An Investor Brief on Impacts that Drive Business Risks: DAIRY

ENGAGE the CHAIN
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This brief provides a summary of the main environmental and social factors that affect dairy production worldwide; however, it spotlights key players in the U.S. value chain, and provides examples of actions being taken by companies operating or headquartered in the U.S.

**KEY TAKEAWAYS**

- Global demand for dairy is expected to increase by approximately 60 percent by 2050, driven by population growth and rising incomes.

- The greenhouse gas emissions from dairy production are significant. In the U.S., the dairy industry accounts for around 2 percent of the country's total GHG emissions. More than half of dairy's GHG emissions are generated from crop production for animal feed, from methane produced by cows digesting their feed and from their manure.

- Dairy production can contribute to water pollution when manure and synthetic fertilizer (used for crops to feed cows) are not managed properly.

- Producing milk uses a lot of water and water scarcity poses risks to dairy production. In the U.S., the dairy industry accounts for 5 percent of total water withdrawal, over 90 percent of which is used to produce feed for cows.

- Investors should address risks in the dairy supply chain through direct engagement with their portfolio companies and support of relevant policies and multi-stakeholder collaborations. Effective implementation of a company's policies requires promoting commodity traceability and having a clear approach to supplier engagement, verification and disclosure of progress.

**COMMODITY OVERVIEW**

Processed Milk, Butter, Cheese and Curd Dominate the Global Dairy Market\(^1\)

In the U.S., the three biggest dairy product segments (based on revenue) are cheese (about 40 percent), milk and milk products (35 percent) and dry and condensed milk products (20 percent).\(^2\)

Other common products sold in the U.S. include butter, ice cream, cottage cheese and yogurt.\(^3\)

Given the importance of freshness, consumers primarily buy domestically raised milk—less than 10 percent of global milk output is traded globally.\(^4\)
GLOBAL PRODUCTION DATA

The U.S. and India are the Two Biggest Producers of Fresh Milk
(though together they account for only 25 percent of total production).

TOP FIVE PRODUCTION REGIONS

- **14%** U.S.
- **11%** India
- **6%** China
- **5%** Brazil
- **5%** Germany

Other: 59%

661 MILLION METRIC TONS

Average global production of whole fresh milk, 2014-2016

$287 BILLION

Global production value of whole fresh milk

<10 PERCENT

Proportion of global milk output traded

Rising Global Dairy Consumption Drives Demand

Global demand for dairy is expected to increase (by approximately 60 percent by 2050) in large part due to population growth, rising incomes, urbanization and the westernization of diets in countries such as China and India. There are approximately 270 million dairy cows worldwide. In 2017, 811 million metric tons of milk were produced, and worldwide, per capital annual consumption of dairy products (fresh milk equivalent basis, not including butter), is expected to increase on a per capita basis by over one-third by 2067.
THE DAIRY VALUE CHAIN

Some Segments in the U.S. Dairy Products Value Chain are Highly Concentrated

<table>
<thead>
<tr>
<th>STAGE OF VALUE CHAIN</th>
<th>SIMPLIFIED DAIRY VALUE CHAIN</th>
<th>SOME KEY COMPANIES IN U.S. FOOD VALUE CHAIN</th>
</tr>
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<tbody>
<tr>
<td>AGRICULTURAL PRODUCTION</td>
<td>MILK PRODUCTION (AND PRODUCTION OF ANIMAL FEED)</td>
<td>Feed Companies</td>
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<td></td>
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<td>ADM, Alltech, Cargill, Purina Animal Nutrition/Land O'Lakes, Tyson Foods</td>
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<tr>
<td>TRANSPORT, PROCESSING, PACKAGING &amp; DISTRIBUTION</td>
<td>MILK &amp; DAIRY PROCESSING FACILITIES</td>
<td>Milk &amp; Dairy Processors</td>
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<td></td>
<td></td>
<td>California Dairies, Dairy Farmers of America, Danone USA, Dean Foods, Great Lakes Cheese, Kraft Heinz, Kroger, Land O'Lakes, Nestle USA, Schrieber Foods</td>
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<tr>
<td>RETAIL &amp; CONSUMPTION</td>
<td>FOOD RETAILERS &amp; OTHER OUTLETS</td>
<td>Restaurants</td>
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<td></td>
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<td>McDonald’s, Restaurant Brands Int’l, Starbucks, Yum! Brands (Taco Bell, Pizza Hut, KFC)</td>
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<tr>
<td></td>
<td></td>
<td>Retailers</td>
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<tr>
<td></td>
<td></td>
<td>Ahold Delhaize USA, Albertsons Companies, Kroger, Walmart</td>
</tr>
</tbody>
</table>
FEED COMPANIES

Feed rations for U.S. dairy cows are made up of around 33 ingredients though the majority are corn (including a by-product called distiller's grains) and alfalfa. About 35 percent of feed is grown by the dairy farmers themselves and the rest is purchased from other farmers, commodity markets and feed companies. The five largest U.S. animal feed producers are Cargill (privately held), Purina Animal Nutrition (subsidiary of Land O’ Lakes, a member cooperative), Tyson Foods, Alltech (privately held) and Archer Daniels Midland (ADM). Collectively, these companies produce approximately 50 million metric tons of feed annually.

DAIRY FARMERS

The vast majority of U.S. dairy farms are family-owned and managed and are often members of producer cooperatives. In 2018, there were over 41,000 dairy farms.

MILK AND DAIRY PROCESSORS

There are more than 1,000 U.S. processing plants that turn raw milk into milk and dairy products, but these operations are highly concentrated. For example, the 50 largest fluid milk processors account for about 90 percent of segment revenue. The 10 largest processors operating in the U.S. are listed in the table below. Of these, five are publicly held with three of these headquartered in the U.S. (Dean Foods, Kraft Heinz and Kroger). The other five are cooperatives or privately held.

RESTAURANTS AND RETAILERS

Retailers and restaurants play an important role in the dairy supply chain. These companies can indirectly influence production practices and supplier standards within their supply chain. Moreover, they are sensitive to external pressures as well as responsive to market trends and consumer preferences. Restaurants use high volumes of milk, cheese and cream for meals and beverages. The four largest quick-service and fast-casual restaurants in the U.S. are McDonald’s, Yum! Brands (Taco Bell, Pizza Hut, KFC), Starbucks and Restaurant Brands International. The four largest supermarkets in the U.S. are Walmart, Kroger, Albertsons and Ahold Delhaize USA.

LARGEST U.S.-BASED DAIRY PROCESSORS, 2018

<table>
<thead>
<tr>
<th>RANK</th>
<th>COMPANY</th>
<th>TYPE OF OWNERSHIP</th>
<th>REVENUE*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nestle USA</td>
<td>Publicly Traded Company (CH)</td>
<td>14,079.0</td>
</tr>
<tr>
<td>2</td>
<td>Dean Foods</td>
<td>Publicly Traded Company</td>
<td>7,795.0</td>
</tr>
<tr>
<td>3</td>
<td>Danone USA</td>
<td>Publicly Traded Company (FR)</td>
<td>6,000.0</td>
</tr>
<tr>
<td>4</td>
<td>Kraft Heinz</td>
<td>Publicly Traded Company</td>
<td>5,482.0</td>
</tr>
<tr>
<td>5</td>
<td>Schreiber Foods</td>
<td>Privately Held Company</td>
<td>5,000.0</td>
</tr>
<tr>
<td>6</td>
<td>Dairy Farmers of America</td>
<td>Cooperative</td>
<td>4,082.8</td>
</tr>
<tr>
<td>7</td>
<td>Land O’Lakes</td>
<td>Cooperative</td>
<td>3,900.0</td>
</tr>
<tr>
<td>8</td>
<td>Kroger</td>
<td>Publicly Traded Company</td>
<td>3,581.0</td>
</tr>
<tr>
<td>9</td>
<td>California Dairies</td>
<td>Cooperative</td>
<td>3,201.9</td>
</tr>
<tr>
<td>10</td>
<td>Great Lakes Cheese</td>
<td>Privately Held Company</td>
<td>3,100.0</td>
</tr>
</tbody>
</table>

*Revenue is in USD (000,000)
U.S. milk production has steadily increased over the past several decades. At the same time, the number of dairy operations has declined and the number of cows per operation has risen. In 2017, there were 9.4 million dairy cows in the U.S., producing over 214 billion pounds of milk. While milk is produced in all 50 states, the top five dairy states—California, Wisconsin, New York, Idaho and Pennsylvania—produce more than half. The state of California alone accounts for about 20 percent of production. The farm value of milk production is significant, equaling that of corn production, and the industry provides a significant source of revenue and jobs in several states. The Innovation Center for U.S. Dairy summarized the national environmental footprint of U.S. dairy in U.S. Dairy’s Environmental Footprint: A Summary of Findings, 2008-2012, noting that:

- GHG emissions of the entire dairy industry total approximately 137 million metric tons CO₂ eq per annum, or about 2 percent of total U.S. GHG emissions.
- More than half of the dairy industry’s GHG emissions arise during on-farm activities and from feed production. The visual below details where in the value chain these emissions occur across several products.
- The dairy industry accounts for approximately 5 percent of U.S. water withdrawals (excluding thermal power), with more than 90 percent of this use linked to growing feed for cows (irrigation).

### U.S. SPOTLIGHT

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**U.S. DAIRY CARBON FOOTPRINT — ALL PRODUCTS**

Total emissions = 137 MMT (The entire dairy industry – farm to manufacturer’s gate - contributes approximately 2% of total U.S. GHG emissions)

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**FLUID MILK**

- 35 MMT CO₂e 0.5% of US Total
- On-Farm Emissions: 13%
- Feed Production: 51%
- Processing, Distribution: 14%
- Retail: 11%
- Consumption: 11%
- Retail + Consumption: 5%

**CHEESE & WHEY**

- 54 MMT CO₂e 0.5% of US Total
- Feed Production: 26%
- Feed + On-Farm: 13%
- Processing, Distribution: 6%
- Retail: 4%
- Consumption: 41%
- Retail + Consumption: 19%

**OTHER DAIRY**

- 48 MMT CO₂e 0.5% of US Total
- Whey: 68%


Globally, the environmental and social issues linked to dairy production include GHG emissions, water pollution and groundwater depletion. The scale of the impacts depends on the practices used by individual dairy farmers and feed growers, as well as regional and local conditions.

**REGIONAL CONTEXT MATTERS**

*When assessing risks to U.S. companies, it is important to keep in mind that most milk and dairy products are produced and consumed in the U.S. However, the impacts from dairy cows raised outside the U.S. are also relevant to U.S.-based companies that operate in other markets. U.S.-headquartered dairy processors operate globally and U.S. imports may include dairy produced elsewhere.*
1. DAIRY COWS AND THEIR MANURE GENERATE SIGNIFICANT AMOUNTS OF GHG EMISSIONS

Dairy production has a significant impact on climate change. Dairy cows contribute directly to greenhouse gas emissions when they digest their feed and produce manure. Fertilizers and energy used to grow feed also contribute to greenhouse gas emissions.\(^{30}\)

More than half of the global emissions from the livestock sector are related to beef and cattle milk production (dairy cows account for 20 percent; beef for 41 percent). Globally, milk produced by dairy cows generates 1.42 gigatons of CO\(_2\) eq per annum, representing approximately 2.9 percent of human-induced GHG emissions.\(^{31}\) When the emissions of meat produced from dairy related culled and fattened animals are included, this number rises to approximately 4 percent.\(^{32}\)

When calculating a greenhouse gas footprint for a particular operation, it is important to consider how the dairy cows are raised, since changes in their feed composition and other management practices considerably affect the amount and type of greenhouse gas emissions generated.\(^{33}\)

2. POOR HANDLING OF MANURE AND FERTILIZERS CAN POLLUTE LOCAL WATER RESOURCES

Dairy operations can significantly contribute to water pollution when manure and fertilizers for feed crops are poorly managed or used. The nitrogen and phosphorus nutrients from manure storage, handling and land application, and from synthetic fertilizers used to grow crops, can run off fields to surface water or leach into groundwater, contaminating local drinking water supplies and posing serious human health risks.

These issues are particularly relevant in places such as California, where the nearly 2 million dairy cows produce 65 billion pounds of manure each year. The resulting nitrates from dairy farms are a significant contributor to groundwater contamination in California and can pollute water sources on which millions of people depend.\(^{34}\)

Companies that fail to understand and manage impacts related to water pollution may face operational, reputational and regulatory risks (see more at Ceres’ Feeding Ourselves Thirsty). For example, in Ohio, a toxic algae bloom on Lake Erie in 2014 caused primarily by agricultural runoff poisoned the water supply for nearly half a million people in Toledo. In response, the governor of Ohio signed legislation requiring dairies and livestock producers to change the way they handle manure.\(^{35}\)

Runoff contributes to "dead zones,"\(^{36}\) areas of water bodies where aquatic life cannot survive because of low oxygen levels. In the Gulf of Mexico (into which runoff from production in the Mississippi River watershed flows), the National Oceanic and Atmospheric Administration (NOAA) reported that the dead zone in July 2017 was the largest ever measured, covering an area about the size of New Jersey.\(^{37}\) The economic impact is significant with NOAA estimating that the harmful algae blooms causing the dead zones cost the seafood, restaurant and tourism industries about $82 million every year.\(^{38}\)

To minimize pollution worldwide, dairy producers need robust nutrient management plans as well as the basic infrastructure and tools for tracking nutrient flows. They also need innovative technology to more precisely apply manure nutrients and clear options for exporting excess manure.\(^{39}\)

FINANCIAL IMPACTS

A number of dairy farmers have been fined for contributing to water pollution and harming aquatic ecosystems.

In Iowa, one dairy operator was fined $24,000 in 2018 when manure leached from his facility killing more than 60,000 fish.\(^{40}\)

In 2017, another farmer was found by the U.S. Department of Justice to have violated the Clean Water Act multiple times and fined $160,000.\(^{41}\) Dairy operators in Wisconsin, Washington and other states have also faced financial penalties from polluting local waterways.
3. HIGH WATER DEMAND FOR ANIMAL FEED CONTRIBUTES TO DROUGHT VULNERABILITY AND GROUNDWATER DEPLETION

Milk production typically requires a lot of water to grow the feed, nourish cows, manage manure and process dairy products. Since pasture and crops used as feed could have significant water demands, efficient use of water to produce these commodities is important, especially if the feed is grown in areas of water stress.\(^42\)

In the U.S., among the potential feed crops (corn, alfalfa, other hay, pastureland, soybeans), corn and alfalfa use the largest amounts of irrigation water. Corn-based feed is particularly vulnerable since 35 percent of global production is grown in regions of high or extremely high water stress, meaning that existing water supplies face intense competition.\(^43\) In California, for example, dairy cows eat a lot of locally grown corn silage. Most of this corn is grown using flood irrigation, which relies on highly stressed surface and groundwater resources (and also results in the over-application of water and nutrients, increasing the risk of nitrate leaching to groundwater).

Companies that fail to understand and manage impacts related to the water demand associated with dairy production may face operational, reputational and regulatory risks (see more at Ceres’ *Feeding Ourselves Thirsty*).\(^44\)\(^45\)

<table>
<thead>
<tr>
<th>Water Requirement</th>
<th>Dairy Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>949 liters of water</td>
<td>1 liter of milk</td>
</tr>
<tr>
<td>4,703 liters of water</td>
<td>1 kg of cheese</td>
</tr>
</tbody>
</table>

(Weighted Global Average)\(^46\)\(^47\)

4. DAIRY FARMING AND ANIMAL FEED PRODUCTION CAN LEAD TO THE LOSS OF ECOLOGICALLY IMPORTANT AREAS AND LEAD TO SOIL EROSION

Poor dairy farming and animal feed production practices can damage ecologically important areas as prairies, wetlands and forests are converted for pasture and crop production. Land conversion is a particular concern in South America, since land is often converted to farms to grow commodity crops such as soybeans and corn for export to Europe and China as meal to feed dairy herds. For example, in the Chaco mixed grass and woodlands of Paraguay and Argentina, between 1976 and 2011, more than 29 million acres of habitat were converted largely first for production of beef and then soy, a feed source for livestock.\(^48\) The U.S. dairy sector buys corn and soy from South America; the majority of feed crops for U.S. dairies are grown in the U.S.\(^49\)

Overgrazing, soil compaction from cow’s hooves and poor agricultural practices can lead to loss of topsoil and organic matter, which can take decades or even centuries to replace. Conversely, dairy cows can contribute to healthy habitats and soils through well-managed grazing and manure applications, which can help to control flooding, protect wetlands, conserve open spaces, sequester carbon and revive degraded lands.\(^49\) Companies that fail to understand and manage impacts related to land conversion and soil health may face market, litigation and reputational risks (see more at Ceres’ *Agricultural Supply Chains as a Driver of Financial Risks*).
5. ANIMAL HEALTH AND WELFARE Issues Spur Consumer and Public Health Concerns

In addition to environmental issues aforementioned, several dairy-related animal health and welfare issues can create major reputational and regulatory risks for companies:

• Poor care for dairy cows can result in lameness and mastitis and not only decrease the productivity of cows due to stress and ill health, but also lead to increased greenhouse gas emissions. A majority of consumers care about animal welfare, according to surveys in Europe and North America, which creates a risk of contracts by corporate customers being terminated to meet consumer pressure. In addition to the possible reputational risk, issues related to animal welfare link to food safety and drug use and are therefore critical for companies to take into account as part of a comprehensive operational risk management strategy.

• Routine, nontherapeutic use of antibiotics in food animal production is contributing to a growing crisis of antibiotic-resistant infections in humans, prompting regulatory action to limit the use of medically important human antibiotics for growth promotion in animals. In the U.S., for example, 75 percent of all antibiotics are given to farmed animals. The misuse of these drugs for nontherapeutic purposes poses a business risk not only from a reputational perspective but also with respect to emerging regulatory and trade restrictions.

• The use of the artificial growth hormone known as recombinant bovine somatotropin (rBST), or recombinant bovine growth hormone (rBGH), may contribute to consumer concern and therefore pose reputational risk. Some companies publish policies on their use of rBST in the production of milk products they sell or provide labels on products stating that no rBST was used in milk production.

6. HEAVY RELIANCE ON MIGRANT LABOR POSES MARKET RISKS TO COMPANIES

Migrant workers are essential to the dairy industry in a number of countries (e.g., the U.S. and New Zealand). In the U.S., a 2016 survey reported that one-third of all dairy farms (producing nearly 80 percent of the nation’s milk) employ foreign-born workers, but seven in ten survey respondents reported having only moderate confidence in the employment documents of those workers. This study also estimated that a complete loss of immigrant labor could cause the loss of one-in-six dairy farms and cost the U.S. economy more than $32 billion.

Migrant agricultural workers are at a particular risk for exploitation by labor brokers who may employ unethical practices such as high recruitment fees, passport retention and contract fraud to lure them into forced labor schemes, and use threats of deportation to keep them from reporting abuses. A 2014 survey of migrant dairy workers in Vermont found that 40 percent of respondents were not making minimum wage; 40 percent reported working seven or more days in a row; and 20 percent stated they had no access to bathrooms or water at work.
7. FARM ACTIVITIES CAN CREATE HAZARDOUS WORKING CONDITIONS AND CONTRIBUTE TO AIR QUALITY CONCERNS

On the farm, the greatest safety concerns for workers stem from operating heavy equipment and handling animals. In the U.S., 46 people were killed in 2016 while working on U.S. dairy farms, representing 11 percent of fatal injuries taking place in the agricultural sectors. Acc\textsuperscript{64} According to Occupational Safety and Health Administration statistics, the rates of injuries on dairy farms have declined,\textsuperscript{65} though some risks and injuries to migrant workers may not be documented if workers feel unable to seek medical or legal help for fear of losing employment or facing immigration-related consequences.

Moreover, dust generated from animals and their feed as well as gases from animal wastes can be hazardous to human and animal health.\textsuperscript{66} Particulate matter and odor from on-farm activities can negatively impact air quality.

8. SMALL-SCALE PRODUCERS LACK ACCESS TO RESOURCES WHICH LIMITS THEIR LIVELIHOODS AND PRODUCTIVITY

It is estimated that around 750 million people are engaged in small-scale milk production worldwide, the majority of them in developing countries.\textsuperscript{67} Small-scale producers may lack access to resources needed to sustain their livelihoods, such as grazing and resource rights, affordable quality inputs (feed and medicine), fair pricing, credit, extension services and technology. For example, in some developing countries, a lack of proper cooling infrastructure results in up to 30 percent of milk being wasted.\textsuperscript{68} Although in many countries small-scale dairy producers have very competitive production costs and the potential to compete with larger, high-tech producers, lack of access often limits their ability to invest in the productivity and sustainability of their farms and participate in the growing global dairy market.\textsuperscript{69}
COLLABORATIVE INITIATIVES

Many players, including buyers, producers, governments, NGOs and communities understand the business risks at play and are collaborating to ensure the long-term sustainability of dairy production.

MULTISTAKEHOLDER SUSTAINABILITY EFFORTS

For the dairy industry, examples of multistakeholder efforts include:

- Innovation Center for U.S. Dairy provides a national forum for the dairy industry to work together: the US Dairy Sustainability Alliance. The Center is leading several greenhouse gas reduction projects to help the dairy industry meet a voluntary goal set in 2009 to reduce GHG emissions by 25 percent by 2020.

In early 2018, the Center's Stewardship and Sustainability Guide for U.S. Dairy evolved into the U.S. Dairy Stewardship Commitment. The Framework's metrics have been renamed the Stewardship Commitment Metrics and are a set of indicators that are aligned with the National Milk Producers Federation's FARM: Farmers Assuring Responsible Management™ program, Field to Market (with respect to dairy feed production), and the Dairy Sustainability Framework (see below).

- A global Dairy Sustainability Framework (DSF), developed by the Global Dairy Agenda for Action (GDAA), outlines 11 global criteria that provide high-level aspirational objectives for desired improvement across the dairy sector. Existing dairy initiatives in geographical regions can align with these global DSF criteria so that progress can be aggregated globally. The DSF tracks initiatives being implemented among its members in order to promote collaboration and the sharing of good practices. In 2017, the greatest number of initiatives (51) were all focused on quantifying and reducing greenhouse gas emissions.

- Twelve dairy cooperatives and two industry associations collaborated to form Newtrient LLC. This coalition's goal is to bring together manure management technologies and providers with dairy farmers, researchers and other stakeholders in order to promote adoption of manure management and nutrient recovery technologies and practices.
SUSTAINABILITY STANDARDS

In the U.S., the National Milk Producers Federation’s FARM Program™ has developed a voluntary program setting minimum standards for animal care and environmental stewardship. It is the only program in the U.S. exclusively focused on dairy cows. More than 98 percent of the U.S. milk supply comes from participating farms.74

In 2017 a new farm worker-led program, Milk with Dignity, was launched in the U.S. focused on supporting compliance towards labor standards that protect workers’ human rights.75

There are several third-party standards relevant for dairy production, including:

• The USDA National Organic Program’s standards include that milk is from cows that get fresh grass, spend at least four months a year grazing in pastures and eat feed that is grown without chemical fertilizers, pesticides or genetically modified seeds. Milk from cows treated with hormones or antibiotics cannot be branded organic.76

• The Animal Welfare Approved as well as Certified Humane Raised and Handled® labels apply to dairy products (as well as a range of meat products) that come from farm animals raised in line with animal welfare and environmental standards.

• The Standard for Sustainable Cattle Production Systems was developed in 2010 by the Rainforest Alliance/ Sustainable Agriculture Network and applies to beef and dairy production systems in the tropics.77
In order to understand and address supply chain risks, dairy companies should have broad policies in place and a commitment to traceability. In order to mitigate reputational risk in supply chains, a company's policy and commitments to traceability should apply to all members of the supply chain (i.e., to direct suppliers as well as the extended supply chain). Companies are therefore increasingly collaborating with suppliers as well as other stakeholders. This includes finding ways to support suppliers as they take the steps needed to uphold the company's policy.

Supplier support can include education and technical support, support in goal setting or financial incentives to meet new standards. When supply chains are transparent, companies can work with suppliers and supporting industries (e.g., farm equipment, soil amendment or irrigation companies) to promote better management practices. Opportunities to engage include providing loans and other financial incentives for dairy farmers to adopt new technologies and solutions that help them reduce their impacts (e.g., investments in anaerobic digesters, efficient irrigation systems that can handle manure, solar and wind power; upgrades to farm equipment and electronics; nutrient recovery technologies). This is particularly important where the price of milk is regulated (for example, in the U.S.) and producers have limited ability to pass on the cost of investments in the prices they charge.

To be effective in achieving their policies, companies are also increasingly establishing a monitoring and verification process to confirm that suppliers are following through on the company's commitments. Without verification, even the strongest policy leaves a company exposed to reputational and market risks. Verification can be conducted by the company or by a third-party certifier. Leading companies include a protocol for supplier non-compliance that facilitates time-bound action plans for suppliers to return to compliance.
**COMPANIES IN ACTION**

- **General Mills** committed to purchasing 100 percent of its directly sourced fluid milk by 2020 from producing regions that demonstrate continuous improvements as measured by the FARM module in the U.S. and other comparable environmental metrics globally. As of fiscal 2017, 83 percent of this milk was sustainably sourced. In California, General Mills is addressing declining groundwater quality and supplies by supporting the California Water Action Collaborative and partnering with its members and local dairy farmers to demonstrate a drip irrigation system that aims to reduce water use, nutrient use and GHG emissions.

- **Danone**’s goal is to have at least 80 percent of its fresh milk supply in compliance with its sustainable agricultural practices by 2020. In 2017, 90 percent of conventional fresh milk from U.S. producers came from farms receiving certification that demonstrates compliance with standards related to proper animal handling and management, food and water quality, as well as housing that promotes animal comfort.

- **Unilever** committed to sustainably sourcing all of its agricultural raw materials by 2020, a commitment that includes the milk it uses in ice creams—such as Ben & Jerry’s—and margarines. At the end of 2017, 74 percent of its dairy products were sustainably sourced globally. Unilever helps suppliers comply with its Sustainable Agriculture Code (SAC) and is moving this program from one based on self-assessment to third-party certification.

  Through its Ben & Jerry’s Caring Dairy™ program (using indicators equivalent to the SAC), the company works with dairy farmers in the U.S. and Europe to develop a tailored action plan based on a self-assessment of their operations and provides financial incentives to farmers who participate in the program. In 2016, 85 farms were participating in Caring Dairy with more than half meeting requirements beyond the program’s basic standard. Starting in 2018, Caring Diary farms will be certified to a new set of labor standards established through the Milk With Dignity program.

- **Dean Foods** committed that by 2018 it would require on-farm assessments of all farms that deliver milk to its plants. Through its Dairy Stewardship program, farms are asked to meet certain animal welfare standards and resolve deficiencies within a specific time frame or demonstrate a plan of action for doing so.
• The USDA conducts research on multiple commodities, including dairy. This includes data on production and consumption, prices and trade and is published through the Economic Research Service, Foreign Agricultural Service, and National Agricultural Statistics Service.

• Both The Sustainability Consortium and World Wildlife Fund offer high-level insights and analysis about potential risks and opportunities across a number of commodities, including dairy.

• Several benchmarking and evaluation tools provide insights about companies involved in dairy production. These include:
  
  o The Coller FAIRR Protein Producer Index by the Farm Animal Investment Risk & Return (FAIRR) investor network assesses how some of the world’s biggest publicly listed producers and processors of meat, dairy and fish (a $300 billion group of 60 companies) are managing critical sustainability risk factors.
  
  o The Business Benchmark on Farm Animal Welfare Report (2017) provides an annual evaluation of food company's actions on farm animal welfare. In the 2017 report, 110 companies were assessed. Of the companies with significant operations in the U.S., McDonald's and Unilever are ranked as having the strongest commitments to farm animal welfare.

• The nonprofit Sustainable Conservation has partnered with the dairy industry for over fifteen years to identify, test and promote management practices and technologies that protect air and water quality and reduce greenhouse gases with a particular focus on California. Recommendations are provided in Greenhouse Gas Mitigation Strategies for California Dairies (2015) and Compost: Enhancing the Value of Manure (2017).

• Good Practice Note: Improving Animal Welfare in Livestock Operations (2014) by the International Finance Corporation (IFC), highlights the business case for improved animal welfare and describes good management practices.

• Tackling Climate Change through Livestock: A Global Assessment of Emissions and Mitigation Opportunities (2013) by the UN Food and Agriculture Organization (FAO) provides an in-depth analysis of issues and practical solutions for reducing greenhouse gas emissions related to livestock, including dairy cows. This report provides more recent data than the oft quoted 2006 FAO report, Livestock's Long Shadow.

• The National Milk Producers Federation has developed several resources including an Environmental Stewardship Continuous Improvement Handbook that focuses on greenhouse gas (GHG) emissions and energy utilization for dairy producers.

• The International Dairy Federation regularly publishes bulletins on issues of concern to dairy sustainability.

• The Innovation Center for U.S. Dairy provides information on studies related to dairy sustainability.

• The Vital Capital Index, produced by Manomet with support from the Innovation Center for U.S. Dairy, consists of 40 field-tested, science-based, practical indicators for on-farm application.

Engage the Chain offers briefs on seven other key commodities, a compelling case for sustainable agriculture and opportunities for action that cut across all types of agricultural commodities.
ENDNOTES


Note: This definition of dairy is for liquid milk equivalents and excludes butter.


12. FAO 2018, Dairy Market Review, April 2018


17 Dairy Good, Overview, https://dairygood.org/about-us


21 Note: Ranking is based on sales, as reported in Progressive Grocer, May 2018, https://progressivegrocer.com/top-50-grocers-amazon-7th-place-while-rest-industry-restrategizes-reshuffles

22 Dairyfoods, Top 100 companies, 2018, https://www.dairyfoods.com/topics/2712-top-100


24 USDA Economic Research Service, Livestock, Dairy, and Poultry Outlook, July 18, 2018, p. 28


29 Emissions from enteric fermentation by ruminants, from agricultural soils and from manure management together represent about 80 percent of annual total non CO2 emissions from agricultural production. Source: IPCC, Fifth Assessment Report 2014, accessible at: https://www.ipcc.ch/report/ar5/wg3


"Dead zones" are created when a body of water becomes enriched by inorganic plant nutrients, especially phosphates and nitrates, and the resulting growth of algae reduces oxygen for aquatic plant and animal life.


Note: Represents the combined "blue" and "green" footprints of dairy

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FAIRR, "Responding to resistance: Investor exposure to antibiotic risk, and FAIRR's engagement with the restaurant sector", November 2017


63 www.migrantjustice.net/resources


70 The Innovation Center for U.S. Dairy was established through Dairy Management Inc., the nonprofit organization that manages the national dairy checkoff program on behalf of America’s more than 45,000 dairy farmers as well as dairy importers.


73 Newtrient LLC, http://www.newtrient.com/


75 Milk with Dignity, https://milkwithdignity.org/about


82 Ben & Jerry’s, Caring Dairy, http://www.benandjerry.co.uk/values/how-we-do-business/caring-dairy


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