Key Considerations for Selecting Indicators for Dairy Agriculture:

A review of indicators for water, energy, climate, working conditions, local economic impacts, and community contributions

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Introduction

The purpose of this report is to provide the Dairy Agriculture Sustainability Framework Taskforce with background information from which to develop indicators for dairy agriculture. This report reviews 23 different sustainability frameworks and identifies potentially useful indicators for the dairy industry (Table 1). These frameworks were selected because they were relevant to the dairy industry and covered a wide range of indicators. It reviews indicators used to assess six topics: water, energy, climate, working conditions, local economic impacts, and community contributions. To review potential indicators, a database of the sustainability indicators from the 23 frameworks was developed.

Table 1. A list of sustainability frameworks reviewed in this report including their lead organizations, scope, and source information.

Sustainability Framework	Lead Organization	Scope	Source of Indicator Information
B-Corp	B-Corp	Manufacturing Farm	B Lab, Inc (2010), B Lab, Inc (2011)
Eco Index (beta)	Outdoor Industry Association & European Outdoor Group	Apparel Supply Chain	The Outdoor Industry Association and European Outdoor Group (2010)
G3.1 Guidelines for Food Processors	Global Reporting Initiative (GRI)	Corporate	Global Reporting Initiative (2010)
Indicators for a Sustainable Food System	Department for Environment, Food and Rural Affairs	Ag. Supply Chain	DEFRA (2011)
SQF Institute	Safe Quality Food Institute (part of the Food Marketing Institute)	Corporate (food industry)	Food Marketing Institute (2010)
Global Protocol on Packaging Sustainability 2.0	The Consumer Goods Forum	Packaging	The Consumer Goods Forum (2011)
The Milk Roadmap - May 2008	Dairy Supply Chain Forum's Sustainable Consumption & Production Taskforce	Dairy Industry	DEFRA (2008), Dairy Supply Chain Forum's Sustainable Consumption and Production Taskforce (2007)
WWF Better Sugar Cane Initiative (Bonsucro Production Standard)	World Wildlife Fund	Ag. Supply Chain	Better Sugar Cane Initiative (2011)
Field to Market	Keystone Institute	Farm	Keystone Institute (2011)
Healthy Farm Index	University of Nebraska	Farm	Quinn et al. (2009)
MOTIFS: A monitoring tool for integrated farm sustainability	Institute for Agricultural and Fisheries Research (Belgium)	Farm	Meul et al. (2008)
RISE – Response-Inducing Sustainability Evaluation	Bern University of Applied Sciences (Switzerland)	Farm	Hani et al. (2003), Hani et al. (2007)
Stewardship Index for Specialty Crops	Natural Resources Defense Council	Farm	Gunders (2010), Malin (2011), McIntyre (2010), Rotkin-Ellman (2009), Siegal (2011a), Siegal (2011b), Siegal (2011c)
Whole Farm/Ranch Inspection Tool	Food Alliance	Farm	Food Alliance (2008)
Caring Dairy	Ben & Jerry's Homemade, Inc.	Dairy farm	van Calker et al. 2006
Dairy Farm Indicator Project	University of Laval	Dairy farm	Belanger et al. (2009), Parent et al. (2011)
Dairy Stewardship Alliance	Agriculture at the University of Vermont, St. Alban's Cooperative Creamery, Ben & Jerry's Homemade, Inc.	Dairy farm	Dairy Stewardship Alliance (2005)
Guide to Good Dairy Farming Practice	Food and Agriculture Organization	Dairy farm	Food and Agriculture Organization (2004)
Northwest Sustainable Dairies	OR Dairy Farmers Association, WA State Dairy Federation	Dairy farm	Northwest Sustainable Dairies (2009)
SAI Platform – Working Group on Dairy	SAI Platform	Dairy farm	SAI Platform (2010)
Sustainability of Dutch Dairy Farming Systems	Wageningen University (The Netherlands)	Dairy farm	van Calker (2005)
Sustainable Development Assessment of Dairy Farms in Bulgaria	Agricultural University – Plovdiv (Bulgaria)	Dairy farm	Atanasov (2008)
Vital Capital Index for Dairy Agriculture	Manomet	Dairy farm	Whitman and Clark (2010)

Description of Database

The database of the sustainability indicators included 449 sustainability indicators and was composed of 19 variables (Table 2). The first ten variables include the indicators, indicator attributes and topics, and type of indicator. The remaining nine database variables were evaluation criteria for scoring the indicators from Whitman and Clark (2009) and Hagan and Whitman (2006, 2007). Indicators were scored for the five criteria using eight evaluation questions (Table 2). Answers to each evaluation question generated a score (1 to 3). Scores were averaged within each criterion when a criterion had multiple evaluation questions and summed across criteria to derive an evaluation score. Although evaluation scores can range from 5 to 15, the best indicators typically score 10 to 13 (Whitman and Hagan 2007). A perfect indicator evaluation score is rare. The scoring system was designed to help simplify yet structure the selection of indicators. The reader is encouraged to critically review the indicator scores to ensure that they select the most useful indicators.

Table 2. Database variables, their name, a description of the variables, and values of the variable.

Variable Name	Description	Values
1. Name	Name of the sustainability framework	One of 20 sustainability efforts in this paper
2. Topic	One of six attributes	Energy, climate, working conditions, local economic impacts, and community contributions
3. Subtopic	A list of subtopics for each topic	Many, created by author from sustainability efforts (see Table 3)
4. Aspect	Heading used by sustainability effort	Many, list identified from 20 sustainability efforts
5. Indicator	Indicator	A description of an indicator
6. Metric	Metric	Formulas for calculating indicator values
7. Level	Portions of the supply chain for which the indicator was developed	Crop, farm, processing, transportation, crop+farm, corporate, or all
8. Type	Type of indicator	Outcome-based or practice-based
9. Type2	Type of indicator	State, pressure, policy, impact, or driving
10. References	Types of indicator reference levels	None, targets, benchmarks
Indicator Evaluation Criteria (scored based on expert opinion)		
11. Score	An evaluation score calculated from V12 to V19	0 to 15
Relevance – How many stakeholder groups are likely to be very interested in this indicator?		
V12. Social Relevance	Number of stakeholder groups who would select indicator (score ranging from 1 to 3)	1-2 groups, 3-4 groups, or >5 groups
Breadth – How well does the indicator correlate to other sustainability topics?		
V13. Breadth	Number of other sustainability topics covered by indicator (score ranging from 1 to 3)	1-2 topics, 3-6 topics, or >6 topics
Scientific Merit – What is the level of scientific support for the indicator?		
V14. Scientific Merit	Level of scientific support for indicator	Expert opinion, few (1-3) studies, or many (>>3) studies
Practicality - How practical is it to measure the indicator?		
V15. Data Availability	Level of existing monitoring systems	N/A, monitored in some regions, or widely monitored by corp./gov't.
V16. Expertise	Level of expertise necessary to apply and use indicator	Specialized training, 1-2 hrs training, or agriculture or business background
V17. Cost	Estimated relative cost to monitor indicator	Monitoring cost>> economic benefit, monitoring cost ~ economic benefit, or monitoring cost<< economic benefit
Utility - How useful is this indicator to decision makers (farmers and managers)		
V18. Usefulness	Level of usefulness for farmer or managers	Uncertain, somewhat useful, or clearly useful
V19. Reference Levels	Identifies availability of reference data	N/A, could be generated using existing data, or published reference level data available

A list of subtopics was generated from information from 23 sustainability frameworks (Table 3). Subtopics capture key elements of a sustainability topic and can be used create categories of indicators. Some subtopics are poorly distinguishable from each other. For example, occupational health and safety conceptually overlaps with health and wellness. The former usually refers to job safety and addresses employee health as it relates to the occupation. The latter usually refers to personal health and also can include employee health related to the occupation. There is some ambiguity in the process of assigning subtopics to indicators though most sustainability indicator frameworks usually included information sufficient to resolve most ambiguity with assigning indicators to sub-topics.

There were more indicators for working conditions (n=143) than the other five sustainability topics. Water had three-quarters as many as working conditions. Energy, Local economic impacts, and Community contributions had roughly similar numbers of indicators. Climate had the fewest numbers of indicators.

Indicator Review

The following sections describe the six sustainability topics, summarize findings from the database, and highlight the high scoring indicators for corporation and farm. The purpose of highlighting six indicators is to prompt the reader to critically review this selection and consider other indicators in the database. Readers are encouraged to review other indicators from the database so that they might select the indicators that best suit their needs.

Table 3. Topics, number of indicators, and subtopics for each topic.

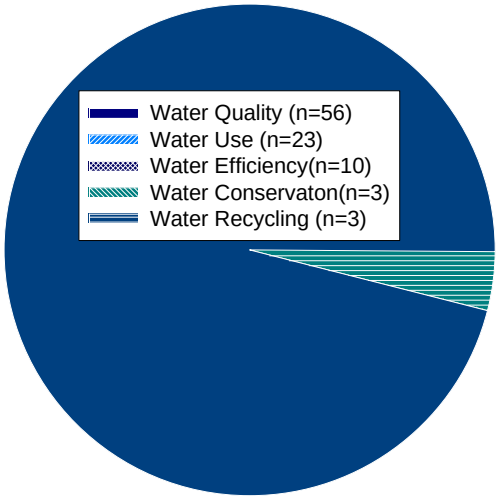
Topic	Number of Indicators	List of Subtopics
Working conditions	143	Child labor Discrimination Diversity Employee compensation & benefits Employee satisfaction Employee turnover Farmer's satisfaction Grievance procedures Health and wellness Illegal labor practices Management & employee relations Occupational health & safety Organized labor Review process Sanitation Training
Water	107	Water Conservation Water Efficiency Water Quality Water Recycling Water Use
Energy	57	Energy conservation Energy efficiency Energy use Renewable energy
Local economic impact	48	Charitable giving Employment Indirect economic impacts Local sourcing impacts Local taxes Other financial benefits Sales & Productivity Total wages
Community contributions	42	Charitable volunteering Community benefits Community engagement Community service Nuisance issues Product produced Product quality
Climate	34	Climate mitigation Economic Risk GHG efficiency GHG emissions GHG reductions

Water

Water is a sustainability attribute widely measured by businesses because water is essential to everything in life, including the economy (WBCSD 2009). Its use poses immediate challenges to businesses, including those in agriculture supply chains. Water resources are highly regulated in many countries, are a significant emerging material risk for the corporate world, are limited in several key agricultural supply areas, and are tangible to stakeholders (Sarni 2011). Approximately 70% of the world's freshwater withdrawals are for agricultural use (irrigation and livestock) (Food and Agriculture Organization 2010). As a result, water management has become a key issue for corporations (Sarni 2011). In a recent survey, 89% of responding companies have developed specific water policies, 60% have set performance targets for water, 50% of companies anticipate risks to their companies in the next 1 to 5 years, and 39% currently experience impacts that affect their operations (e.g., drought, flooding, declining water quality, increases in water prices). It is also a key issue for many environmental NGOs because freshwater ecosystems are currently declining faster than terrestrial ecosystems due to human impacts (Hoekstra 2006).

Water-related challenges in agricultural production are a regional phenomenon because impacts on water are confined to watersheds. Current dairy production water use density (million gallons per day per km^2) is less than half a percent of irrigation water use density. When water is limiting for dairy farming, the water supply challenge for dairy producers will be to have sufficient irrigation water for growing feed, as other on-farm needs (e.g., water for cows or milk room cleaning) are small (Gleick et al. 2003). Many producers recognize the importance of keeping water clean and work hard to achieve this goal

Fig. 1. Percent of water indicators assign to each of five subtopics.



by adopting effective nutrient, cropping, and stock management practices to protect water quality. Milk processing uses about 2.8 gallons of water to process a gallon of milk, with 71% of water used for cooling and 23% used for processing (Gleick et al. 2003). It is estimated that the dairy sector could reduce water consumption by 65% (Gleick et al. 2003).

Sustainability efforts usually focus on two aspects of the water issue: water supply and water quality. Dairy supply chains mostly use water to produce feed and milk and for dairy processing and can impact water quality through discharges and non-point pollution. In addition, because water use, energy use, and climate change impacts all cross link with agriculture, they might best be tackled together (WBCSD 2009). The key challenge for measuring water impacts is understanding how water impacts are bounded within watersheds. Hence, local context must be integrated into measurement and management.

In this review, five subtopics were identified for water (Table 3, Fig 1). Although water quality had the greatest percentage of indicators, water use had a similar percentage of indicators given that water conservation , water efficiency, and water recycling are generally water use issues.

High scoring water indicators were from GRI and B Corp (tie) and measured water use (Table 4). The three highest scoring water indicators for corporations and farms addressed three of the four subtopics for Water, but omitted water recycling. They covered a wide range of practices and outcome-based indicators.

Table 4. Six very high scoring water indicators for corporation and farm-level.

Name	Subtopic	Indicator	Metric	Level	Type	Score
B Corp	Water Use	EN1.6 Total water use	Water used (liters / year)	All	Outcome	13.7
GRI	Water Use	EN8 Total water withdrawal by source.	Total volume of water in m3 withdrawn from any water source that was either withdrawn directly by the reporting organization or through intermediaries such as water utilities by source type including surface water, including water from wetlands, rivers, lakes and oceans.	Corporate	Outcome	13.7
Food Alliance	Water Quality	Nutrient Management	Nutrient management practices: 1-4 levels of practice	Farm	Practice	13.2
Sustainability of Dutch Dairy Farming Systems	Water Use	Water use	m3/ha	Farm	Outcome	13.2
Manomet Small Business Sustainability Tool	Water Conservation	118: Are your toilets low flow or waterless (answer yes for all that apply)?	(a) 50% or more of toilets are low flow or waterless, (b) 100% of toilets are low flow or waterless	Corporate	Practice	13.0

Energy

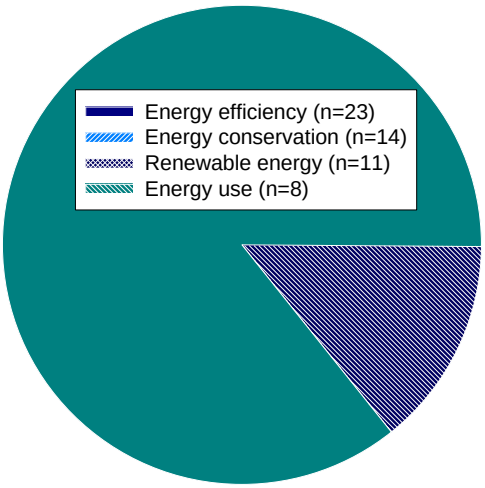
Energy costs were was the top issue for agriculture business is a frequently monitored attribute in sustainability efforts because the unabated trend of increasing and volatile energy prices affects the bottom line and creates challenging business risks. Many businesses strategically track energy use in order to manage costs and exposure to uncertainty. However, agriculture businesses find it difficult to adjust dairy prices quickly enough to keep up with increases in energy prices. It is also frequently tracked in sustainability efforts, fossil fuel use especially, because it is directly linked to other key sustainability concerns, including greenhouse gas (GHG) emissions, air pollution, water quality and use, and other, indirect environmental impacts. About 37% of GHG emissions from the dairy industry are attributable to fossil fuel use (Canning et al. 2010).

Energy is critical for the dairy industry, from essential crop inputs to the farm on up to the retailer (Food and Agriculture Organization 2010). This degree of dependency, coupled with the effects of imported energy on pricing and availability, prompts concerns for the industry about how high and volatile energy prices might increase food prices, reduce domestic food security, and affect domestic markets for dairy products (Canning et al. 2010). Energy used on dairy farms and in processing of dairy products each account for about one third of the energy used in dairy product supply chains (Canning et al. 2010). Packaging accounts for about 10% of energy use and wholesale and retail account for the remaining 20%. Energy use in dairy foods processing has steadily increased from 1997 to 2002 as Americans increasingly rely on processed foods (Canning et al. 2010). However, energy use on dairy farms has steadily declined over the same period.

Though direct energy costs may be <10% of total costs for dairy farms, energy prices and their volatility, including their effects on purchased feed and fertilizer, can be challenging. Controlling energy costs and improving energy efficiency can increase farm economic viability. For other dairy industry businesses, the benefits of improved energy management include: reduced operating costs, increased productivity, reduced regulatory issues (from air pollution and GHG emissions regulations), reduced vulnerability to energy price volatility, enhanced public image, and enhanced reputation within the financial community as a well managed company (for large companies).

Although dairy industry businesses, including dairy farms, have made great strides in reducing energy use, efforts at energy conservation can vary greatly across businesses in each production stage, including dairy farms. This variability represents a great opportunity to reduce costs and improve the economic sustainability of the industry.

Fig. 2. Percent of energy indicators assigned to four subtopics.



In this review, four subtopics were identified for energy (Table 3, Fig 2): energy use, renewable energy use, energy conservation, and energy efficiency. Energy efficiency had the greatest percentage of indicators (Fig 2). A lower percentage of indicators were related to energy conservation, energy use and renewable energy.

High scoring energy indicators were from GRI and measured energy use and renewable energy use (Table 5). The high scoring energy indicators for corporations and farms addressed all four energy subtopics for Energy. The farm-level energy indicators all addressed energy efficiency. They covered a wide range of practices and outcome-based indicators.

Table 5. Six very high scoring energy indicators for corporation and farm level.

Name	Subtopic	Indicator	Metric	Level	Type	Score
GRI	Energy use	EN3 Direct energy consumption by primary energy source (core indicator)	Total energy consumption in joules or multiples.	Corporate	Outcome	13.2
GRI	Renewable energy	EN3 Direct energy consumption by primary energy source (core indicator)	Total direct energy consumption in joules or multiples by renewable primary source.	Corporate	Outcome	13.2
Manomet Small Business Sustainability Tool	Energy conservation	82: Are all of your thermostats programmable?	Yes/No	Corporate	Practice	13.0
Field to Market	Energy efficiency	Energy use (cost efficiency)	[Direct] Energy cost ($/yield unit [bu])	Crop	Outcome	12.8
Stewardship Index for Specialty Crops	Energy efficiency	Energy Use	Energy use / unit of production (Btu/lb or kg)	Farm	Outcome	12.8
RISE	Energy efficiency	Energy	DP1: Energy-input per hectare of farmland	Farm	Outcome	12.3

Phillips, B.D. and H. Wade 2008. Small Business Problems & Priorities. NFIB Research Foundation. Washington, DC

Climate

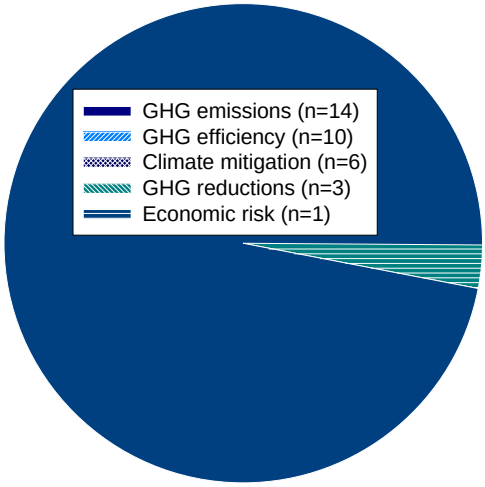
Greenhouse gas emissions and other climate-related issues are increasingly tracked attributes in sustainability efforts because of the growing specter of climate change and its social and environmental importance. Earth's atmosphere is undergoing unusual changes due to anthropogenic GHG emissions that are globally altering the climate and ecosystems (Parmesan and Galbraith 2004, IPCC 2007). Modeling and field research suggest that if these impacts continue to grow, they will impact the delivery of natural resources critical to human well being (Hughes et al 1997). Even with reductions in GHG emissions, already elevated atmospheric GHG levels and their impacts will persist for centuries (Frumhoff et al. 2007).

Although climate change impacts are now inevitable, a reduction of GHG emissions is essential to avoiding even larger impacts. Most corporations focus on GHG emissions but changes in the insurance industry and in Securities and Exchange Commission (SEC) disclosure requirements regarding climate change have led businesses to consider the regulatory, market, and physical risks posed by climate change to their business operations (Brandon et al. 2010).

In the U.S., dairy agriculture significantly contributes to animal agriculture emissions (US EPA 2009). Many consumers seek products with low environmental impact and so retailers such as Wal-Mart are pressuring the dairy industry to address GHG emissions. This pressure on the dairy industry is likely only to increase.

Because dairy farms are the greatest contributor to the industry's GHG footprint (CH_4 manure and enteric emissions, and N_2O emissions from cropping and manure), changing farm practices could greatly reduce the dairy industry's GHG footprint (Paustian et al. 2006). They can reduce GHG emissions by adopting new practices that reduce energy use, improve crop management, and reduce emissions from manure and cows; many of these practices will also improve milk production and reduce costs. Although seemingly distinct issues, challenges posed by energy costs and GHG emissions go hand in hand. Fossil fuels are the primary direct and indirect farm energy source and lead to significant costs and GHG emissions.

Fig. 3. Percent of climate indicators assigned to five subtopics.



In this review, five subtopics were identified for climate (Table 3, Fig 3): GHG emissions, GHG efficiency, climate mitigation, GHG reductions, and economic risk (related to climate change). GHG emissions had the greatest percentage indicators followed GHG efficiency, climate mitigation, GHG reductions, and economic risk (Fig 3).

The highest scoring climate indicators were from GRI and measured GHG emissions (Table 6). The three highest scoring climate indicators for corporation and farm-level addressed four of the five subtopics for Climate, missing economic risk. They covered a wide range of practices and outcome-based indicators.

Table 6. Six very high scoring climate indicators for corporation and farm level.

Name	Subtopic	Indicator	Metric	Level	Type	Score
GRI	GHG emissions	EN16 Total direct and indirect greenhouse gas emissions by weight	Total greenhouse gas emissions as the sum of direct and indirect emissions in tons of CO2 equivalent.	Corporate	Outcome	12.2
Manomet Small Business Sustainability Tool	Renewable energy	71: Does 100% of your company's electricity come from renewable sources?	Yes/No	Corporate	Practice	12.0
GRI	GHG emissions	EN17 Other relevant indirect greenhouse gas emissions by weight	The sum of indirect GHG emissions identified in tons of CO2 equivalent.	Corporate	Outcome	11.7
Manomet Vital Capital Index	GHG efficiency	Fossil Fuel Use Efficiency	Fossil Fuel Use Efficiency ($/cwt)	Farm	Outcome	11.5
Field to Market	GHG efficiency	Climate impact (production efficiency)	CO2 equivalent emissions (CO2/yield unit [bu])	Crop	Outcome	10.7
Manomet Vital Capital Index	GHG reductions	Greenhouse Gas Emissions (based on feeding strategies, soil carbon, fertilizer use, and methane management)	Greenhouse Gas Emissions: 1-10 levels of practices	Farm	Practice	10.7

Working Conditions

Working conditions are an often-tracked sustainability attribute because employee productivity is essential to profitability and business success. In a recent random global survey by GRI on reporting on community impacts, 79% of North American companies reported on some topic directly related to working conditions (Welford and Gilbert 2008).

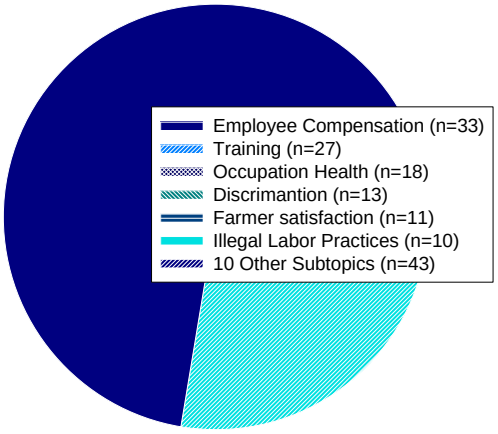
Farm labor is essential to the dairy industry. Farm employees are essential to the success of a dairy farm and their compensation is a significant portion of a dairy farm's budget (Kandel 2008). Depending on the economy, keeping qualified labor can be challenging for farmers. Dairy farming is labor intensive with modest wages. It includes year-round jobs such as milking and feeding cows, animal health care, and facility management as well as seasonal jobs such as harvesting feed, applying manure, or irrigating crop land. Safety is a significant issue because farm work is more dangerous than many other occupations, with the causes of most injuries being related to machinery and animals (Douphrate 2011). Most dairy farms are small businesses with relatively few employees so dairy farmers can find employee management, including staying on top of labor rules, challenging.

For dairy processing, most line jobs require little formal education and have low wages compared to other manufacturing sectors (Bureau of Labor Statistics 2011). Safety is also a key issue as workers are highly susceptible to repetitive-strain injuries. In response, many companies have implemented practices to reduce occupational hazards.

Although this attribute is less prominent than other sustainability issues, the controversial "conversation" about working conditions has been largely defined by business and labor groups. Three viewpoints dominate thinking on this issue: the business view, which is focused on productivity; the labor view, which is focused on employee compensation and well being; and the social view, which is similar to the labor perspective but also looks for businesses to provide societal benefits through their employees. All three of these viewpoints are captured in the diversity of sustainability efforts examined for this report, but each of those efforts tends to take one viewpoint.

In this review, 16 subtopics were identified for working conditions and they reflect the diversity of viewpoints on this issue: occupational health and safety, employee health and wellness, employee compensation and benefits, sanitation (including clean drinking water), training (including safety training), diversity, discrimination, management and employee relations, grievance procedures, organized labor, employee turnover, review process, child labor, farmer satisfaction, employee satisfaction, and illegal labor. In this review, 16 subtopics were identified for working conditions (Table 3, Fig 4).

Fig. 4. Percent of working conditions indicators assigned to 16 subtopics.



In this review, six of the sixteen subtopics accounted for the greatest percentage of indicators: employee compensation and benefits, training, occupational health and safety, discrimination, farmer satisfaction, and illegal labor practices (Table 3, Fig 4). Examples of high scoring indicators addressed issues regarding employee compensation and benefits (Table 7).

Table 7. Six very high scoring working conditions indicators for corporation and farm level.

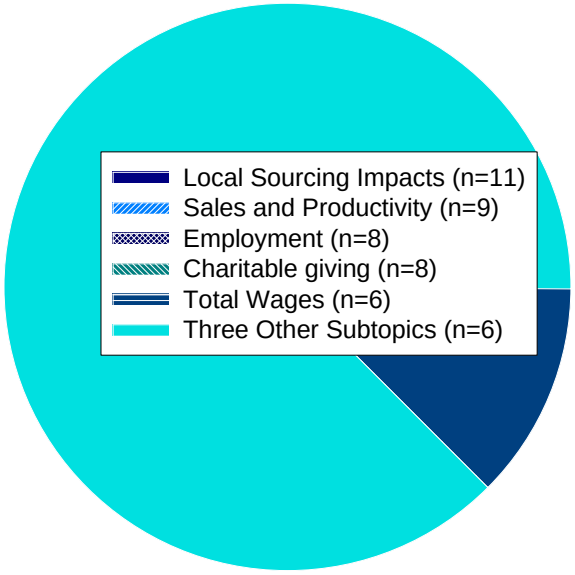
Name	Subtopic	Indicator	Metric	Level	Type	Score
Stewardship Index for Specialty Crops	Employee Compensation & Benefits	Wages and benefits - Average hourly wage of direct hire non-supervisory employees	Total wages of direct-hire non-supervisory employees / # hours worked by direct hire non-supervisory employees	Farm	Outcome	12.7
Stewardship Index for Specialty Crops	Employee Compensation & Benefits	Wages and benefits - Benefits	Dollars spent on all benefits for direct hire, non-supervisory employees / total hours worked by direct hire non-supervisory employees	Farm	Outcome	12.7
B Corp	Employee Compensation & Benefits	WR3.2 What % of paid health insurance premiums for individual coverage do full-time workers receive?	0%, 1-49%, 50-69%, 70-79%, >80%	All	Outcome	12.2
SAI Platform	Employee Compensation & Benefits	Economic return	Pay relative to national minimum standard (co-workers)(percent of minimum wage)	Farm	Outcome	12.0
Manomet Small Business Sustainability Tool	Employee Compensation & Benefits	35: Do you offer employee health insurance?	Yes/No	Corporate	Practice	11.7

Local Economic Impact

Although there are a number of tools for measuring local economic impact, it is less frequently monitored in sustainability efforts than other attributes because it is poorly aligned with profitability. Moreover, many businesses can claim positive local economic impacts without changing their sustainability activities. Not surprisingly, 29% of North American companies reported on some topic directly related to local economic impacts in a recent random global survey by GRI on reporting on community impacts (Welford and Gilbert 2008).

The dairy industry has many direct and indirect local economic impacts (Connecticut Department of Economic and Community Development 2009). Dairy farmers provide employment, pay taxes at rates that often exceed the level of public services they need, and make contributions to local charities. They are also indirectly responsible for jobs associated with feed suppliers, veterinary services, equipment suppliers, and financial services, thereby multiplying the economic impact. The remainder of the dairy industry makes similar economic contributions to local communities and can multiply the economic impacts of dairy farming up to severalfold (e.g., Connecticut Department of Economic and Community Development 2009, Mayen and McNamara 2006).

Fig. 5. Percent of local economic impacts indicators assigned to 9 subtopics.



This review identified nine subtopics associated with local economic impacts: employment, total wages, other financial benefits, local taxes, charitable giving, sales and productivity (including efficiency), local sourcing impacts, investments, and indirect economic impacts (Table 3).

In this review, five of the sixteen subtopics accounted for the greatest percentage of indicators: local sourcing impacts, sales and productivity employment, charitable giving, and total wages (Fig. 5). Examples of high scoring indicators addressed issues regarding employee compensation and benefits (Table 7).

Table 8. Five very high scoring local economic impact indicators for corporation and farm level.

Name	Subtopic	Indicator	Metric	Level	Type	Score
MOTIFS	Total Wages	Disposable income	Total income (earned either at the farm or outside)	Farm	Outcome	14.8
Sustainability of Dutch Dairy Farming Systems	Sales & Productivity	Level of milk production	Milk yields per cow	Farm	Outcome	14.8
Manomet Vital Capital Index	Employment	Employment	cows per full-time equivalent (FTE)	Farm	Outcome	12.7
Manomet Small Business Sustainability Tool	Other Financial Benefits	37: Do you offer benefits other than health insurance to your employees (answer yes for all that apply)?	(a) dental coverage, (b) retirement savings program, (c) employee stock option, (d) flexible spending accounts	Corporate	Practice	11.7
GRI	Employment	LA1 Total workforce by employment type, employment contract, and region.	2.1 Identify the total workforce (employees & supervised workers) working for the organization at the end of the reporting period	Corporate	Outcome	11.3

Community Contributions

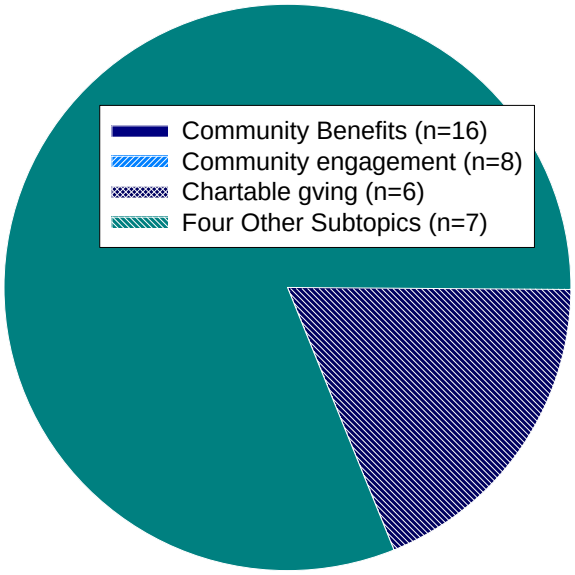
Although there are many ways to measure for community contributions, it is less frequently tracked than other sustainability attributes because it poorly aligns with profitability and its meaning can be unclear. In a recent random global survey by GRI on reporting on community impacts, 43% of North American companies reported on some topic directly related to community impacts (Welford and Gilbert 2008).

In highly settled areas, dairy farmers may leverage their community contributions as a means of keeping a social license to farm. Being a good neighbor and having good relationships with regulators can help maintain and build local support for dairy agriculture. Minimizing what neighbors perceive as nuisances can help maintain good neighbor relationships. Volunteering can support local communities. Community contributions include supporting conservation of agriculture and heritage, food production, and providing access to other resources (e.g., clean water, recreation).

Other companies in dairy supply chains may use community contributions to build up brand value. Being responsive to key community stakeholders and improving stakeholder relationships can foster loyalty and trust. The consequences of mismanaging sustainability and community stakeholder relationships can be significant and costly in terms of reputational damage and potential impacts on the bottom line.

In this review, three of the seven subtopics accounted for the greatest percentage of indicators for community benefits, community engagement, and charitable volunteering (Fig. 6). Other subtopics related to community contribution include: volunteering, nuisance issues, and product quality (which can include food safety).

Fig. 6. Percent of commuity contribution indicators assigned to 7 subtopics.



The very high scoring community contributions indicators focused on community engagement, service, and volunteering (Table 9). The three highest scoring community contribution indicators for corporation and farm level addressed four of the five subtopics for community contributions. They covered a wide range of practices and outcome-based indicators.

Table 9. Six very high scoring community contributions indicators for corporation and farm level.

Name	Subtopic	Indicator	Metric	Level	Type	Score
Manomet Vital Capital Index	Charitable volunteering	Number of local and regional non-profit organizations for which you volunteered	Number of organizations/year	Farm	Outcome	10.7
B Corp	Community service	*CM1.9 Number of Customers/Clients Served	Number of Customers/Clients	Corporate	Outcome	10.5
Dairy Stewardship Alliance	Community engagement	1. Community Relations	1 to 7 levels of practices	Farm	Practice	9.8
Caring Dairy	Community engagement	Guided tours	Number per year	Farm	Outcome	9.0
B Corp	Charitable volunteering	*CM1.15 Community Service Hours Contributed	Total community service hours	Corporate	Practice	8.8

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