

# Sustainability: Addressing the Life Cycle of Cereal Food Products

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The food supply is responsible for about 20–30% of total greenhouse gas emissions (2). More than a third of child deaths worldwide are attributed to undernutrition (18). As a result, there remains a significant challenge ahead for the cereal food industry to be more sustainable. Sustainability for cereal foods means that it is produced and consumed in a way that supports the wellbeing of generations. Sustainability includes consideration of environmental, social, and economic factors. Industry leaders are implementing sustainability efforts within the company as well as upstream and downstream of the company. This is the life cycle approach to sustainability.

The life cycle of food products include agriculture, manufacturing, packaging, distribution, use, and disposal. Agricultural production generally is the largest contributor to the life cycle impact of food, typically greater than 50% of the environmental footprint. Downstream considerations have lower impacts, but can range depending on the product. In general, food processing is the next most significant contributor to impacts in the supply chain (20). Packaging impacts tend to be very limited compared to other components of the supply chain, less than 2% for most food products, but can be up to 20% due to energy needed to produce the package or when packaging light-weight products (9). Consumer transport to purchase food can be a significant impact (3). And finally, consumer use of the food, when including cooking, can also be a contributor to the life cycle impact (3).

## Agriculture

Agriculture is the largest source of environmental impact from food and beverage products. Agricultural production is estimated to be responsible for about one-third of the human-induced greenhouse gas (GHG) emissions and about half of the food supply's GHG emissions. In the

- ▶ A life cycle approach to sustainability includes economic, environmental, and social considerations from raw material production, product manufacturing and packaging to distribution, use, and end-of-life.
- ▶ Leading companies have found ways to make environmental and social improvements across the product's life cycle to have long-term financial success.
- ▶ Agricultural production is generally the area of greatest opportunity for environmental improvement for cereal food products.

United States, it is estimated that 70% of river and stream pollution is caused by agriculture from chemicals, silt, and animal waste (5). Further, agriculture is the largest user of water worldwide and only 45% of the irrigation water is effectively used (6). Many pesticides used in agriculture have been linked to causing cancer and having endocrine disruptor activity (8). Food production methods are available that have reduced GHG emissions, water needs, hazardous chemical use, as well as other important environmental and social benefits like biodiversity. As a result, the primary focus should be on supporting and procuring from more responsible (often called sustainable) agricultural production practices. For example, organic wheat production is more favorable than conventional production due to lower global warming potential with the production method (3). Further, H. J. Heinz Company has worked with producers to use water conservation measures, such as drip irrigation.

It has been shown that conventional animal production has significantly greater life cycle impacts than other products. For example, the global warming potential of 1 kg of bread is only 68% of that of 1 kg of skimmed milk (11). However, cereal products often include animal-based products (and cereal products are used to produce animal products). As a result, attention to responsible means of producing animal products is important. When animal-based products are used, it's best to find sources with less intensive feeding and raising practices (grazing vs. grain fed). It is also estimated that 70% of antibiotics used in the United States are fed to farm animals to artificially promote growth and counteract unhealthy living conditions (19). As a result, companies should support and procure animal products raised humanely and with less intensity. For example, Del Monte Meat Co. Inc., a food service provider in

the United States, provides meat products that were produced with strict standards on humane practices (e.g., no antibiotics, no added hormones) and raised on sustainable farms and ranches.

The consolidation of farms has led to a concentration of wealth, reductions in rural population, loss of infrastructure in farming communities, and reduction of small farms that are generally more diversified than large industrial farms, providing for more nutritionally dense foods and using more environmentally preferable production methods. However, fair prices need to be offered to small-scale producers to prevent further consolidation. To provide fair markets and wages, greater choice, and more environmentally preferable options, diversification of sourcing from growers and suppliers should be practiced. Some companies have chosen to work with programs like Fairtrade to support this effort. For example, Cadbury teamed with the Fairtrade Foundation to achieve Fairtrade certification for Cadbury Dairy Milk, the United Kingdom's top selling chocolate bar, with further commitments in Canada, Australia, and New Zealand to be certified Fairtrade by early 2010. (At the writing of this article, an official report on progress was not published.)

## Manufacturing

Food processing is typically the second largest source of environmental impact from food and beverage products, and typically the area the food industry has focused its sustainability efforts on to date. Food processing constitutes 25% of all water consumption worldwide and 50–80% of all water used in industrial countries (14). It is estimated that 7% of the food supply is wasted at the point of processing (12). Processing food with minimal inputs, including water, raw materials, and energy, will reduce the total impact of

food processing. These are the typical goals for processors. Goals should be aggressive since they can be met. For example, Walkers, a Frito Lay brand, has reduced its water usage by 42%. Frito-Lay, a division of PepsiCo, saved 21% of its energy usage across its 34 U.S. facilities. An aim should also be toward using renewable energy or even process wastes to produce energy. McCains Foods Limited produces renewable energy to source most of its electricity needs in its plants. Further, processing with zero waste (solid, liquid, and emissions) is achievable and should be practiced. For example, Nestle has successfully diverted 95% of its waste from the landfill.

### Packaging and Disposal

Packaging helps deliver safe food, and has had limited contribution to the total environmental impact of food. However, it has been found that more than 95% of the environmental impact of packaging is from the production of the package. The remaining 5% is in the disposal of the package (4). Thus, efforts for packaging should focus on reducing material use and using recycled content. Alara Wholefoods, a U.K. muesli producer, redesigned its muesli package, which resulted in a 70% reduction in material. Kellogg Co. uses recyclable cartons with 100% recycled content, and at least 35% post-consumer material in its cereal boxes, reducing total energy needs to produce the package.

### Sustainability Life Cycle Principles for Food Products

#### Agriculture

- Lower intensity production methods
- Animal welfare and reduced reliance on animal products
- Diverse suppliers with fair prices

#### Manufacturing

- Food safety
- Nutritional density
- Resource efficiency (raw materials, energy, water)
- Zero waste

#### Packaging/Waste

- Efficient material use and production (light weight, recycled content)
- Zero waste (recyclable, reusable, no package)

#### Distribution/Use

- Efficient (distance/mode, substitute, or redesign)

### Distribution and Use

The contribution of distribution and use on food's environmental impact ranges widely. Key considerations are distance and mode of transport of the food product to the retail outlet (or food service) or for the consumer to get to the retail outlet (or food service) and the amount of energy needed to store and prepare the food for consumption. Distribution should be as efficient as possible. Air transit of food is the least efficient distribution option, and thus alternatives should be found (more efficient options are sea and rail). For example, General Mills sends 80% of its shipments to the United Kingdom by sea, typically the least energy-intensive distribution option (7). Distribution systems should also leverage new technologies (e.g., alternative fuels) and redesign distribution channels (e.g., just-in-time, local) to find further efficiencies. For example, Nestle utilized dual-temperature vehicles to reduce transportation by 7% in its Argentina operations.

### The Life Cycle Approach

Providing safe and nutritious food remains a leading priority of the food industry. These issues overlap with the life cycle considerations outlined above. For example, food safety is linked to agricultural practices, such as factory farming and high-speed processing of animal products associated with the most prevalent food-borne pathogens (15).

The book, *Sustainability in the Food Industry*, outlines 10 key principles to more sustainable food products that brings together all of these life cycle considerations (1). This is summarized in Figure 1. Companies that practice the principles, as the World Business Council for Sustainable Development (17) has found, have had greater financial success (17). Such financial success includes lower production costs, improved product function and quality, increased market share, improved environmental performance, improved relationships with stakeholders, and lower risks. A recent study by A. T. Kearny found that companies committed to sustainability financially outperformed industry averages by 15% over the six months from May through November 2008 (10). Thus, investing in a life cycle approach to sustainability may be the best way to protect a company's value as well as the future generation's food supply.

Using this life cycle approach to sustainability has demonstrated success for cereal food producers. The following is a brief case study on Nature's Path. The company, a North American manufacturer of certified organic cereal and snack food,

is growing their business with a life cycle approach to sustainability. In 2009, the company saw a growth of 22% at the time of the economic downturn, while their competitors were seeing decreases in sales (16). To address the significant sustainability issues in the agriculture portion of the life cycle, Nature's Path produces only certified organic products. The company is also actively involved in expanding the acreage in organic production through the growth of their business and extensive outreach initiatives. For the manufacturing portion of the life cycle, the company has a zero waste goal for 2010, making progress with aggressive waste reduction, donations, composting, and recycling efforts across the company. In addition, energy reduction initiatives (e.g., oven efficiencies) are underway that complement their use of renewable energy to make progress toward their carbon neutral goal. For example, 35% of the power for their Blaine, WA, U.S.A., facility (one of three of the company's manufacturing plants) comes from wind power (19). To address the packaging and waste portions of the life cycle, the company uses paperboard with 100% recycled content and at least 60% postconsumer material. The company also developed a smaller cereal box that reduced packaging material by 10%, with no change in the amount of product in the package. Bulk packaging is also offered, further reducing packaging by 60–66% (19). Packaging optimization has also led to more efficient palletizing and logistics (fewer truckloads). Additional efforts are in place to address the distribution portion of the life cycle by reducing distances traveled and leveraging lower impact transport systems, like rail.

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Fig. 1. Adapted from *Sustainability in the Food Industry* (1).

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