Forged in the Fires of Battle Creek: The Intensely Industrialized Origins of Breakfast Cereal

Objective

What industrial processes does “cereal production” encompass? The cereal industry is an oligopoly dominated by four enormous companies (General Mills, Kellogg’s, Post, and Quaker, collectively known as “The Big Four”) which each use their massive industries of scale to their full advantage. As such, our cereal undergoes an intensely mechanized, remarkably energy-intensive and highly scientific odyssey as it is transformed from a relatively anonymous agricultural commodity into a very distinct and instantly recognizable variety of breakfast cereal. Furthermore, what are the environmental repercussions of this extraordinary transformation from common crop to highly processed food item?

Methods of Production

In its purest form, the origins of our breakfast cereal are humble enough, being derived from staple crops such as wheat, corn, rice, oats, millet, and sorghum, among others, all of which have given sustenance to humanity since the invention of agriculture. Whereas cereal production used to require perhaps only a scythe and a millstone, nowadays a dizzying sequence of steps are required to convert starch that is initially unsuitable for human consumption into the digestible, “ready-to-eat”, and usually highly-processed cereals that we contentedly pluck from the grocery store shelves.

Kent’s Technology of Cereals, a book principally for use by students of food science, outlines the steps taken to produce different kinds of cereal from different base materials in methodical detail. In a chapter dedicated solely to breakfast cereals, it is noted that this popular food can be “classified according to the form of the product, and according to the particular cereal used as the raw material.” This source then identifies flaking, puffing, and shredding as the three most commonly practiced types of cereal processing, with a technique known as extrusion often used in conjunction with flaking and puffing. Data within the text reveal that roughly equal amounts of cold cereals undergo flaking and puffing, with little over 40% of cereal fated for each of the two steps. The remaining cereal that is neither flaked nor puffed is often shredded. Shredding is the end result of approximately 12% of “ready-to-eat” cereals. Of cereal consumed in the United States, about 37% is wheat, bran, or farina based, 30% is derived from oatmeal or oat flour, 22% is maize based, and 11% is rice based (Kent, 254).
Flaking

The term “flaking” encompasses two main strategies for developed “flaked” cereal. The first strategy involves processing corn, wheat or rice in a manner that will yield flake-like particles, known as flaking grits, while the rival flaking process is done alongside an extruding process, when dough is simply cut into flake-like shapes. In the former flaking process, the steps of production involved include “preprocessing, mixing, cooking, delumping, drying, cooling and tempering, flaking, toasting, and packaging” as outlined by the Environmental Protection Agency (EPA). For most cereals, preprocessing involves removal of the germ and bran from the desirable parts of the cereal as well as cleaning (EPA, 5).

The steps constituting flaking and extruding are fairly similar with the only key distinctions being an exchange of the cooking and delumping steps for an extruding interlude. The EPA lists the components of this process as “preprocessing, mixing, extruding, drying, cooling and tempering, flaking, toasting, and packaging” (EPA, 7).

Puffing and Extruding

Puffing, along with flaking, is the other dominant method of cereal processing, being applied to nearly the same percentage of cold cereals. Puffing is often preceded by a complementary practice known as extruding. Though puffing and extruding are addressed in highly technical detail in both Kent’s and the EPA report on cereal production, Malt-o-Meal’s website offers an informative, simplified description of the processes. Prior to being puffed, the main ingredients of a cereal are mixed and cooked. Following cooking, the dough is run through an “extruder”, which lends the cereal dough distinct and desirable shapes. The resulting shapes are then dried before entering the puffing phase.

Malt-o-Meal’s account of puffing explains that once ingredients or extruded shapes are dried, they are subjected to extremely high temperatures and pressures before experiencing a sudden release. The sudden drop in temperature and pressure causes the cereal to become “puffed” owing to its rapid expansion (Malt-o-Meal).

Shredding

Though not as common as flaking or puffing, shredding represents the third pillar of the reigning cereal processing triumvirate. Shredding is typically applied exclusively to wheat-based cereals, such as the aptly named Shredded Wheat. Shredding is a time consuming procedure that often surpasses twenty-four hours in length, as the process includes “grain cleaning, cooking, cooling and tempering, shredding, biscuit formation, biscuit baking, and packaging” according to the EPA. Following cleaning, wheat grain is initially cooked to give the material a “soft and rubbery” consistency. The essential next step is for the wheat to cool and rest for over twenty-four hours. This interval enables the wheat to firm up and gain the strength necessary to survive the next step of being run through the shredder and maintaining its stringy, shredded form afterwards. The grain shredder typically consists of two metal rolls- one that is smooth, and another that has
grooves which cut the material into shreds before it continues its passage and is cut into smaller tablets. Upon completion of biscuit formation, it is still necessary to bake, and then dry, and finally package the shredded wheat cereal (Kent, 252; EPA, 8).

**Environmental Significance**

As such a pervasive food product, it is important to assess the environmental impact of the breakfast cereal that so many of us eat without directing thought to any externalities that may have arisen from its production. As is shown, cold cereal touches on a number of hot-button environmental issues.

**Carbon Footprint**

According to a study originally published in the journal *NewScientist*, the typical bowl of cereal has a carbon footprint roughly equivalent to driving an SUV 6 km. Though this figure may initially come as a shock, it is made less surprising when one considers the industrial processes outlined above, and that doesn’t even begin to take into account the agricultural energy and resources expended to produce the grain in the first place. Interestingly, the study stressed that “the main culprit in the bowl isn’t the cereal, it’s the milk. That’s because the most emissions-intensive foods are red meat and dairy products” (Trivedi).

**Agricultural Sustainability**

As mentioned previously, mass-production of cereal relies almost heavily on an abundance of cheap commodity crops such as wheat, rice, and maize, which astonishingly combine to account for two-thirds of all energy in human diets. Obviously such strong dependence on these staple crops touches closely to a number of environmental issues tied to agriculture. In recent decades yields of these crops has risen dramatically, owing to greater inputs of fertilizer and other advances in technology though, as we’ve seen, this can also contribute to the nitrification of surrounding ecosystems.

**Kashi: An Eco-Friendly Breakfast Choice?**

As concerns over nutrition and the environment have converged in recent years, many new brands of cereal have emerged to cater to the growing ranks of environmentally and health-conscious consumers. One such brand that has risen to prominence is Kashi, which largely promotes itself as a more earth-friendly alternative to most conventional cereals. Despite these claims of environmental stewardship and responsibility, extensive research on the company’s website does little to substantiate these claims beyond revealing efforts to reduce packaging in some, but not all, of their products. Information on the website does, however, serve to bolster the brand’s claims about their product’s nutritional strength (Kashi).
Palm Oil and Tropical Deforestation

General Mills, one of the “Big Four” cereal titans, has recently come under fire from advocacy groups boldly claiming that the seemingly innocent bowls of Cheerios (a General Mills brand) enjoyed by millions is contributing to destruction of the rainforest and accelerating global warming. Though Cheerios may be a part of the topic of debate, the arguments against General Mills are not entirely full of holes. In 2009, members of the Rainforest Action Network (RAN) held demonstrations outside of General Mills’ Minneapolis headquarters to protest the company’s use of Southeast Asian palm oil in over 100 food products. The items called into question included some cereals, but also very different foods from the company’s highly diversified range of products, which included the Hamburger Helper, Pillsbury, and Betty Crocker brands (Taibbi).

Increasing global demand for palm oil (an ingredient in “roughly half of all products sold in U.S. supermarkets”) has triggered an unprecedented rate of deforestation in Southeast Asia, where rainforest is cleared as the palm oil industry scrambles to satiate heightened demand. Deforestation of tropical rainforests is one of the leading sources of anthropogenic carbon dioxide emissions. Destruction of rainforests presents not only a staggering loss of biodiversity, but with respect to carbon sequestration, one of the planet’s most robust carbon sinks is suddenly turned into a carbon source as plants’ biomass decays. It is estimated that fifteen percent of annual global carbon emissions stem from destruction of rainforests, with eight percent of the global total being attributed to Indonesian deforestation alone. Indonesia’s rate of deforestation is so alarming that it has made them— a non-industrialized nation- the world’s third largest emitter of greenhouse gases, behind the United States and China (Taibbi).

Packaging

To wrap up our discussion of cereal, let us direct our attention to packaging. When considering the overall environmental footprint of any given cereal, it is essential to take the influence of packaging into account. A stroll through any store’s cereal aisle reveals that an overwhelming majority of cereal products are sold in boxes with bags of plastic lining on the interior. Boxes provide sound structural support and an effective medium for advertising, but do those advantages offset the extra cost in resources? One maverick cereal company bucking the trend of boxed cereal is the Malt-o-Meal Company native to Minnesota. Malt-o-Meal cereals have shed the box, and are sold just in plastic bags with a resealable top. The company proudly advertises the fact that their bag-only approach reduces the amount of packaging necessary by 75%. Citing reputable sources such as the American Forest and Paper Association on their website, Malt-o-Meal points out that despite widespread recycling initiatives, 44% of “paper, corrugate and paperboard packaging consumed annually still ends up in landfills.” Additionally, they note that if all cereal were to be sold in bags only, the United States could reduce its use of paperboard by over 375 million pounds per year! (Malt-o-Meal).
Though Malt-o-Meal remains an anomaly in their refusal to use boxes, there’s a chance that bigger cereal companies may eventually follow their example. The British supermarket chain, Sainsbury’s, has stopped carrying boxed cereal altogether, and as recently as last year, Kellogg’s has considered experimenting with the bag-only strategy as a means of boosting profits and cutting costs. Reportedly, the greatest source of their trepidation in making the transition is their concern about the cereal’s protection. It is feared that the loss of the box will result in an unacceptable degree of physical damage to the cereal, and shoppers’ Rice Krispies and Corn Flakes would be reduced to dust by the time they returned home from the supermarket. (Waite).

Sources


