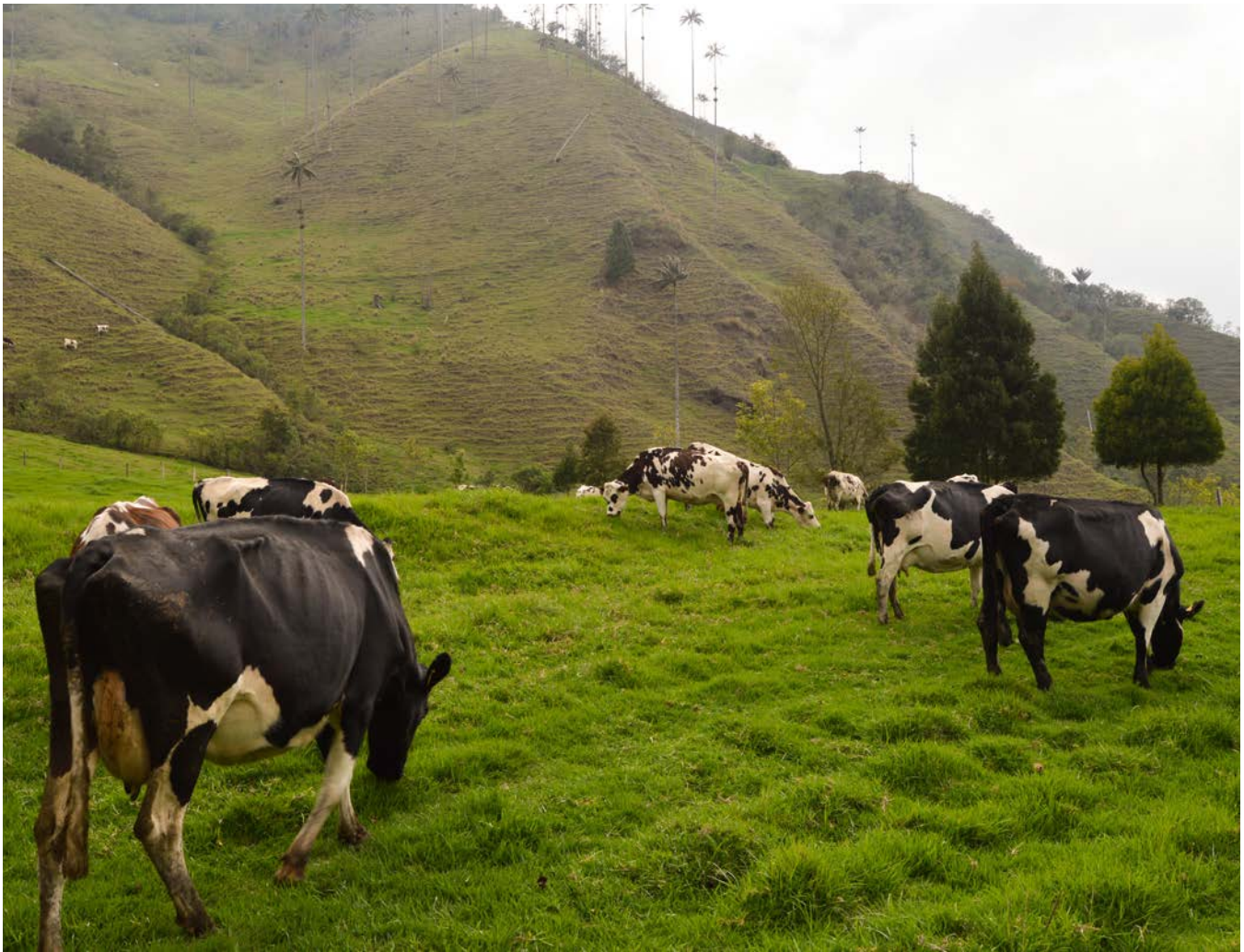
**Brian Lindsay,**  
Sector Lead for Sustainability,  
Global Dairy Platform



**Frank Mitloehner, PhD,**  
Professor at the University  
of California, Davis

# A Global Model to Address Sustainability Challenges

One billion people rely on the dairy sector for their livelihoods. Six hundred million people live on 133 million dairy farms, and 400 million people depend on the full-time jobs in support of the dairy industry.



The global dairy sector provides nutritious food to six billion people around the world. Dairy farms represent 20% of global agricultural lands and dairy products provide five percent of total energy consumed, including 10% of protein and nine percent of fat in the average human's diet. One billion people rely on the dairy sector for their livelihoods. Six hundred million people live on 133 million dairy farms, and 400 million people depend on the full-time jobs in support of the dairy industry. Dairy farmers and producers are committed to not only providing wholesome, nutritious dairy products, but also to being good stewards of the land and natural resources. They are embracing sustainability practices and implementing continuous improvement programs as new science-based practices emerge.

At the same time, the industry is facing a number of challenges. World population is growing and the challenges of feeding this population are numerous. Additionally, animal agriculture is being questioned for its impact on the environment. There is opportunity for the industry to implement changes and continuously improve systems to meet sustainability challenges. It is also important for the industry to determine how to quantify evidence of the impact. These problems are not unique to any one country within the dairy sector, so collaboration is key in terms of sharing best practices and key learnings.

The Dairy Sustainability Framework (DSF) was launched in 2013 to align the sector's sustainability actions and to report progress globally.<sup>26</sup>

# Dairy Sustainability Framework

The DSF is a framework, not a standard or certification program. It serves as an umbrella that the global dairy industry can operate within while maintaining the diversity of production formats that exist within the global dairy industry. The DSF aligns global priorities

to tactical regional activities through a recognized and consistent process. It connects members allowing them to share their solutions to common sustainability challenges. And the DSF focuses on continuous improvement by reporting progression over time



supported by scientific evidence. It is governed by a group of global and regional industry associations. Approximately 30% of global milk production, or 231 billion liters of milk, reports sustainability progress

through the DSE, which includes 48% of the formal milk market. The DSE tracks 11 criteria that represent three pillars of sustainability: economic, social and environmental. The criteria are:



**Greenhouse Gas Emissions**

GHG emissions across the full value chain are quantified and reduced through all economically viable mechanisms.



**Soil**

Soil quality and retention is proactively managed and enhanced to ensure optimal productivity.



**Working Conditions**

Across the dairy value chain, workers operate in a safe environment, and their rights are respected and promoted.



**Soils Nutrients**

Nutrient application is managed to minimize impacts on water and air, while maintaining and enhancing soil quality.



**Biodiversity**

Direct and indirect biodiversity risks and opportunities are understood, and strategies to maintain or enhance it are established.



**Product Safety & Quality**

The integrity and transparency of the dairy value chain is safeguarded, so as to ensure the optimal nutrition, quality, and safety of products.



**Waste**

Waste generation is minimized and, where unavoidable, waste is reused and recycled.



**Market Development**

Members along the dairy value chain are able to build economically viable businesses through the development of transparent and effective markets.



**Animal Care**

Dairy animals are treated with care, and are free from hunger and thirst, discomfort, pain, injury and disease, fear and distress, and are able to engage in relatively normal patterns of animal behavior.



**Water**

Water availability, as well as water quality, is managed responsibly throughout the dairy value chain.



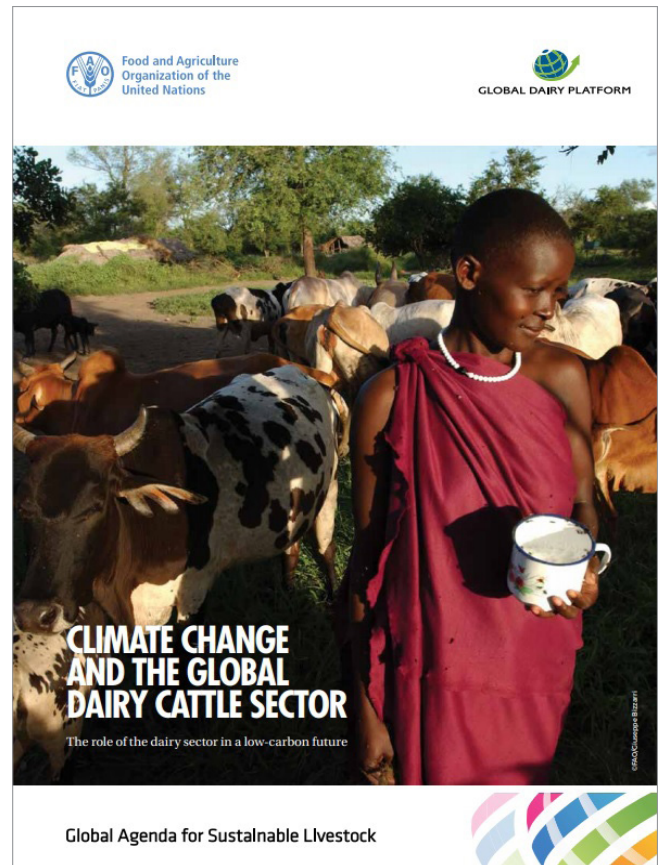
**Rural Economies**

The dairy sector contributes to the resilience and economic viability of farmers and rural communities.



## GDP Supports International Efforts

In 2019, GDP worked in collaboration with FAO to study climate change and the dairy industry. The result was a report entitled, “Climate Change and the Global Dairy Cattle Sector” that examined changes in emissions from the dairy sector between 2005-2015.<sup>27</sup> During those 10 years, global milk production increased 30% and the global dairy herd grew 11%. In the same time period, total GHG emissions by the dairy sector increased 18%. However, the emission intensity per liter of product produced (GHG per kilogram of milk) declined 11%, due to production efficiency improvements in every dairy region of the world. The report estimated that the increase in total emissions would have been 38% if the dairy sector had not implemented efficiency measures. This report will be repeated every five years.



## Every System Has the Opportunity to be More Sustainable

A variety of information and resources are available to help any production system be increasingly sustainable. In 2019, FAO released a report entitled, “Five Practical Actions Towards Low-Carbon Livestock 2030.”<sup>28</sup> This report detailed methods for boosting efficiency of livestock production, intensifying recycling efforts for a circular bioeconomy and addressing other lifestyle and policy solutions. The DSF (with funding from GDP and the NZ Government) has also worked in partnership with the Global Research Alliance for Agricultural Greenhouse Gases to examine methods for providing more food without growing GHG emissions through proactive cattle health management. The partnership yielded a knowledge base of simple methods that make economic and climate

sense to farmers. As a sustainability conscious industry, the dairy sector is identifying what it needs to do to keep the warming potential of dairy as low as possible. GHG emissions are an important criteria when evaluating emissions across the full value chain. But when it comes to measuring and reporting within this criteria, it is important to use a relevant metric.

**As a sustainability-conscious industry, dairy is identifying how to keep its warming potential as low as possible.**

## Rethinking Greenhouse Gas Emissions

Carbon dioxide ( $\text{CO}_2$ ), methane ( $\text{CH}_4$ ) and nitrous oxide ( $\text{N}_2\text{O}$ ) are the three agricultural GHGs that are measured with regards to global warming. The global warming potential of these GHGs are compared to one another using a metric abbreviated to GWP.  $\text{GWP}_{100}$  was developed in 1990 because policy makers and governments needed a way to quantify the potential impact of GHGs.  $\text{GWP}_{100}$  converts the potency of different gases to that of carbon dioxide by multiplying with a standard factor respective to the gas being evaluated. For example, if a farm produces 1,000 tons of methane within a given time period, that 1,000 tons is multiplied by a factor of 28 to find the carbon dioxide equivalent unit. The problem with the  $\text{GWP}_{100}$  metric is that it paints an incomplete picture of how the various gases warm the atmosphere.

GHGs don't just differ with respect to their potency, but also with respect to their lifespan or the time they are active in the atmosphere. Lifespan, or the half-life of GHGs, is important when measuring how a gas warms the planet. Carbon dioxide has a half-life of 1,000 years and nitrous oxide has a half-life of 110 years, making them both long-lived climate pollutants. Methane is a potent GHG, but it is a short-lived climate pollutant because it has a half-life of only 10 years.

---

## A Closer Look at Methane

Methane should not be simply compared to carbon dioxide and nitrous oxide, because it has a different impact on warming of the planet.

Methane is the primary GHG of concern with respect to agriculture and the dairy industry. Global methane emission contributions come from fossil fuel production, agriculture, biomass burning, wetlands as well as other natural emissions. Methane emissions from these sources collectively totaled approximately 560 million tons of methane per year ( $\text{Tg CH}_4/\text{yr}$ ) from 2003-2012. However, methane is also simultaneously destroyed in the atmosphere by a process called hydroxyl oxidation that converts methane to carbon dioxide within a span of 10 years. This atmospheric reaction occurs when methane combines with another molecule called the radical, which removes the hydrogen from the methane, resulting in the conversion to carbon dioxide. While methane is being produced and emitted from industry, agriculture and natural sources, it is also being destroyed and returned from the atmosphere. The rate of this atmospheric reaction can also be measured and, in the same time period from 2003-2012, 550 million tons of methane were destroyed. The net methane added to the atmosphere from all sources in this time period is 10 million tons, not 560 million tons. Methane should not be simply compared to carbon dioxide and nitrous oxide, because it has a different impact on warming of the planet.

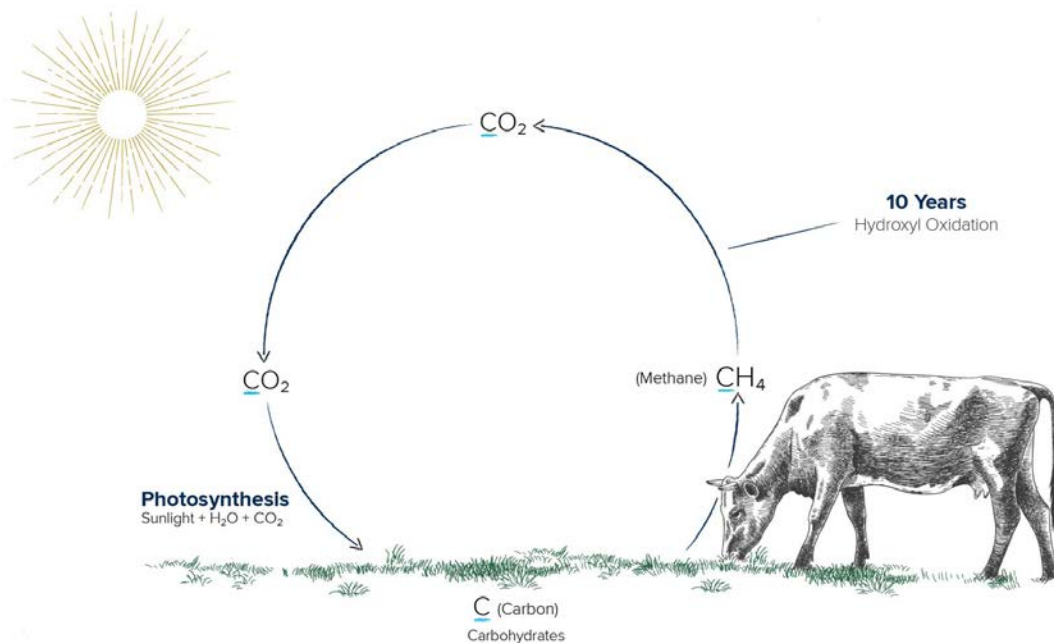
# Comparing Biogenic to Fossil Carbon Pathways

Fossil fuels are responsible for more than 80% of all GHGs. Livestock in the U.S. and other developed countries is responsible for four-to-five percent of total GHG emissions. The dairy sector in particular is responsible for two percent of all GHGs in the U.S., three percent globally. The way these GHGs are released into the atmosphere is very different. Fossil fuels are released through the fossil carbon pathway and GHGs from livestock industries are released through the cyclical biogenic carbon cycle.

The route of the biogenic carbon cycle, and the methane contained therein, begins with the process of photosynthesis. Green plants conduct photosynthesis by using sunlight to synthesize carbohydrates such as cellulose and starch from atmospheric carbon dioxide and water. A ruminant animal, such as a cow, eats the plant carbohydrates, generates methane as a result of natural digestive processes and releases this methane via belching and manure. The methane released contains carbon, but

this carbon is not newly created, it is recycled carbon that originally came from the atmospheric carbon dioxide used to make the plant carbohydrates. The methane stays in the atmosphere for 10 years (the half-life of methane) and then undergoes the previously described process of hydroxyl oxidation where the methane is converted back to carbon dioxide. Because of this cyclical pathway and the hydroxyl oxidation process, a constant herd of cattle will release a constant amount of methane and will not add additional new carbon to the atmosphere or contribute to incremental warming. A constant herd or constant methane emission source will lead to constant warming and not increased warming.

This is very different compared to the main culprit of human-caused climate change, which is the use of fossil fuels including oil, coal and gas. Hundreds of millions of years ago, plants and animals died and have been decaying buried deep below many layers of sediment in the ground. As such, the carbon contained in those plants and animals has been locked away in the earth. Over the last 70 years, fossil fuels have been extensively extracted from the ground and burned as fuel to power cars, trucks, trains, planes and ships. The process of extracting and burning these fossil fuels took the carbon that was locked in the ground and released it into the atmosphere. This has resulted in adding new carbon daily and, as such, makes fossil fuels the main culprit of human-caused GHGs and resulting climate change.



# Stock Gas Versus Flow Gas

Efforts by the industry to decrease methane emissions can have a positive impact on decreasing warming, meaning the industry can actually induce a cooling effect on the atmosphere.

Due to the long half-life of carbon dioxide, it is called a long-lived climate pollutant and is known as a stock gas. Each time carbon dioxide is emitted into the air, it adds additional carbon dioxide and accumulates over time, creating a stockpile because it stays in the environment. Methane, on the other hand, is called a flow gas and this is due to its relatively shorter half-life and the hydroxyl oxidation process. A flow gas stays constant in the atmosphere because it is destroyed at relatively the same rate of emission.<sup>29</sup> This means that the amount of methane emitted by a constant herd of cattle and the amount of methane destroyed balance each other out. If herd sizes were to increase, new additional methane would be added and this is a scenario the industry is examining in order to support farmers who want to grow and to meet the challenges of feeding a growing world population.

Researchers from the University of Oxford in England recently published data that models how changes in methane emissions are quantified. The research compares methane emissions under three conditions: methane emissions increase by 35%; methane emissions decrease slightly by 10%; and methane emissions decrease significantly by 35%. Using  $GWP_{100}$ , the researchers showed that carbon dioxide equivalent emissions of all three modeling scenarios resulted in a significant increase of carbon dioxide equivalents. The problem with this metric is that it treats methane as if it were an accumulating stock

gas and does not take into account that methane is also being destroyed via the hydroxyl oxidation process. The Oxford researchers proposed an alternative metric called  $GWP^*$  that not only converts methane to carbon dioxide equivalents based on a standard factor, but also accounts for the rate at which methane is destroyed. When the same three modeling scenarios were evaluated using  $GWP^*$ , the researchers found that increasing methane emissions by 35% was still associated with a significant increase in carbon dioxide equivalent emissions. A slight reduction in methane emissions of 10% results in no additional carbon dioxide equivalents and perhaps even a reduction. The scenario where methane emissions decrease by 35% results in a drastic reduction in carbon dioxide equivalents, where the hydroxyl oxidation process is actively pulling carbon out of the atmosphere and positively contributing to cooling the atmosphere.<sup>30</sup>



Additional modeling with GWP\* examined how atmospheric carbon dioxide and methane emissions correlate with warming. In a scenario where both carbon dioxide and methane emissions rise, warming rises also. In a scenario where carbon dioxide and methane emissions remained constant, the warming effect of carbon dioxide increased due to the stockpile effect of carbon dioxide as a stock gas. But the warming effect of methane stayed constant because methane is a flow gas. In a scenario where both carbon dioxide and methane emissions decreased, the warming effect of carbon dioxide still increased to a point and then plateaued, but the warming effect of methane decreased significantly to the point where it actually contributed to cooling by pulling carbon out of the atmosphere.<sup>31</sup>

This observation is extremely important because it demonstrates that efforts by the industry to decrease methane emissions can have a positive impact on decreasing warming, meaning the industry can actually induce a cooling effect on the atmosphere. Scientists are currently

measuring and observing GHG emissions from manure from dairy lagoons and enteric emissions from individual animals to demonstrate where progress is being made. In the state of California, for example, a new law mandates a 40% reduction of methane by the dairy industry by 2030. In order to achieve this, dairies in California have installed covered lagoons that capture biogas emissions. The biogas is converted into renewable natural gas (RNG) that is used to fuel vehicle fleets. Lawmakers and the industry have worked together to achieve this progress. Rather than creating rules implemented with regulations and fines, the farmers are incentivized and supported by government to implement positive changes. These changes have had a significant impact on methane reduction and RNG is viewed as the most carbon negative fuel source benefitting multiple stakeholders and ultimately having a positive impact on the earth. Since 2015, methane emissions in California have been reduced by 2.2 million metric tons annually, which equates to a 25% reduction achieved annually and more than halfway to the goal of a 40% reduction by 2030.

## Conclusion

As a sustainability conscious industry, the dairy sector is examining how to minimize the impact on the planet. Dairy is embracing innovative sustainability practices and implementing continuous improvement programs as new science-based practices emerge. The sector is working to better understand its impact on GHG emissions and improvement strategies are already making a measurable difference. As discussed, FAO research shows that emission intensity from the dairy sector has declined even as milk production and herd sizes increased. Farmers across the globe are making an impact and sharing best-practice advances with others.

### References

- <sup>1</sup> The Global Dairy Agenda for Action on Climate Change Progress Report 2009-2011; Available from: <https://dairysustainabilityframework.org/wp-content/uploads/2014/08/GDAAprogress2011report.pdf>
- <sup>2</sup> Dairy Sustainability Framework; Available from: <https://dairysustainabilityframework.org/>
- <sup>3</sup> FAO and GDP. 2018. Climate change and the global dairy cattle sector – The role of the dairy sector in a low-carbon future. Rome. 36 pp.; Available from: <http://www.fao.org/3/CA2929EN/ca2929en.pdf>
- <sup>4</sup> FAO. 2019. Five practical actions towards low-carbon livestock. Rome; Available from: <http://www.fao.org/3/ca7089en/CA7089EN.pdf>
- <sup>5</sup> M. Allen et al. A solution to the misrepresentations of CO<sub>2</sub>-equivalent emissions of short-lived climate pollutants under ambitious mitigation. *Climate and Atmospheric Science*; (2018)1:16
- <sup>6</sup> M. Cain et al. Net zero for agriculture. Oxford Martin Programme on Climate Pollutants. University of Oxford. 2019; Available from: [https://www.oxfordmartin.ox.ac.uk/downloads/academic/201908\\_ClimatePollutants.pdf](https://www.oxfordmartin.ox.ac.uk/downloads/academic/201908_ClimatePollutants.pdf)
- <sup>7</sup> M. Allen et al. Climate metrics for ruminant livestock. University of Oxford. 2018; Available from: <https://www.oxfordmartin.ox.ac.uk/downloads/reports/Climate-metrics-for-ruminant-livestock.pdf>

## Introduction



**Ernesto Reyes,**  
Sector Lead for Development,  
Global Dairy Platform

# Dairy's Role in Sustainable Socioeconomic Development

Agriculture and the rural economy are key sectors for supporting livelihoods and social development.

Nearly 800 million people live in rural areas and they rely on family livestock to make a living. In addition, more than 75% of the world's poor live in rural areas and they are mostly dependent on agricultural production for their subsistence. Gender inequality remains a major barrier to equitable and sustainable development, and is both an outcome and a driver of poverty, hunger and malnutrition.<sup>32</sup> The availability of jobs in rural areas for youth is an issue in regions like Africa where an estimated 720 million people, or nearly 60% of the population, are under the age of 25.<sup>33</sup>

Poverty rates in Latin America had been declining, but since 2016 rates of rural poverty and extreme rural poverty have been on the rise. The livestock sector accounts for 46% of the agricultural gross domestic product in Latin America, growing at an annual rate of

3.7%, which is higher than the average global growth rate of 2.1%. Small producers of livestock are an important part of this growth and they may hold the key to assist with sustainable socioeconomic development. In Bolivia, for example, small scale producers hold 43% of the national cattle population and in Colombia small scale producers account for 80.7% of total farms. In Ecuador, 84% of rural households own livestock (an average of 2.8 animals per household) and in Peru, 88% of the cattle population are on farms with fewer than 10 head of cattle each.<sup>34</sup> Agriculture and the rural economy are key sectors for supporting livelihoods and social development. However, all of this is happening in a global climate where livestock agriculture is under the microscope as conversations about transforming food systems to address the way food is grown, processed, distributed, consumed and wasted occur.



## Creating an Informed Dairy Development Strategy

GDP has developed a two-pronged approach to evaluate systematic evidence and measure the impact of the dairy sector on social development. The focus areas for these efforts are based on the UN Sustainable Development Goals (SDGs). The SDGs, which were adopted in 2015 by the 193 Member States of the UN, aim to end poverty and hunger while restoring and sustainably managing natural resources.<sup>35</sup> GDP evaluated the SDGs, nearly all of which interrelate with issues that impact rural agriculture, and selected seven SDG focus areas to implement the two-pronged approach. These SDGs include: no poverty, zero hunger, good health and well-being, quality education, gender equality, decent work, and economic growth and reduced inequalities.

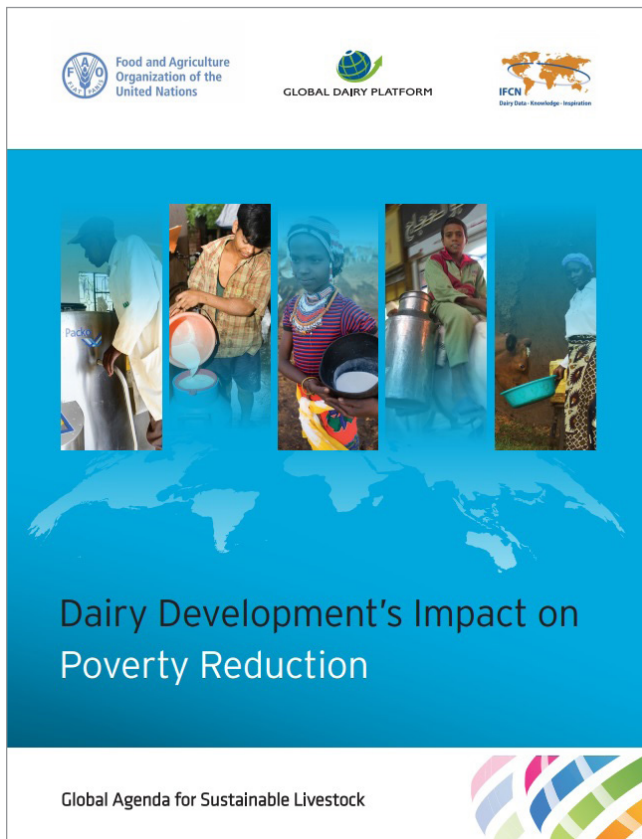
GDP's dairy development strategy is grounded in collaborations and partnerships with a variety of organizations, including FAO, the Global Agenda for Sustainable Livestock (GASL), the International Fund for Agricultural Development (IFAD) and the IFCN Dairy Research center. In 2016, GDP began work with FAO to explore common working areas. In 2017, this partnership expanded to include GASL and resulted in the development of the Action Network on Livestock for Social Development. In 2018 and 2019, GDP and FAO co-published two systematic review reports; one that examines poverty reduction and the second that explores global hunger. Beginning in 2019, using a grant from IFAD, the Dairy Impact Methodology (DIM) was created and is now being piloted in Africa and Asia.

## Systematic Reviews to Evaluate Evidence

With FAO, GDP created a methodology to examine dairy in the context of key SDGs using academic consistency and rigor. The process starts with a comprehensive review of peer-reviewed literature as well as other publicly available literature to identify studies providing quantitative information on the potential impacts of dairy. Literature database search strings are defined for the topic area and studies must be published in 2000 or after. Publications are only used in the review if they include statistical analysis and are either randomized controlled trials (RCTs) or observational studies with a comparison group. This process and the resulting report are overseen by a neutral editor. Thus far, two of these reports have been published and are available to download free of charge from FAO. The two published reports address the SDGs of poverty reduction and reducing global hunger. Reports on gender equality and economic growth are anticipated by the end of 2021.

“Dairy Development’s Impact on Poverty Reduction” evaluates the existing evidence of how dairying contributes to poverty reduction and to improving socio-economic factors.<sup>36</sup> Several studies show that total income attributable to dairy cow ownership has increased between 27% and 115%, and other studies found that improved dairy cow management resulted in substantial increases in dairy income and total household income of between 46% to 600%. Access to extension services and membership in local dairy cooperatives are directly related to increased profitability of small-holder dairy farms. Even relatively small improvements





The evidence revealed that dairy development makes a significant contribution to poverty reduction, both at the household and community level. The evidence also shows that dairy cow ownership and improvement of cow's production had a substantial positive impact on household welfare.

in performance can have significant impact on profitability. The evidence shows that families adopting dairy cows increased their cultivated land by 39%, which increases crop yield for own consumption and for selling out of farm. Another observation is that dairy cow ownership increases the demand for farm labor, which may be fulfilled within the family or by hiring labor. Observations at the community level show how dairy development results in employment generation. In Bangladesh, Ghana, Kenya and India, studies show that raw milk collection and distribution created between 20 and 40 full-time jobs per 1,000 liters of traded milk. In Assam, India and Bangladesh, milk processing generated 60 to 100 jobs per 1,000 liters produced. Studies in the U.S. and Canada indicate that 0.3 to 1.5 jobs are created for every dairy farm job. The evidence revealed that dairy development makes a significant contribution to poverty reduction, both at household and community level. The evidence also shows that dairy cow ownership and improvement of cow's production had a substantial positive impact of household welfare.

The second joint FAO/GDP report entitled, "Dairy's Impact on Reducing Global Hunger" evaluates the positive and causal relationship between ownership of dairy animals and milk/dairy consumption on child growth in low- and middle-income countries.<sup>37</sup> All of the studies provide strong evidence that household milk production increases household milk consumption, and increases in milk consumption result in improved child linear growth and reduced stunting. In all the studies with interventional trials, there was a positive association between dairy consumption and height and weight gain, both monthly and cumulative. Studies that examined cow ownership and child growth all showed that cow ownership results in decreased stunting, increased height and increased weight. Together, this systematic review, along with the previously discussed analysis, demonstrate with statistical evidence that dairy development can be considered a useful instrument in the quest to achieve poverty reduction and reducing global hunger.

# Establishing Metrics to Measure Dairy's Impact

The Dairy Impact Methodology (DIM) is a 5-year project developed in collaboration with GDP, FAO and IFAD, among others. DIM is an open-source tool that enables governments and other stakeholders assess the contribution of the dairy sector to social development, as well as estimate the returns on investment (ROI) of dairy sector growth and transformation. The project has three major phases, including examination of basic impact, what-if analysis and social ROI. Development of the methodology began in 2018 with a global task force of advisors. This group identified relevant domains and analysis dimensions that make up the DIM tool. The five DIM dimensions are production, economy, people, affordability and government. The domains within these categories are evaluated throughout the dairy value chain. For example, DIM could be used to illustrate the contribution of the dairy sector on social development of a given country by quantifying domains such as total dairy cows, annual milk production and milk supply per capita, value of the milk at market level, number of livelihoods supported, full-time jobs created and value-added tax (VAT) revenue, among others.

The DIM project is currently in phase one (out of three) of development. The framework for the tool has been created and is now being piloted in India and Rwanda to assess the basic contribution of the dairy sector to society, including economic impact, employment along the dairy value chain, affordability of milk and dairy products and government's revenue from the dairy sector. In 2022, phase two of the project will use DIM to predict the anticipated effects of dairy sector transformation, such as increasing herd size or improving productivity of cows. Phase three of the

project, anticipated in 2024, will evaluate social ROI by quantifying investments in dairy sector growth while considering contributions to the SDGs.

## Latin American Case Study

The Caquetá region of the Amazon River basin is one of three of the largest dairy regions in Columbia. It produces a significant amount of salted cheese that is used in the production of pandebono, a popular cheese bread Columbians consume every day. There are 20,000 farms representing 2 million hectares of land and 650,000 dairy cows in the region. Seventy percent of these farms are small holders. Collectively, on a daily basis, they produce 1.7 million liters of milk and 150 tons of artisan cheese. The dairy industry in this region generates \$270 million U.S. per year and 100,000 people depend on dairy farming to live. However, this region is also one of the largest hotspots for deforestation in Latin America. In 2017, deforestation destroyed 220,000 hectares of land, an increase of 67% from the previous year. The major causes of deforestation in this region are timber extraction, illicit crops and extensive cattle ranching. The unfortunate reality is that the dairy industry has had an impact on deforestation and biodiversity, but the dairy industry can also be part of the solution.

The Regional Cattle Federation has created an agreement called Zero Deforestation and Cattle Ranching Reconciliation. This agreement is a stakeholder integration program that brings together government, academia, private sector and development agencies to work together with the regional federation of cattle ranchers. The goal of the agreement is to reconvert one million hectares of land to sustainable livestock production systems. The value chain approach will be used to implement the agreement, with participation at the farm, processing and distribution levels. Production strategies include sustainable livestock pilot

projects, land release conservation agreements and farmer trainings. At the processing level, a protected designation of origin label has been created to signify artisan, local and regional cheese, butter and yogurt in order to bring added value to the farmer. A regional collective trademark and related trademarked franchise pilot programs have been developed for distributors.

Results from these measures create a business case supporting the impact of dairy sector transformation

in the Caquetá region. Supermarkets in Colombia carry products certifying farms and processors from the region and highlighting their sustainable models. The TAKAMI group, representing 14 trademarks and 28 restaurants in the largest cities in Columbia, is using local ingredients from the Caquetá region and planting a traceable tree for every home delivery service. This is an example of how social development can help the dairy sector as well as provide solutions for larger sustainability issues.



# Conclusion

The global dairy sector contributes much more than simply wholesome, nutritious foods. It plays a critical role in supporting livelihoods and food security. Livestock ownership impacts the ability to get a quality education and helps support gender equality. Until recently, concrete evidence of the impact of the dairy sector on social development was not available. But the creation of standardized tools to conduct systematic evidence reviews and data evaluation have provided quantifiable proof. It is imperative that the entire dairy sector uses this information to communicate the significant impact that livestock, particularly dairy, makes in the world. Sharing available evidence with external stakeholders, including consumers, medical professionals and journalists, is particularly important as transforming food systems is being discussed, and radical changes to the way humans produce, process and consume food are being proposed.

---

## References

- <sup>1</sup> FAO, 2016 Available from: [http://www.fao.org/fileadmin/user\\_upload/gender/UNGA-SideEvent20180926-ConceptNoteProgrammeEN.pdf](http://www.fao.org/fileadmin/user_upload/gender/UNGA-SideEvent20180926-ConceptNoteProgrammeEN.pdf)
  - <sup>2</sup> FAO, 2016 Available from: <http://www.fao.org/about/meetings/youth-in-agriculture/en/>
  - <sup>3</sup> FAO Available from: <http://www.fao.org/americas/prioridades/produccion-pecuaria/en/>
  - <sup>4</sup> United Nations Sustainable Development Goals; Available from: <https://sdgs.un.org/goals>
  - <sup>5</sup> FAO, GDP and IFCN. 2018. Dairy Development's Impact on Poverty Reduction. Chicago, Illinois, USA; Available from: <http://www.fao.org/3/CA0289EN/ca0289en.pdf>
  - <sup>6</sup> FAO, GDP and IFCN. 2020. Dairy's Impact on Reducing Global Hungry. Chicago, Illinois, USA; Available from: <http://www.fao.org/3/ca7500en/CA7500EN.pdf>
-

## Introduction



**Jamie Jonker, PhD,**  
Vice President, Sustainability  
and Scientific Affairs, National  
Milk Producers Federation



**Emily Yeiser Stepp,**  
Vice President, Farmers Assuring  
Responsible Management, National  
Milk Producers Federation

# A Framework for a Standardized Animal Care Program

Treating animals well and making a consistent impact across the marketplace is important not just in the U.S., but around the world as well.

Animal care is of utmost importance to the dairy industry because healthy, well-cared for cows provide safe and wholesome milk and other dairy products to consumers around the world. Animal care of the highest standard is important to farmers, dairy co-ops, processors, suppliers, retailers and government. Additionally, consumers are more interested in their food today than ever before. They want to know how it is produced and who is producing it, that it is safe, how animals are treated and the impact on the planet. The National Dairy FARM Program: Farmers Assuring Responsible Management™ (FARM Program) is an industry-wide social responsibility program that provides assurances that U.S. dairy farmers both value and act upon consumer concerns related to animal care and also signals confidence to consumers that their dairy products are produced in accordance with the highest level of science-based animal care. Treating animals well and making a consistent impact across the marketplace is important not just in the U.S., but around the world as well. The FARM Program demonstrates key learnings and models implementation possibilities for the global dairy industry.

# About the National Dairy FARM Animal Care Program

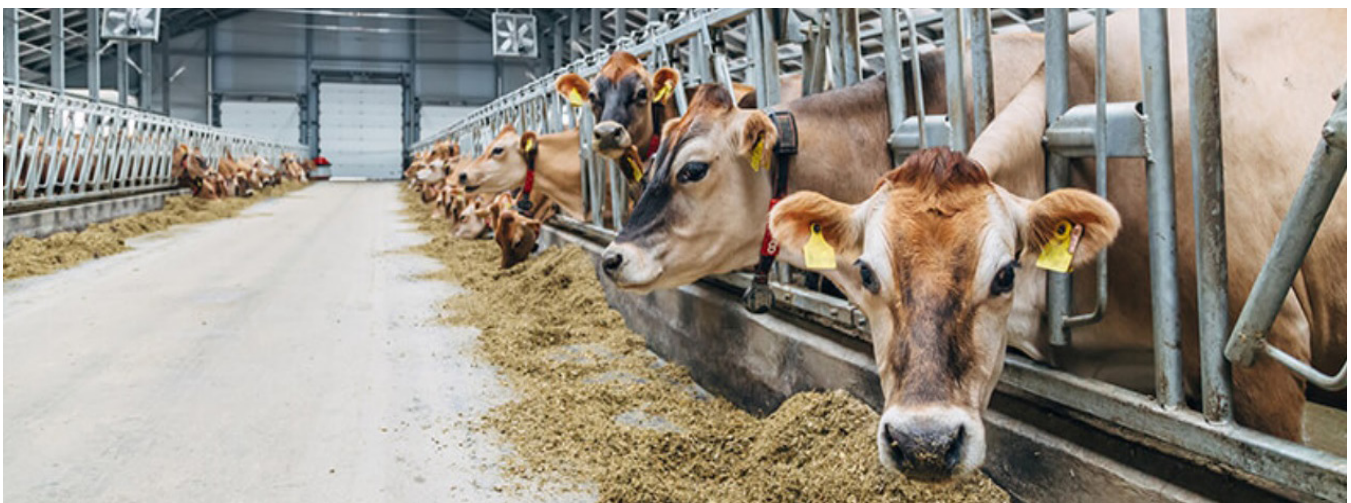
As of August 2020, participation in the National Dairy FARM Program includes approximately 130 dairy co-ops and processors. In the U.S., that represents approximately 98% of the U.S. domestic milk supply and includes dairy farmers in 49 of 50 states (34,000 dairy farm participants).

The FARM Program was created by the National Milk Producers Federation (NMPF) in partnership with the U.S. levy program Dairy Management, Inc. (DMI) and is open to all U.S. dairy farmers, co-ops and processors.<sup>38</sup> The Innovation Center for U.S. Dairy coordinated alignment behind the FARM Program as the industry-wide social responsibility program for on-farm production. The goal is to assure consumers and customers that dairy farmers care for their animals, workforce, and land in a humane and

ethical manner. The program not only focuses on animal care and well-being, but it also encompasses numerous other aspects of social responsibility related to dairy farm production. It identifies areas of risk and highest liability in terms of consumer perception; areas where, even when standards are executed perfectly, can be perceived negatively by the general public.

At the core of the mission of the FARM Program are science-driven standards and best practices with a commitment to continuous improvement. The best practices and standards that make up the FARM Program are required to have a scientific and technical basis, and these standards are reviewed every three years to ensure the program is keeping up with the latest science-based recommendations. These data-driven procedures are what allow the program to empower dairy farmers, cooperatives and processors to assure consumers and customers that dairy farmers manage their animals, workforce and land in a responsible manner.

There is a long-standing, proud history within the dairy farmer community about the importance of caring for animals, stewardship of the land and employee well-being. The FARM Program formally started in 2009, but the U.S. dairy industry's commitment to on-farm socially responsible production goes back much further. The roots of the FARM Program started approximately 30 years ago with the creation of the first edition of the Milk and Dairy Beef Drug Residue Avoidance Manual. This manual has evolved into the present day FARM Antibiotic Stewardship program area.



In the mid-1990s, NMPE, in collaboration with the Dairy Quality Assurance (DQA) Center, developed the Caring for Dairy Animals Technical Reference Guide. This guide was updated four times over the following 13 years and was the true beginning of the FARM Animal Care program. Today the National Dairy FARM Program includes four program pillars: Animal Care, Antibiotic Stewardship, Environmental Stewardship and Workforce Development.

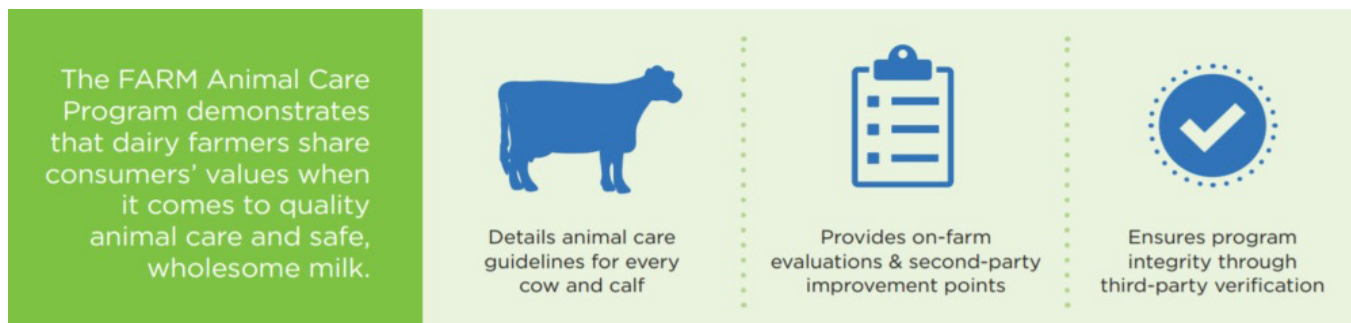
The Animal Care pillar has three components. The first is best management practice manuals including the Animal Care Reference Manual<sup>39</sup> and the Milk & Dairy Beef Drug Residue Prevention Reference Manual.<sup>40</sup> These science-based manuals provide a comprehensive set of expectations and are educational tools and resources for farm managers as they develop on-farm best management practices. All dairy farmers participating in the FARM Program are encouraged to review standards annually with their employees, veterinarians and other management team members to determine how to apply the best practices on their individual farms.

The second component is second party farm evaluations conducted by trained and certified evaluators. These evaluations follow a standardized protocol and evaluation rubric based upon the current version of the FARM Program standards and best practices. Evaluations take place at least once every three years and include an opening interview with the farm owner or manager, a review of written protocols and verification that the protocols have been reviewed by their veterinarian and implemented as intended, observations of animals and the facility, opportunities for conversations with employees and a closing interview with the farm owner or manager. The result of the evaluation includes any necessary action plans that may be needed to meet minimum criteria

as well as longer-term continuous improvement plans. Corrective action plans include immediate corrections that must be addressed within 48 hours, mandatory corrections that must be addressed within 9 months and areas for continuous improvement to address consistently over the three-year period between evaluations.

The third component of the FARM Animal Care program is a third party verification process that helps demonstrate program integrity by objectively evaluating the consistency and accuracy of farm evaluators and the program itself. This verification process is conducted by third party verifiers at facilities from a random sample of all eligible facilities that were evaluated by second<sup>d</sup> party evaluators in the previous six months. These third party verifications both evaluate the integrity of the implementation of the program and provide feedback to assess the knowledge, accuracy and consistency of the second party evaluators.

As of August 2020, participation in the National Dairy FARM Program includes approximately 130 dairy co-ops and processors. In the U.S., that represents approximately 98% of the U.S. domestic milk supply and includes dairy farmers in 49 of 50 states (34,000 dairy farm participants). More than 60,000 second party evaluations have been conducted since the inception of the program in 2009, and there are about 350 certified evaluators who conduct the second party evaluations. The FARM Program has become the predominant animal welfare program for the U.S. dairy industry, while also being recognized as the first International Standards Organization (ISO) accredited livestock animal care program in the world. The continuous improvement commitment of the program allows it to continue to meet the needs of U.S. dairy farmers, cooperatives, processors and customers in the U.S. and around the world.



# Evaluator Standards & Training

Perhaps the most critical and trusted resource of the National Dairy FARM Animal Care program are the second party evaluators who complete on farm evaluations. The evaluators report how well individual dairy farms implement the program and they collect the data that dairy cooperatives and processors use to demonstrate how their milk supply chain is meeting commitments to animal care. The rigor of the evaluators ensures the precision of the quality assurance program and

helps assure stakeholders of the quality of the information that is coming out of the program.

It is essential that program evaluators are consistent in their implementation of the program to ensure that all participants receive equal treatment in their reviews. There is an application process and annual certification program that evaluators must successfully complete. The qualities of a good evaluator candidate include robust knowledge and experience with animal care and interaction, the ability to see both details and the bigger picture, particularly within the context of day-to-day farm life and the ability to communicate well with others. Approved applicants attend program-hosted training and need to pass competency exams. Evaluators are also shadowed by a certified trainer at least once a year. Failing to maintain program standards is grounds for evaluators to be dismissed.





# Development & Continuous Improvement of the FARM Animal Care Program

Dairy farmer involvement in the development of the standards of the FARM Animal Care program is highly important. The program is reevaluated at least once every three years, creating a cadence for identifying high priority areas for continuous improvement throughout the supply chain. There is a very structured governance system in place that includes both experts and farmers, which allows for numerous opportunities to provide input into the development of standards and for the application of the program. The FARM Program Farmer Advisory Council provides recommendations for the program's standards and includes nearly 20 dairy farmers from around the country, representing both small and large as well as organic and conventional production facilities. The standards, rationale, and accountability measures are then reviewed and revised by the FARM Animal Care Technical Writing Group, made up of dairy producers, veterinarians, animal scientists and industry personnel. The NMPF Animal Health and Well-Being Committee then reviews and provides feedback to any proposed changes. The proposed standards are made available for an open comment period, where any industry stakeholder, including dairy farmers, anyone representing the dairy value chain and allied industries and even members of the public are welcome to provide feedback. In 2019, during the revision process for the most recent version of the Animal Care program, more than 370 unique comments were received. Following completion of the comment period, FARM staff, the Technical Writing Group and the NMPF Animal

Health and Well-Being Committee considers revisions based upon the comments and presents final proposed standards to the NMPF Board of Directors for approval.

When the National Dairy FARM Program began in 2009, participation in second party evaluations was voluntary. Since the program was entirely new, it was critical for dairy farmers, dairy cooperatives and processors to have time to understand the program and how it operated. Version 2.0 of the program covered the years from 2013-2016 and, at that time, participation in evaluations became mandatory for participating cooperatives and processors and all of their supplying dairy farms. This time period was when voluntary action plans for continuous improvement were implemented, and when the issue of phasing out tail docking was addressed (with a goal of eliminating the practice by 2022). In the 2017-2019 Version 3.0 of the program, greater accountability was emphasized in the form of minimum-participation requirements designed around critical control points and mandatory corrective action plans. A probation and suspension process was also added at that time, i.e., a farm could be placed on probation or suspended from the program if it was unable or unwilling to meet the requirements of the corrective action plan.

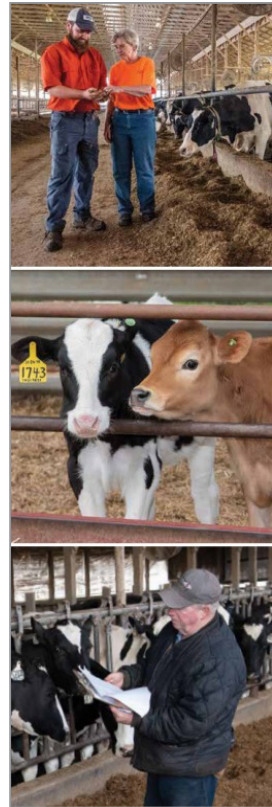
**Dairy farmer involvement in the development of the standards of the FARM Animal Care program is highly important.**

# Animal Care Version 4.0 and New Resources

Version 4.0 of the Animal Care program, launched in January 2020, is the most recent iteration of the program. Accountability was increased with additional minimum criteria for mandatory corrective action plans. Timelines were shortened for making corrections to meet the mandatory corrective action plans. Implementation oversight of the program was also increased.

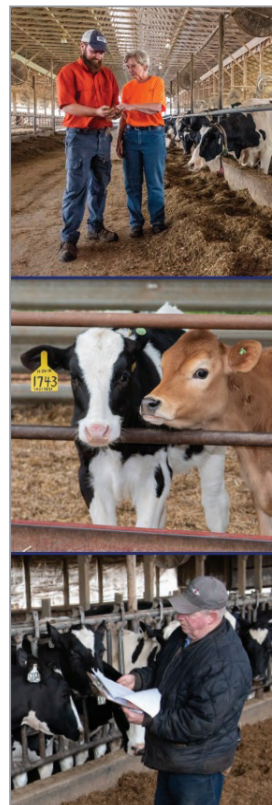
Specifically, Version 4.0 maintains the importance of veterinary care supported by documentation between the veterinarian of record as well as the farmer on an annual basis, in addition to an annual review of the comprehensive herd health plan. These plans demonstrate proactive prioritization of animal health and disease prevention before treatment is necessary, as well as documentation of treatment when needed. The fourth iteration of the program also more robustly identifies how practices related to calves, non-ambulatory animals and euthanasia are carried out on farms, and puts more emphasis on the necessity for continuing education and training of any individuals that have animal care responsibilities specifically related to the previously mentioned priority areas. Another priority standard revised in Version 4.0 is the fitness of transport protocol for dairy animals transitioning to beef animals, which was made in cooperation with beef industry counterparts. The latest version also bolsters expectations around pain management for disbudding, more specifically defines expectations regarding written drug treatment records, adds criteria for completion of continuing education and recognizes any ongoing practice of prohibited tail docking as an immediate corrective action.

Producer and participant resources are the foundation for education and outreach, which help bring the program to life. These resources are available online and as hardcopy materials in both English and Spanish. One relatively



## Animal Care

Reference Manual Version 4  
2020-2022



## FARM Animal Care Evaluation Preparation Guide

2020-2022  
Version 4

new resource is the latest version of the FARM Animal Care Evaluation Preparation Guide that provides a variety of checklists to help producers feel prepared for an evaluation.<sup>41</sup> Another is a poster created in collaboration with National Beef Quality Assurance entitled, “Considerations When Transporting Dairy Animals”.<sup>42</sup> New evaluator resources are also available, including an evaluator pocket guide and evaluator handbook.

One of the most successful resources developed in 2020 is a 10-minute educational video entitled, “I Care.” Developed as a partnership between the FARM Program, Elanco, Alltech and the Animal Agriculture Alliance,<sup>43</sup> the video illustrates the important role of dairy employees in the care of animals. It shares the intent of undercover animal activist tactics and encourages employees to alert supervisors when necessary. Completion of this resource also provides certificates of completion for participants.

Program implementation and continuous improvement relies on a network of stakeholders and trusted advisors.

Since veterinarians are the primary trusted advisor on the farm and, from a consumer perspective, the experts that are most trusted regarding animal care and animal welfare, engaging the veterinarian community is foundational to the success of implementation. Methods for engaging the veterinarian community include trade shows, workshops, webinars, podcasts and other educational opportunities. Organizations such as pharmaceutical companies, animal nutritional companies and equipment manufacturers are potential partners to develop joint resources and share information. Having a close and collaborative relationship with the beef community is also an opportunity for successful program implementation. The most recent iteration of the FARM Animal Care program provides equivalency with the Beef Quality Assurance (BQA) program, so any dairy farm that is certified under the FARM Program also carries a BQA certification. And, lastly, the partnership between the National Dairy FARM Program and DMI allows the program to identify and engage important partners in the retailer brand space.



# Conclusion

Animal care is a year-round commitment for dairy farm owners, managers and their employees. A science-based, industry-wide social responsibility effort such as the U.S. National Dairy FARM Program creates a framework for on-farm animal care and fosters a culture of continuous improvement. However, it is not a replacement for supervision and management of employees and, if the program is not embraced by the farm owner, managers and employees, it cannot create a culture of continuous improvement. It is important that programs of this nature be facility- and size-neutral, implementable on all scales of dairy farms in a variety of climates and geographic regions. One of the biggest keys to success is an open and transparent communications process between all stakeholders in the program. Even the most advanced, science-based standards alone cannot create a successful program without open dialog between all stakeholders. These programs help illustrate what modern dairy production looks like, allowing an opportunity to transparently connect with customers and consumers in a meaningful way. This type of program cannot eliminate threats to consumer trust, but it can provide a framework for regaining trust in the event of an unforeseen situation. This type of program could expand well beyond the borders of the U.S. and could be developed and implemented in many other parts of the world.

## References

- <sup>1</sup> National Dairy FARM Program; Available from: <https://nationaldairyfarm.com/>
- <sup>2</sup> Animal Care Reference Manual 4; Available from: <https://nationaldairyfarm.com/farm-animal-care-version-4-0/>
- <sup>3</sup> Milk & Dairy Beef Drug Residue Prevention Reference Manual 2020; Available from: <https://nationaldairyfarm.com/wp-content/uploads/2018/10/DRM2020-Web.pdf>
- <sup>4</sup> FARM Animal Care Evaluation Preparation Guide Version 4.0; Available from: <https://nationaldairyfarm.com/producer-resources/farm-animal-care-evaluation-prep/>
- <sup>5</sup> Considerations When Transporting Dairy Animals; Available from: <https://nationaldairyfarm.com/product/consideration-when-transporting-dairy-animals/>
- <sup>6</sup> I Care – A Mi Si Me Importa; Available from: <https://nationaldairyfarm.com/icare-video/>



### Inter-American Institute for Cooperation on Agriculture

Headquarters, P.O. Box 55-2200,  
San José, Vázquez de Coronado,  
San Isidro 11101 - Costa Rica

Telephone: (+506) 2216 0222 • Fax: (+506) 2216 0233  
E-mail: [iicahq@iica.int](mailto:iicahq@iica.int) • Web Site: [www.iica.int](http://www.iica.int)

