



# HISTORY OF FOOD

## BACKGROUND READING

The food system is continually evolving. The development of **agriculture**, the invention of the **plow**, the dawn of agricultural chemicals and the ongoing process of industrialization are among the revolutions that have transformed nations through food. Many of the most dramatic changes have taken place over the past century, ushering in an era of relatively abundant food production. With the benefits of plentiful **calories**, however, have come many costs, including **ecosystem** degradation, the loss of natural resources, rising rates of diet-related chronic disease and ongoing inequalities in access to food. Many authors speculate that the current period of fossil-fuel-derived abundance will be a brief one, calling attention to the question of where our food system is headed next.<sup>1-3</sup> To successfully navigate the future, we must first gain an understanding of how we got here. What follows is a brief, and simplified, overview of the history of the food system.

### Agriculture and the dawn of civilizations

Most modern industrialized societies depend on agriculture, the practice of growing crops and raising animals for food and other needs. Agriculture has been practiced sporadically for roughly 10,000 years<sup>4,5</sup> but widely established for only 5,000<sup>6</sup>—just 3 percent of the span of human history. Although it is a relatively recent phenomenon, agriculture has had profound effects on human societies.

Paleoanthropologists estimate that *Homo sapiens*—anatomically modern humans—originated about 150,000 years ago.<sup>7</sup> Throughout the vast majority of their history, humans acquired their food by hunting wild animals (including prehistoric megafauna like mammoths, woolly rhinos and giant elk<sup>4</sup>) or gathering food from wild plants.<sup>8,9</sup> Recent research suggests our ancestors may have lived well into their 70s;<sup>6</sup> eaten healthy diets high in fruits, vegetables, lean protein and healthy fats (though not by choice—this was all that was available); and not suffered from the diet-related chronic illnesses that are common today.<sup>10</sup>

From as early as 11,000 BCE, humans began a gradual transition away from a hunter-gatherer lifestyle toward cultivating crops and animals for food.<sup>4</sup> The shift to agriculture is believed to have originated in several parts of the world, including the Fertile Crescent, a region in the Middle East that cradled some of the earliest civilizations.<sup>4</sup> By 6000 BCE, most of the farm animals we are familiar with today had been domesticated.<sup>4</sup> By 5000 BCE, agriculture was practiced in every major continent except Australia.<sup>11</sup>

What motivated this transition? Changes in **climate** may have caused shortages of wild food sources,<sup>4</sup> growing and denser populations may have demanded more food than could be harvested

in the wild,<sup>5</sup> and innovations in food harvesting and **processing** technology may have made agriculture a more viable lifestyle.<sup>8</sup> Many theories exist, and the actual reasons probably varied across time and place.

How did agriculture change human civilizations? In some parts of the world, agriculture may have required more time and energy than hunting and gathering, but it also provided a more stable and abundant food supply<sup>4</sup>—farming yielded 10 to 100 times more food calories per acre.<sup>8</sup> Agriculture's effect on food production spurred tremendous growth in the global human population, from an estimated 4 million in 10,000 BCE, to 50 million in 1000 BCE, to close to 200 million by the beginning of the Common Era.<sup>4,12</sup> Because agriculture tied people to their land, much of this growth occurred around densely populated settlements.<sup>8</sup> By 6500 BCE, towns of several thousand people were common in the Middle East.<sup>4</sup> By 3000 BCE, Uruk—possibly the world's first city, located in what is now modern-day Iraq<sup>13</sup>—was home to around 50,000 people.<sup>4</sup> As cities began to acquire more than enough food to support their population, people became free to pursue interests other than farming.<sup>4</sup> The rise of political elites, responsible for overseeing the distribution of surplus food and other resources, created social inequalities.<sup>4</sup> Others devoted their energies to pursuits such as the arts, literature and technology that would drive the growth of civilizations.<sup>4</sup>

## Cycles of boom and bust

Although agriculture was a driving force in the growth of civilizations, it has never been a safeguard against collapse. Throughout history, societies' food systems have swayed between times of prosperity and hardship. Increases in global food production competed against population growth, resource degradation, changing climates, droughts, flooding, disease, war and the many other forces that periodically plunged civilizations into famine.

Like many of their modern counterparts, early farmers often worked the land in ways that depleted fertile **soil**. Technological innovations like **irrigation** (circa 6000 BCE) and the plow (circa 3000 BCE) brought gains in productivity and growth in populations, but often worsened prospects of long-term soil fertility through **erosion** and other means.<sup>4,14</sup> In the words of one soil expert, "In the history of civilization... the plowshare has been far more destructive than the sword."<sup>15</sup> As short-sighted practices "mined" nearby farmland of its fertility, many cities grew dependent on far-away lands for food. The land surrounding Rome, for example, had been depleted of its fertility by the beginning of the Common Era. To feed the growing populace, Romans came to rely on wheat shipments from over 1,000 miles away in Egypt and North Africa.<sup>4</sup> Commenting on how a reliance on distant food sources can leave a region more vulnerable to political, economic or environmental forces, the Roman Emperor Tiberius wrote, "The very existence of the people of Rome is daily at the mercy of uncertain waves and storms."<sup>4</sup> Like Sumeria and Greece before her, Rome's eventual decline was aided by depleted soils and a weakened food supply.<sup>4</sup>

Following the fall of the Roman Empire, a favorable climate aided the growth of European agriculture. By 1300 CE, Europe's population had reached 80 million;<sup>4</sup> the global population, 360 million.<sup>12</sup> By this point, Europe's population had neared the limit of what its agricultural system could support.

Over the following centuries, poor weather, shifts in climate and degraded soil dampened agricultural production, while parts of Europe periodically fell into famine as its food supply struggled to keep pace with a growing population.<sup>4</sup> By the 17<sup>th</sup> century, European farmers had managed to increase crop yields by promoting the use of animal **manure**, crop rotations, cover crops and other practices that improve soil fertility<sup>4</sup>—but as before, population growth overtook the increased food supply, leaving large segments of the populace in a state of malnutrition.<sup>4</sup> In 1798, the British economist Thomas Malthus wrote that unchecked exponential population growth would outpace food production, plunging humanity into long periods of famine.<sup>16</sup> Though his often cited prediction has yet to unfold on a global scale, his work reminds us that the Earth has a finite capacity for human growth.

Between 1650 and 1850, the population more than doubled, from roughly 550 million to 1.2 billion.<sup>17</sup> By 1900, it had reached 1.65 billion.<sup>17</sup> What kept Malthus' doomsday prediction at bay? There were many factors that led to lower death rates, including what has been called a "global agricultural evolution."<sup>14</sup> Food plants imported from the Americas, such as corn, sweet potatoes and cassava, rapidly spread across the globe.<sup>14</sup> Some scholars suggest that the improved nutrition provided by these prolific crops helped stave off disease.<sup>14</sup> Others credit refrigerated transport, improved processing techniques for preserving perishable foods and a growing network of railways and shipping routes.<sup>1</sup> These innovations allowed farmers to ship their surplus goods over greater distances.<sup>1</sup> From the 1850s onward, much of this food came from the United States, where a favorable climate and fertile soils allowed American farmers to produce enough surplus grain, and eventually meat, to supply much of Europe.<sup>1</sup>

Technological innovations would further boost food production in the United States and abroad; perhaps none was more influential than the invention of synthetic (man-made) **fertilizers** in the early 1900s.<sup>18</sup> These chemicals dramatically increased crop yields (at least in the short term), so much so that they have been credited with feeding the lion's share of a global population that grew from 1.6 to 6 billion over the 20<sup>th</sup> century.<sup>18</sup> The use of these chemicals would become a hallmark of modern industrial agriculture.

## Industrialization of the U.S. food system

The largely industrialized U.S. food system has only been widely established for less than a century, a blip in the long span of human history. During this brief period, the food system has undergone greater transformation than it had experienced during the previous 10,000 years.

In the early 1900s, more than half of Americans were either farmers or lived in rural communities.<sup>19</sup> In order to fuel the newly industrializing U.S. economy, some believed that Americans ought to be freed from the drudgery of farming so they could join the labor force in offices and factories, and that food and farming needed to be cheaper so Americans could afford the products offered by emerging industries.<sup>19</sup> The industrialization of the U.S. food system, sometimes characterized by specialization, simplification, routinization, **mechanization**, standardization and **consolidation**,<sup>20,21</sup> was intended to achieve these objectives by transforming the food **supply chain**.

Before World War II, most U.S. farmers cultivated a variety of crops, along with livestock, on what are called diversified farms.<sup>21,22</sup> As the food system became more industrialized, farmers abandoned diverse farming systems in favor of highly specialized operations that separated crops from animals.<sup>23,24</sup> Specialization in the food system is based on the idea that farms and other operations could function more efficiently by focusing on fewer tasks.<sup>24</sup> Consider two farmers, each producing both corn and beef: According to the principles that drove industrialization, both would be better off if one only grew corn while the other only raised beef cattle.<sup>25</sup> Each farmer could then limit his investment to the equipment and routine skills needed to perform his sole task more efficiently. Today, industrialized U.S. crop production is characterized by highly specialized, genetically uniform corn and soybean **monocultures**<sup>2</sup>—fields planted with a single crop species over a given season, typically over a very large area.<sup>26,27</sup> The beef supply chain, meanwhile, is separated into many distinct, specialized industries: breeding and birthing calves, raising cattle on **pasture**, growing feed crops, storing and transporting grain, transporting cattle, finishing them in **feedlots**, slaughtering them and processing their meat.<sup>23</sup>

As food production and processing became more specialized, work became simpler and more routine.<sup>24</sup> This allowed for mechanization—the replacement of human and animal labor with machinery that could aid in routine tasks,<sup>24</sup> such as sowing seeds and harvesting.<sup>27</sup> Production became more dependent on resources manufactured off the farm, such as agricultural chemicals and fossil fuels.<sup>28</sup> Monocultures, for example, led to a greater dependency on synthetic fertilizers (to manage **nutrients** in soil) and chemical **pesticides** (to control crop **pests**);<sup>2,21,27</sup> from 1948 to 2008, the use of agricultural chemicals increased more than fivefold.<sup>29</sup> In food animal production, hormones and antibiotics were introduced to speed the growth of food animals.<sup>30</sup> These new technologies made production more predictable, reliable and repetitive.<sup>24</sup> These transitions were based on an assumption that cheap energy would always be available to fuel the system, and that technological innovation would always overcome production challenges.<sup>28</sup>

Specialized facilities, including farms, feedlots and processing plants, could work together more efficiently by adopting uniform practices and turning out products of uniform size, weight and consistency.<sup>21,31</sup> Chickens, for example, are now grown to a uniform size so they can be quickly slaughtered, plucked and processed into meat using mechanized assembly lines.<sup>32</sup> Fast food

restaurants came to expect uniform cuts of meat that cooked evenly, fit between standardized sandwich buns and met consumer expectations.<sup>33</sup>

As the food system became increasingly industrialized, operations grew larger so they could capitalize on **economies of scale**<sup>21,29,34</sup>—the gain in efficiency that comes from doing something on a larger scale, such as mass production or buying in bulk. During these growth periods, many smaller facilities shut down, often because they could not compete with larger, more efficient operations.<sup>34-39</sup> Mechanized agriculture, for example, allowed farmers to work larger areas of land with fewer farm workers.<sup>24</sup> Since 1950, the average U.S. farm has more than doubled in size; less than half as many farms are in operation,<sup>40</sup> and they employ roughly an eighth as many farm workers.<sup>41</sup> Supermarkets and other food retailers followed a similar trend,<sup>39</sup> partly because they relocated from urban neighborhoods to suburbs, where cheap land allowed them to grow larger in size.<sup>35,36</sup> This trend toward fewer, larger operations within an industry is called consolidation.<sup>42</sup>

The industrialization of the food system has been tremendously successful in providing enormous amounts of food with a minimal amount of labor,<sup>28</sup> often at lower prices (controlling for inflation) to consumers.<sup>43,44</sup> From 1950 to 2000, production on U.S. farms more than doubled, with a fraction of the human labor.<sup>29</sup> Not all of these gains have been for direct human consumption; over half of U.S. corn crops, for example, are fed to cattle, hogs and poultry.<sup>45</sup> The actual amount of calories in the U.S. food supply increased by 20 percent over this period.<sup>46</sup> It has been said that U.S. agriculture has become the “most efficient in the world, at least in terms of the dollar and cent costs of production.”<sup>19</sup> These benefits, however, have come with costs to the public’s health, social **equity**, animal welfare and the natural environment. Because these costs are not reflected in the price tag of food, they are sometimes called **externalities** or **hidden costs**. These are discussed in detail throughout the rest of the curriculum.

## Industry concentration

One of the more recent trends in the history of the U.S. food system has been the shift toward greater industry **concentration**—the extent to which a small number of corporations control most of the sales.<sup>42</sup> The economic conditions established by the industrialization of the food system played a large part in furthering this trend.<sup>21</sup> The expenses associated with operating large-scale, industrialized facilities generally favored large, well-financed corporations.<sup>47</sup> These corporations grew even larger as they acquired smaller businesses and merged with other corporations.<sup>37,39,42</sup> As a result, many industries along the supply chain have come under the control of fewer corporations.<sup>42</sup> These include seed and chemical manufacturing, food animal production, food processing, supermarket retail and fast food restaurants.<sup>21,39,48</sup> Over 80 percent of the beef packing industry is owned by just four corporations, while just two corporations control over half of the corn seed market.<sup>48</sup> Many fast food franchises are now owned by larger food corporations.<sup>38</sup> One measure of industry concentration is **vertical integration**—the extent to which a single company

controls multiple successive stages along the supply chain of a product.<sup>49</sup> For example, a single corporation controls a large share of seed, pesticide, fertilizer and animal feed production; grain storage and distribution, poultry production and processing, and TV dinner manufacturing.<sup>50</sup>

Concentration in the food system can lead to greater efficiency, reduced costs and, in some cases, lower prices for consumers.<sup>42</sup> With fewer competitors in the market, however, dominant corporations gain greater control over setting food prices.<sup>21,42</sup> Concentration can also leave farmers and other citizens with less autonomy over how food is produced, processed, shipped and sold. For example, farmers may be pressured into following the practices dictated by dominant agricultural and food processing corporations.<sup>21,47</sup> Individual livestock producers, under contracts with vertically integrated corporations, have limited control over how to raise animals.<sup>30</sup> Many dominant corporations in the food system have a strong presence in the federal agencies responsible for oversight of agriculture and related activities, where they can influence policies in their favor.<sup>21</sup>

## Looking to the future

Over the past 10,000 years, the world's food systems have undergone enormous changes. The current industrialized system in the United States represents only a brief moment in the long span of human history; even agriculture is a relatively recent phenomenon. The many trials, tribulations and transformations of the food system over time remind us that the current form is not necessarily here to stay, nor do we necessarily wish it to remain unchanged. Along with the benefits that industrialization offers are a significant number of health, social, environmental and economic costs. An understanding of how the current system came to be established can help guide efforts to address these harms.



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