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Food Choice Reform: Shifting American Culture Toward Sustainable Diets

Colleen McCarthy
cmccarthy52@fordham.edu

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Food Choice Reform: Shifting American Culture Toward Sustainable Diets

Colleen McCarthy

Abstract

Excessive meat consumption is associated with a wide range of environmental problems.

Reducing meat consumption has been recognized as one of the most efficient ways to decrease one's ecological footprint, yet meat consumption is still on the rise and many are not willing to make changes to their diets to include less meat. This paper discusses the problem of America's continued and rising overconsumption of meat, with the end goal of developing and concluding which strategies are most effective at motivating consumers toward a more sustainable diet.

Chapter 1 gives an overview of why a reduction in meat consumption is necessary by discussing quantitative data from the Food and Agriculture Organization showing the environmental implications of meat consumption and the relationship between industrialized animal agriculture and environmental issues such as climate change. Chapter 2 delves into the history and development of the American food system and how different dominant food systems affect our diets. It explains the different cultural, economic, and technological factors that influence our food choices. Chapter 3 defines what a sustainable diet is, what it means for the environment, and what it means for our health. It gives examples of and guidelines of diets that are considered sustainable. It concludes that the two most important things to do when trying to eat more sustainably is to eat more plants, and eat less meat. Chapter 4 discusses the various psychological, sociological, cultural, and economic internal and external barriers that exist that prevent consumers from making the switch to a more sustainable diet. Chapter 5 is primarily concerned with combating these barriers, and coming up with solutions on how to best motivate consumers to make more sustainable food choices with both bottom up and top down efforts.

Keywords: Sustainability, meat consumption, animal agriculture, anthropology of food, behavior change, sustainable diet, food systems

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Introduction

As population and general affluence of the world has increased, specifically in the United States, our culture has morphed into one that is primarily defined and controlled by one thing: consumption. Oftentimes, the word “consumption” is associated with an increase in material possessions, but one of the most impactful things that is consumed more as a result of our industrialized society is food, particularly meat. The environmental impacts of an increase of meat in the American diet is staggering, and per capita consumption of it is only expected to increase. In order to mitigate this crisis, consumer preferences need to shift toward diets that include less meat, and more plant based, sustainably sourced options.

This paper discusses the problem of America’s continued and rising overconsumption of meat, with the end goal of developing and concluding which strategies are most effective at promoting sustainable diets. Chapter 1 gives an overview of why a reduction in meat consumption is necessary by discussing quantitative data from the Food and Agriculture Organization showing the negative environmental, personal, social, and economic implications of meat consumption and the relationship between industrialized animal agriculture and environmental issues such as climate change. Chapter 2 delves into the history and development of the American food system and how different dominant food systems affect our diets. It explains the different cultural, economic, and technological factors that influence our food choices. Chapter 3 discusses what a sustainable diet actually comprises of, as well as what a sustainable diet means for individual health, the economy, our culture, and our environment. It proposes reduction of meat consumption as an important factor of a sustainable diet. Chapter 4 discusses the various psychological, sociological, cultural, and economic internal and

external barriers that exist that prevent consumers from making the switch to a more sustainable diet. Chapter 5 is primarily concerned with combating these barriers, and coming up with solutions on how to best motivate consumers to make more sustainable food choices with both bottom up and top down efforts.

Chapter 1. The Costs of Factory Farming

According to the Millennium Ecosystem assessment, global economic activity increased nearly sevenfold between 1950 and 2000. As income grows, the importance of cheap staples such as rice, wheat, and potatoes declines, diets include more fat, meat and fish, and fruits and vegetables, and the proportionate consumption of industrial goods and services rises. The Food and Agricultural Organization confirms this statement, saying that global demand for livestock production is projected to increase 70 percent to feed a population estimated to reach 9.6 billion by 2050 (Steinfeld et al. 2006, 21).

Why is this a problem? Because excessive consumption of factory farmed meat is linked to a variety of environmental, social, economic, and public health issues. The livestock sector is the world's largest user of agricultural land, through grazing and the use of feed crops, as well as a major contributor to climate change, air pollution, water pollution and overuse, and biodiversity loss. These impacts will diminish the positive ecosystem services the environment offers to human life. Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food, water, timber, and fiber; regulating services that affect climate, floods, disease, wastes, and water quality; cultural services that provide

recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling. The human species is fundamentally dependent on the flow of ecosystem services, but industrial meat production degrades these services (Millennium Ecosystem Assessment 2005, V).

The degradation of ecosystem services also represents a loss of natural capital asset. Both renewable resources and nonrenewable resources such as mineral deposits, soil nutrients, and fossil fuels are natural capital assets, yet traditional national accounts do not include measures of resource depletion or of the degradation of renewable resources. The Millennium Ecosystem Assessment explains that, as a result, the land degradation, deforestation, and pollution caused by animal agriculture only shows as a positive gain to GDP despite the loss of the capital asset. The negative impacts of animal agriculture are as follows.

Land Degradation. A 2006 report from the FAO called “Livestock's Long Shadow” aims to assess the impact of the livestock sector on environmental problems, starting with the problem of land degradation. The livestock sector is the single largest anthropogenic user of land. The total area dedicated to feed crop production amounts to 33 percent of total arable land, and overall, livestock production accounts for 70 percent of all agricultural land and 30 percent of the land surface of the planet. Expansion of livestock production is a key factor in deforestation, primarily in Latin America where the greatest amount of deforestation is occurring – 70 percent of previous forested land in the Amazon is occupied by pastures, with the remainder covered by feed crops. About 20 percent of the world’s pastures and rangelands have been degraded to some extent, mostly through overgrazing and erosion (Steinfeld et al. 2006, xxi). This is a serious threat to biodiversity, which will be discussed later, as well as a threat to air quality given the

elimination of forests as carbon sinks for conversion into pastures or land to grow crops for livestock. As the demand for meat rises, habitats will continue to be turned into agricultural land and we will continue to lose the ecosystem services these habitats offer us.

Climate Change. Climate change is currently one of the most serious issues facing the human race. According to the Intergovernmental Panel on Climate Change, each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850 (Pachauri and Mayer, 2015). The globally averaged combined land and ocean surface temperature data as calculated by a linear trend show a warming of 0.85 [0.65 to 1.06] °C over the period 1880 to 2012. The livestock sector is a major contributor to climate change, responsible for 18 percent of greenhouse gas emissions measured in CO₂ equivalent. This is a higher share than transport. This is mostly due to land-use changes such as deforestation in order to expand pastures and arable land for feed crops. The greatest contribution to these emissions come from producing and processing animal feed (45%). The rapid increase in factory farms in the United States was made possible by the overproduction of corn and soybeans—resulting in increased emissions from fertilizing, harvesting, transporting and processing all of these grains into feed. Livestock are also responsible for much larger shares of some gases with far higher potential to warm the atmosphere. The sector emits 37 percent of anthropogenic methane, which has 23 times the global warming potential of CO₂ (though it does not stay in the atmosphere as long). The sector also emits 65 percent of anthropogenic nitrous oxide, mostly from manure. Livestock are also responsible for almost two-thirds of anthropogenic ammonia emissions, which contribute to acid rain and acidification of ecosystems (Steinfeld et al. 2006, xxii).

Air Pollution. Factory farms are responsible for significant amounts of toxic chemicals being released into the air. Decomposing manure releases ammonia and hydrogen sulfide gases in concentrations that are potentially harmful to nearby residents. According to the Government Accountability Office (GAO), storing large quantities of livestock manure on factory farms could cause emissions of “unsafe quantities” of ammonia, hydrogen sulfide and particulate matter. Overexposure to hydrogen sulfide can cause dizziness, nausea, headaches, respiratory failure, hypoxia and even death. Hydrogen sulfide released from factory farms has contributed to increased diagnosis of respiratory and digestive illness and workers in factory farms experience high levels of asthma like symptoms and bronchitis. Releases of hydrogen sulfide in liquid manure holding pits can exceed lethal levels when waste from the lagoons is agitated prior to being pumped out of the facility. In fact, one 1,500-cow dairy in Minnesota released so much hydrogen sulfide gas in 2008 that the state evacuated nearby residents and declared the dairy a public health hazard. Exposure to a variety of pollutants from factory farms can lead to lung problems such as irritation and impaired breathing. Children exposed to factory farm pollutants face higher likelihood of having asthma or taking medication for wheezing. In addition to the health risks, factory farm odors diminish the quality of life for neighbors who can no longer hang their laundry out to dry, picnic in their yards, sit on their porches or even open their windows. Odors from factory farms have been associated with physical symptoms such as headaches, eye irritation and nausea. (Factory Farm Nation 2015, 23).

Water Depletion and Pollution. 64 percent of the world’s population is expected to live in water-stressed basins by 2025. The livestock sector is a key player in increasing water use, accounting for over 8 percent of global human water use, mostly for the irrigation of feed crops.

It is also most likely the largest sectoral source of water pollution, contributing to eutrophication, “dead” zones in coastal areas, degradation of coral reefs, human health problems, and emergence of antibiotic resistance. The major sources of pollution are from animal wastes, antibiotics and hormones, chemicals from tanneries, fertilizers and pesticides used for feed crops, and sediments from eroded pastures. In the United States, livestock are responsible for an estimated 55 percent of erosion and sediment, 37 percent of pesticide use, 50 percent of antibiotic use, and a third of the loads of nitrogen and phosphorus into freshwater resources. Livestock also affect the replenishment of freshwater by compacting soil, reducing infiltration, degrading the banks of watercourses, drying up floodplains and lowering water tables. Livestock’s contribution to deforestation also increases runoff and reduces dry season flows (Steinfeld et al. 2006, xxii).

States have identified animal feeding operations specifically as the polluters of almost 20,000 miles of rivers and streams and over 250,000 acres of lakes, reservoirs and ponds. untreated livestock waste is flushed out of confinement buildings into large cesspools, or lagoons which can leak or burst and spill into local waterways, killing aquatic life and spreading waste and odor across communities. Contaminants that make their way from manure into drinking water includes heavy metals, antibiotics and pathogenic bacteria. Six of the 150 pathogens found in animal manure are responsible for 90 percent of human food- and water-borne diseases: Campylobacter, Salmonella, Listeria, E. coli 0157:H7, Cryptosporidium and Giardia. (Factory Farm Nation 2015, 21).

Biodiversity. We are currently in an era of unprecedented threats to biodiversity. The loss of species is estimated to be running 50 to 500 times higher than background rates found in the fossil record. Fifteen out of 24 important ecosystem services are assessed to be in decline.

Livestock account for about 20 percent of the total terrestrial animal biomass, and the 30 percent of the earth's land surface that was once habitat for wildlife. Since it is the major driver of deforestation, it very well be the main cause of biodiversity loss. Some 306 of the 825 terrestrial ecoregions identified by the Worldwide Fund for Nature (WWF) – ranged across all biomes and all biogeographical realms, reported livestock as one of the current threats. Conservation International has identified 35 global hotspots for biodiversity, characterized by exceptional levels of plant endemism and serious levels of habitat loss, and of these, 23 are reported to be affected by livestock production. An analysis of the authoritative World Conservation Union (IUCN) Red List of Threatened Species shows that most of the world's threatened species are suffering habitat loss where livestock are a factor (Henning et al. 2006).

Impact on Communities. The negative impacts of factory farming are not limited to environmental degradation and pollution—they also threaten the livelihoods of independent, medium-size and smaller farmers. Research shows that as factory farms increase in number, rural employment and income decline. A 2003 study of nearly 2,250 rural counties nationwide found that counties with larger farms had lower levels of economic growth, suggesting that larger farms make smaller contributions to local economies. (Factory Farm Nation 2015, 25).

Factory farming processes also have severe negative impacts on public health, harming not only those who live near the farms, but those who consume the meat produced there. Factory farming processes often lead to food borne illnesses including E. coli and Salmonella. This is a result of the cramped, unsanitary conditions of CAFOS that create the perfect environment for diseases to thrive.

E. Coli thrives in factory farm conditions. This is because instead of eating grass, cattle in feedlots are fed grains such as corn and soybeans that increase the concentration and length of time that E. coli survives in manure, contaminating not only the animals themselves, but surrounding crops such as vegetables. In fact, the FDA suggested that the 2018 outbreak of E. coli from romaine lettuce could likely be attributed to contamination of water supply by a neighboring feedlot (Beach 2018).

Salmonella is another one of the most common causes of foodborne illness, and is a bacteria found in the intestinal tracts of animals. Meat, poultry and eggs are common sources of Salmonella infection for people. The tight confinement and crowded conditions found in U.S. operations are thought to increase the risk of Salmonella. In addition to the threat of foodborne illness posed by Salmonella, the medical community has worried that the overuse of antibiotics in livestock production could make these illnesses harder to treat. Although Salmonella can run its course without treatment, it also can cause severe complications, especially in the very young, elderly and immune-compromised (Factory Farm Nation 2015, 29).

Antibiotic resistant bacteria is another issue. Factory farms administer antibiotics to livestock in such a way that promotes antibiotic resistance. The Food and Drug Administration reported in 2011 that agriculture uses drugs from every major class of antibiotics used in human medicine. Livestock and poultry producers typically mix low doses of antibiotics, below the amount used to treat an actual disease or infection, into animals' feed and water over long periods of time. The low doses of antibiotics kill some bacteria, but not all, leaving the antibiotic-resistant bacteria to survive. Multiple studies have found antibiotic-resistant bacteria in many types of retail meat and poultry products. In other words, when you buy meat at the

grocery store, there's a decent chance that it has antibiotic-resistant bacteria on it. The Centers for Disease Control and Prevention (CDC) estimates that over 400,000 Americans experience an antibiotic-resistant infection from pathogens spread through food every year. (Factory Farm Nation 2015, 29).

Impact on Animal Welfare. The inhumane conditions of factory farms are indisputable, and largely concern our cultural and ethical relations with other sentient beings. Chickens and hogs raised in factory farms usually have no access to the outdoors, fresh air or natural light, and may spend much of their time confined in crates that are so restrictive that the animals cannot stand up, turn around or fully extend their limbs or wings. Dairy and beef cattle on factory farms do not have access to pasture where they can express their natural behavior and diet of grazing. Industrial livestock conditions make animals very vulnerable to disease. Additionally, most livestock breeds have been bred for specific production traits such as rapid weight gain, larger breasts on chickens, or high milk or egg production. For example, since the 1920s, changes to broiler chicken breeding and production have resulted in chickens that grow twice as big in half the time. This has created animals that are prone to structural deformities such as lameness and bone deformities, metabolic problems and susceptibility to infections. Growth promotion selective breeding that makes livestock prone to health problems is coupled with pharmaceuticals designed to make animals grow faster, such as the use of artificial growth hormones that can cause additional stress and side effects. Two controversial drugs designed to make animals grow lean meat faster are Ractopamine and Zilmax. Ractopamine mimics stress hormones in pigs and stimulates increased aggressive behavior, making pigs more likely to attack each other. The drug's manufacturer Elanco acknowledged that, because of aggressive behavior, pigs treated

with Ractopamine are at increased risk of injury during transport. In over 200,000 reports to the FDA, livestock producers reported pigs treated with Ractopamine experiencing “hyperactivity, trembling, broken limbs, inability to walk and death,” leading the FDA to require that a warning label be added to the drug. Zilmax, a similar drug to Ractopamine, has raised similar concerns. Meat producer Tyson rejected animals raised with Zilmax, citing concerns such as cattle arriving at slaughterhouses unable to walk. In 2014, Zilmax manufacturer Merck Animal Health suspended sales of the drug in order to audit its use, while still touting its safety. The FDA has approved adjustments to the drug label that would require lower doses, a likely precursor to returning Zilmax to the market (Factory Farm Nation 2015, 32).

Clearly, factory farming produces countless less than desirable effects for the environment, public health, and animal welfare. Next, we will we explore how this business came to be so entrenched within the U.S. economy and culture.

Chapter 2. From Agrarianism to Consumerism: The History of the American Diet

America is a meat-eating nation. Despite the knowledge that a diet that revolves around meat and dairy will take a greater toll on the world’s resources than one that is more plant based, meat remains the centerpiece of American meals. We love our burgers, we love our steak, and for many people, to give that up is unthinkable. How did meat become such an entrenched part of the American diet? Why the transition to the abusive, environmentally degrading factory farming system? How did our food system and our perceptions of what we should be eating become so complicated? There is no simple answer to these questions without analyzing the

history of the American diet through an anthropological, historical technological, economic, and cultural point of view.

Until agriculture was developed around 10,000 years ago, all humans got their food by hunting, gathering, and fishing. Traditional anthropological theories posit that man was able to develop from the nutrients they got from meat. By starting to eat calorie-dense meat instead of the “low-quality” plant diet of apes, *Homo erectus* took in enough extra energy at each meal to help fuel a larger brain (Gibbons 2013). However, new studies suggest that more than a reliance on meat in ancient human diets fueled the brain’s development. Richard Wrangham, for example, dismisses the popular Man-the-Hunter hypothesis about evolution and argues that meat “has had less impact on our bodies than cooked food,” and that “Even vegetarians thrive on cooked diets. We are cooks more than carnivores” (Garner 2009). Year-round observations confirm that hunter-gatherers often have poor success as hunters. For example, the Hadza and Kung bushmen of Africa fail to get meat more than half the time even with weapons such as bows and arrows. It had to have been even harder for our ancestors who didn’t have these weapons. The reality of the remaining hunter gatherer groups today is that no one eats a lot of meat, except in the arctic where seals and fish are a primary source of calories (Gibbons 2013). The primary conclusion we can draw from this is that meat is not necessary for humans to live healthy lives, yet we have found ourselves obsessed with it. This is why we must examine the cultural and economic factors that influenced meat consumption trends in the U.S throughout history.

It is necessary to explore the dietary habits of those in Europe, before America was colonized. In medieval England, the nobility spent personal fortunes and countless time and

energy preparing elaborate feasts. Among the wealthy, food and its preparation became the primary means of expressing rank and privilege. It has been said that in England “the poor eat to live, while in too many cases the rich live to eat” (Rifkin 1992, 53). In this sense, meat was used as a political and social tool, and this continued on for decades to come. Britain's attachment to beef became an obsession in the early modern era, influencing much of the direction of its colonial policies. The growing demand for beef among the British aristocracy, the emerging bourgeoisie class, and the military forced the British government to search for new pasture land in the 17th century. Scotland and Ireland became the first colonial grazing lands, followed in the nineteenth Century by the North American Plains (59).

America Pre-independence. In North America, land abundance enabled colonists to develop a meat centered diet on a scale that the old world could never provide. In the earliest years, settlers trapped, shot, netted, and ate venison, squirrel, lobster, pigeon, pheasant, and possum, but this was not enough for them (in terms of desire). This type of food was not “civilized” enough, as meat like beef, mutton, and pork were (Ogle 2013, 1). To European settlers, a civilization was not civilized without livestock. They could not succumb to the “uncivilized” hunting and gathering techniques of the Native Americans, and so, they didn’t. They imported livestock which thrived and spread across the land, as a symbol of the European’s “superior” culture and wealth. They were a symbol of wealth as well as the easiest way to convert a breadth of land into profit. Settlers valued livestock as evidence of civilization and sources of wealth. The consumption of large quantities of beef was believed to ensure greater strength and virility. Not to mention, the production of meat was less labor intensive than the production of fruits and vegetables, which required more labor in the form of planting, hoeing,

and harvesting. And so came the rise of livestock production in the U.S., which would only continue to grow with each passing year (Ogle 2013, 2).

America Post-independence. About fifty years after America gained its independence from Britain, the Western prairies had been completely subdued and colonized. Many of their inhabitants were exterminated. The Native Americans were forced onto reservations. The Buffalo had been slaughtered, leaving the rich grasslands of the Western Range to be used as grazing fields for cattle. By the time the U.S. Census Bureau declared the frontier officially closed in 1890, an area the size of all of Western Europe had been transformed into the largest pasture land in the world. In less than half a century, the Western wilderness had been converted to a productive resource (Rifkin 1992, 67).

The post-civil War era marked the beginning of America's emergence as an industrial power. Rail links and telegraph wires crossed the continent, bringing together raw resources, an immigrant workforce, and urban markets. This was a time when efficiency became highly valued; people were obsessed with finding new ways to maximize output in the minimum time, while exerting the minimum labor, energy, and capital in the process speed replace quality (119). Meatpacking houses were the first American industry to create the assembly line. They streamlined the process of slaughter by the use of the conveyor belt, and suddenly, the speed with which an animal could be killed, dismembered, cleaned, and packed was extraordinary (119).

America Post WWII. After World War II came the rise of Factory feedlots in the 1950s and 1960s. As Americans started leaving cities or suburbs, our food moved in the opposite direction, and went from widely dispersed farms to live in “new animal cities” called

Concentrated Animal Feeding Operations (CAFOs). Both of these were a result of post war government policy—suburbs were built because of the interstate highway system, the G.I bill, and federally subsidized mortgages, and CAFOs developed as a result of cheap, federally subsidized corn (Pollan 2006, 67). As animals left the actual farms, more land became available for the production of corn, which became the main feed for animals that had never eaten corn, and weren't necessarily supposed to eat corn. This was economically convenient—more meat could be fed and therefore produced at a faster rate and at a cheaper price. Meat, which was once a special occasion in American homes, was made so cheap that many could start eating it three times a day. The cheapness of CAFO meat has seen its consumption increase, despite the biological and economic consequences of it (Pollan 2006, 67).

Meat consumption has since steadily risen in the U.S., and this primarily coincides with rises in income. Regional, ethnic, or ethnic differences aside, as income rose, so did the demand for meat (Horowitz 2006, 11). In 1909, the British Board of Trade conducted a study that showed that per capita meat consumption ranged from 136.1 pounds for households earning less than \$1,000 annually to over 200 pounds for families with incomes higher than \$2,000, demonstrating that families favored beef and poultry as incomes rose. This pattern has remained true for much of history. Meat consumption dropped significantly during The Great Depression, climbed again in the 1950's after the end of the Korean War's rationing programs, and reached a high level in 1965 with all groups eating over 200 pounds of meat per capita annually, as a result of the post-World War II boom. This post war boom made things that were once luxuries, normal, and meat became a symbol of post war prosperity. For children who grew up in this post-war boom in the 1960's, meat was "a part of what it meant to have a prosperous America" (Horowitz 2006,

15). Why would anyone intentionally eat less of it and revert back to a depression era diet when they could now afford it? Meat was a measure of how good life was—it became ingrained in the American culture.

Consumer eating habits also influenced the way, and how much, meat was produced. Post World War II was a time when convenience was highly valued. Both consumption and production sped up, and meal preparation times declined as more women joined the workforce in the 1950's. This drop in meal prep time was facilitated by new technologies and food products. The home refrigerator became common in the 1950's. Microwaves, too, made it easy and convenient to heat up and defrost food. This made it easy to buy convenient meats, and simply keep them in the refrigerator or freezer until it was time to eat. Eating out also became more commonplace in the 1950's. These changes in consumer demand for convenient meat influenced the way meat was farmed, processed, retailed, and distributed. The meat industry had to keep up with the preference for convenience by continually trying to “tame nature” and bring meat further and further away from the way it exists in nature, which necessitated greater technological and chemical intervention (Horowitz 2006, 130). By the end of the twentieth century, meat was no longer raised, but rather, “grown.” Focus was spent on having the animals gain as much weight as possible in as little time as possible, which was done mainly through the use of the use of feedlots.

This new way of producing “convenient meat” did not come without criticism of the meat industry—many were aware of issues such as antibiotic use, additives, food borne illnesses, and bad working conditions for those employed in the meatpacking industry. Yet, the way meat was packed was, and still is, so simple, obscuring the actual complicated nature of its production.

America remains a meat-eating nation, because meat has remained a sign of the good, American life, despite our skepticism about the ethicality of our food system. Even the horrors that were depicted by Upton Sinclair's "The Jungle" were not enough to significantly change the culture around meat. Our culture values convenience, therefore we continue to consume and create demand for the "convenient meat" that is destroying the environment (Horowitz 2006, 152).

History of US Dietary Guidelines. The Federal government has provided dietary advice for the public for more than 100 years through bulletins, posters, brochures, books, and—more recently—websites and social media. Dietary guidance has generally included advice about what to eat and drink for better health, but the specific messaging has changed throughout the years to reflect advances in nutrition science and the role of specific foods and nutrients on health. The earliest focus of dietary guidance was on food groups in a healthy diet, food safety, food storage, and ensuring that people get enough minerals and vitamins to prevent certain diseases that occur when a vitamin or mineral is lacking in the diet. As nutrition science evolved, there was greater recognition of how the diet can play a role in disease prevention and health promotion. In 1980, the first publication of the Dietary Guidelines for Americans was released. Since then, the Dietary Guidelines have become the cornerstone of Federal food and nutrition guidance (History of the Dietary Guidelines, 2019). The U.S. dietary guidelines did not include considerations for sustainability until very recently in 2015, recommending Americans eat more fruits, vegetables, whole grains, and varied proteins. The new guidelines did not, however, recommend limits on processed or red meat. This is to be further discussed in the following chapter.

Chapter 3. What is a Sustainable Diet?

So far we have established that meat consumption has negative impacts on the environment, and that it is a large part of what is considered an American diet. If we want to improve the health of the environment, and the health of ourselves, there is a need for a shift to more of a sustainable diet. But what is a sustainable diet? The United Nations Food and Agriculture Organization describes a sustainable diet as “Those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources” (Burlingame and Dernini 2010). In short, a sustainable diet is one that promotes both human health and environmental health.

Environmental indicators of a sustainable diet. A sustainable diet is one that protects biodiversity—but how do we measure how much certain foods/diets do this? There are several indicators that help us do this. The first is the life-cycle assessment. In this method, an estimate is made of the effects on the environment over the whole lifecycle of a specific product such as food. The life cycle includes from production, to processing, to manufacturing, to transportation, to consumption, and finally, to disposal. Another environmental indicator of a sustainable diet is its carbon footprint. The carbon footprint is a measurement of the amount of GHG emissions resulting from a particular food/method of food production. A third indicator is embedded energy, which takes into account the energy used from agriculture, transportation, processing, food sales, storage, and preparation. Next is input-output analysis, which is the estimated impact of the average ecological impact of a product. Another form of measurement is ecological footprint; this is an assessment of societies demand for resources which is converted into a

measure of impact in terms of the measure of land that is used up to support society's demand, expressed in global hectares. Food miles is used to measure the distance that food products travel from producer to consumer, and the emissions that result from this. Water footprint is used to measure the footprint of water in diets, including both direct and indirect water use. It is also important to consider soil health, as if a diet deteriorates soil quality, it cannot be considered sustainable. Healthy soil provides many natural services including food growth, water filtration, and resistance to pests and diseases. Poor farming techniques can destroy soil. Waste is another factor to be considered when evaluating the sustainability of a certain diet—a diet that is sustainable would be one that produces as little food waste as possible. The last indicator is organic output or sales—generally organic production is more respectful of natural systems and is therefore more diverse and naturally produced (Mason and Lang 2017).

Health requirements of a sustainable diet. A sustainable diet not only promotes environmental health, but provides adequate nutrition to promote human health. How do we define adequate nutrition? Nutrition science is a complicated subject, and oftentimes susceptible to scientific reductionism. This can make it very hard for us to know what, and how much, of everything we should eat, especially while also considering the environmental impacts of our food. Excessive meat consumption has been associated with higher rates of heart disease and cancer—but how are we to know that this is because of the excess of meat, and not the lack of plants that the meat may be replacing? (Pollan 2009, 69). Diets and nutrition are complicated subjects but there is one thing that all scientists and dietary guidelines seem to agree on: eat less meat, and eat more plants. The 2015 Dietary Guidelines Advising Committee uses an evidence-based approach to evaluate the foods and food components that improve the

sustainability of dietary patterns. The approach used was to determine dietary patterns that are nutritionally adequate and promote health, while at the same time are more protective of natural resources (Dietary Guidelines Advisory Committee 2015, 94). They concluded that the U.S. population should move toward dietary patterns that generally increase consumption of vegetables, fruits, whole grains, legumes, nuts and seeds, while decreasing total calories and some animal-based foods. A diet that is more environmentally sustainable than the average U.S. diet can be achieved without excluding any food groups. The evidence consists primarily of Life Cycle Assessment (LCA) modeling studies or land-use studies from highly developed countries, including the United States. This can be achieved through a variety of dietary patterns, including the Healthy USDA-style Pattern, the Healthy Vegetarian Pattern, and the Healthy Mediterranean-style Pattern, each of which provides more plant-based foods and lower amounts of meat than are currently consumed by the U.S. population (See table 1) (Dietary Guidelines Advisory Committee 2015, 289). Despite misconceptions that may exist, low and meat free diets are compatible with our health.

Table 1. Composition of three USDA Food Patterns (Healthy U.S.-Style, Healthy Vegetarian, and Healthy Mediterranean-style) at the 2000 calorie level. Daily or weekly amounts from selected food groups, subgroups, and components.

Food group	Healthy US-style Pattern	Healthy Vegetarian Pattern	Healthy Med-style Pattern
Fruit	2 c per day	2 c per day	2 ½ c per day
Vegetables	2 ½ c per day	2 ½ c per day	2 ½ c per day
--Legumes	1 ½ c per wk	3 c per wk	1 ½ c per wk
Whole Grains	3 oz eq per day	3 oz eq per day	3 oz eq per day
Dairy	3 c per day	3 c per day	2 c per day
Protein Foods	5 ½ oz eq per day	3 ½ oz eq per day	6 ½ oz eq per day
--Meat	12 ½ oz eq/wk	--	12 ½ oz eq/wk
--Poultry	10 ½ oz eq/wk	--	10 ½ oz eq/wk
--Seafood	8 oz eq/wk	--	15 oz eq/wk
--Eggs	3 oz eq/wk	3 oz eq/wk	3 oz eq/wk
--Nuts/seeds	4 oz eq/wk	7 oz eq/wk	4 oz eq/wk
--Processed soy	½ oz eq/wk	8 oz eq/wk	½ oz eq/wk
Oils	27 g per day	27 g per day	27 g per day

Source: Dietary Guidelines Advisory Committee. 2015. Scientific Report of the 2015 Dietary Guidelines Advisory Committee: Advisory Report to the Secretary of Health and Human Services and the Secretary of Agriculture. U.S. Department of Agriculture, Agricultural Research Service, Washington, DC. Table D1.33.

Diets that limit or exclude meat consumption generally have better health and sustainability outcomes. Several studies examined variations on vegetarian diets, or a spectrum from vegan to omnivorous dietary patterns, and associated environmental outcomes. Vegetarian diets, dietary guidelines-related diets, and Mediterranean-style diets were variously compared with the average dietary patterns in selected countries. Overall, the estimated greater environmental benefits, including reduced projected GHG emissions and land use, resulted from vegan, lacto-ovo vegetarian, and pesco-vegetarian diets, as well as dietary guidelines-related and

Mediterranean style dietary patterns. These diets had higher overall predicted health scores than the average diet patterns. Moreover, for the most part, the high health scores of these dietary patterns were paralleled by high combined estimated sustainability scores. The synergy measured across vegetarian, Mediterranean-style, and dietary guidelines-related scores could be explained by a reduction in consumption of meat, dairy, extras (i.e., snacks and sweets), and beverages, as well as a reduction in overall food consumption (Dietary Guidelines Advisory Committee 2015, 290).

The Mediterranean-style dietary pattern described in Table 1 also has better health and sustainability outcomes than the average diet. The Mediterranean-style dietary pattern was examined in both Mediterranean and non-Mediterranean countries. In all cases, adherence to a Mediterranean-style dietary pattern compared to usual intake reduced the environmental footprint, including improved GHG emissions, agricultural land use, and energy and water consumption. Both studies limited either red and processed meat or meat and poultry to less than 1 serving per week, and increased seafood intake. The authors concluded that adherence to a Mediterranean-style dietary pattern would make a significant contribution to increasing food sustainability, as well as increasing the health benefits that are well-documented for this type of diet (Dietary Guidelines Advisory Committee 2015, 291).

Other studies examined different diets that generally replaced animal foods in various ways with plant foods. It was found that a diet with 50 percent reduced total meat and dairy replaced by fruit, vegetables, and cereals contributed the most to estimated reduced risk of total mortality and also had the largest potential positive environmental impact. This diet scenario increased fruit and vegetable consumption by 63 percent and decreased saturated fat and salt

consumption; micronutrient intake was generally similar with the exception of a drop in vitamin B12 (292).

Case study. Nordic countries, such as Sweden, have been researching sustainability and dietary choice since the late 1990s with the most recent edition of the Nordic Nutrition Recommendations (NNR) including an emphasis on the environmental impact of dietary recommendations. They concluded that in order to reach a more sustainable diet, we require more plant based foods and less animal-based food. We should choose primarily meat and fish with low environmental impact, eat more dried beans, peas, lentils, and cereals, choose mainly field vegetables, root vegetables, potatoes, fruits, and berries that store well, choose perishable products when they are in season, and minimize waste. There could, however, be a conflict between nutritionally and environmentally sustainable diets regarding the advice for fish and seafood and for the use of dairy fat in the food industry. The overall conclusion is that there are promising possibilities to eat nutritionally adequate and varied diets in a sustainable way (Nordic Nutrition Recommendations 2012, 47). The food choices recommended as necessary to reach a more sustainable diet are summarized in Table 2.

Table 2. Possible dietary changes from present average consumption to reach a sustainable diet: Health and environmental impact.

Consumption challenges. Change in present average consumption	Health effects		Environmental effects		Comments
	Positive	Negative	Positive	Negative	
Meat and eggs					
Less Meat – Ruminants (beef, sheep, game)	Less saturated fat Decreased cancer risk	Less iron and zinc	Less GHG* Less eutrophication	Lack of grazing animals where land is in abundance results in difficulty keeping the landscape open and varied. This might have a negative impact on biodiversity.	2/3 of all grain produced goes to animal feed. Demand for soy drives deforestation in the Amazon. Combined meat and milk production is more efficient than only meat production.
Less Meat – Pork, poultry	Less saturated fat Decreased cancer risk	Less iron and zinc	Less GHG	Pork and fowl production does not affect biodiversity.	2/3 of grain produced used in animal feed. Demand for soy drives deforestation in the Amazon. Fowl production is very efficient.
More eggs	Source of many nutrients		Climate effective	Soy in feed drives deforestation in Amazonas.	Soy can be replaced by domestic legumes.
Dairy products					
Less Dairy Milk	Less saturated fat (if consumption of high-fat dairy is reduced)	Less calcium Less iodine	Less GHG* Less eutrophication	Lack of grazing animals where land is in abundance results in difficulty keeping the landscape open and varied. This might have a negative impact on biodiversity.	Difficult to meet calcium recommendations without milk and dairy products.
Less Dairy Cheese	Less saturated fat Less salt	Less calcium Less iodine	Less GHG* Less eutrophication	Lack of grazing animals where land is in abundance results in difficulty keeping the landscape open and varied. This might have a negative impact on biodiversity.	Difficult to meet calcium recommendations without milk and dairy products.

Fish and shellfish					
More fish and seafood Wild	More unsaturated long-chain fatty acids More vitamin D More selenium More iodine	Risk of being exposed to contaminants		Increased pressure on fish stocks if not handled with caution following scientific advice. Leaking refrigerants on fishing vessels are strong greenhouse gases. Some fishing methods damage the ocean floor. Fishing methods are not always selective and large amounts of unwanted fish are caught and discarded.	Overexploitation of fish populations is a concern. Scientific advice and policies need to be followed.
More fish and seafood Farmed	More unsaturated long-chain fatty acids More vitamin D More selenium More iodine		More vegetable-based fodder is used, including for predatory fish	Farmed predators need large amount of fodder based on fish. Farmed fish that escape might weaken the wild population's genetic pool. Disease might spread to wild fish. Eutrophication from concentration of fish.	Aquaculture is rapidly increasing. Herbivorous fish species and filtering organisms are interesting options. Microalgae oil with DHA and EPA could be an alternative to consuming fish, but supplements have not been shown to perform as well as the naturally occurring nutrients in fish.
Plant food					
More fruits and berries	More dietary fibre More folate More nutrients overall		Low climate impact	Many fruits and berries are treated with pesticides. Large amounts are imported and transported long distances under climatized conditions.	Numerous foods in this category are transported by air.
More field vegetables including root vegetables	More dietary fibre More folate More nutrients overall		Low climate impact	Many field vegetables are treated with pesticides	Choose those that store well. Many of these vegetables store well.

Consumption challenges. Change in present average consumption	Health effects		Environmental effects		Comments
	Positive	Negative	Positive	Negative	
More, but less fossil fuelled greenhouse-grown, vegetables	More dietary fibre More folate More nutrients overall		Fewer pesticides are used and are often replaced with biological methods in greenhouses.	Fossil fuel is used for heating and cooling greenhouses.	Many greenhouse-grown vegetables are sensitive and require care-ful handling and certain tem-pe-ra-tures during transport. Many do not store well. More fossil free greenhouses are seen.
More potatoes	More dietary fibre More vitamins and minerals		Low climate impact	Potatoes are exposed to many diseases and pesticides are often used.	Store well
More dried legumes	Protein-dense plant food Low fat More dietary fibre More nutrients Overall health-promoting benefits	Might contain anti-nutritional substances and flatulence-promoting oligosaccharides	Nitrogen fixator Beneficial for crop rotation	Pesticide use	Store well Acceptability problems among some consumers
More nuts and seeds	Unsaturated fat Dietary fibre Protein Vitamins and minerals	Prone to mould.			Toxins, e.g. aflatoxins
More cereals and grains	More dietary fibre/ whole grain (if the intake of whole-grain cereals is increased) More vitamins and minerals	Increased intake of rapidly absorbed starch, with only minimal amounts of fibre and nutrients (if the intake of refined grain is increased). Prone to mold	Low climate impact for cereals, higher impact for rice.	Production of fertilizers causes emission of N ₂ O. Fertilizer used on fields cause eutrophication and emission of N ₂ O. Pesticide use	Rice production leads to CH ₄ emissions due to anaerobic fermentation under water. Toxins, e.g. DON in cereals.
More organic	None	None	Less or no pesticide is used		Lower production per hectare

			Beneficial for soil conditions Promotes biodiversity		
Dietary fats					
More vegetable oils	More unsaturated fats		Rapeseed production is part of agricultural rotation	Pesticide use	
Less butter	Less saturated fat		Less CHG* Less eutrophication	Lack of grazing animals where land is in abundance results in difficulty keeping the landscape open and varied. This might have a negative impact on biodiversity.	
Less palm oil	Less saturated fat		Less pesticide use Less deforestation Biodiversity increases		Palm oil production is very efficient per hectare. Land use change from deforestation is not included in the evaluation. Production of certified (sustainable production) palm oil is small but increasing. Trans fatty acid intake decreased dramatically when palm oil replaced partially hydrogenated fats.
Other					
Less savoury snacks	Less salt and fat				
Less sweets	Less energy (sugar and fat)			Some sweets have high climate impact	This is a large group consisting of a variety of sugary and fatty foods. The nutritional benefit is very low.
More water as drink	Contains no extra energy			The packaging and transport of bottled water has a significant climate impact.	

Source: Nordic Nutrition Recommendations 2012: Integrating Nutrition and Physical Activity.
2012. 5th ed. Nordic Council of Ministers.

Affordability and accessibility of a sustainable diet. Another aspect of a sustainable diet is its accessibility. In order for a diet to truly be sustainable, it must be available to those of all religions, cultures, and socioeconomic statuses. All people must be able to attain affordable, nutritionally sufficient, culturally acceptable food that has a limited impact on the environment (Mason and Lang 2017, 174). The diets proposed by the DGAC reflect foods that can be used to achieve a healthful eating pattern, and support the inclusion of diverse foods that are consistent with personal, cultural and religious preferences (Dietary Guidelines Advisory Committee 2015, 94). A diet that is nutritionally sufficient as well as environmentally friendly can fit into these factors, however unfortunately socioeconomic status, culture, and religion still play a role in the barriers to sustainable consumption, which will be discussed in chapter 4.

What Should We Eat? Quality food for sustainable diets should have a low environmental impact, promote public health, be culturally acceptable, accessible and economical, fair and affordable (Mason and Lang 2017, 220). Coming up with a meal plan of what someone should, how much of it they should eat, and when they should eat it is unrealistic. There is no one “sustainable diet” that is going to be perfect for everyone, or perfect for the environment. Given the many social, environmental, and nutritional factors sustainable diets take into account, achieving one can seem like a daunting task. We can, however, come up with a simple set of guidelines that will guide our food choices to be healthy for ourselves and healthy for the environment. Firstly, to achieve a sustainable diet, we should eat more plants. Humans have a biological dependence on plants and many studies have demonstrated that a diet rich in

vegetables and fruits reduces the risk of dying from common western diseases. The rate of cancer in countries where people eat diets rich in vegetables and fruits every day is half of what it is in the United States. Plants are rich in antioxidants, omega-3's, and fiber. Plant foods are also less energy dense than most other foods, meaning that consuming a plant based diet means consuming fewer calories (Pollan 2009, 163). The second guideline people should follow when it comes to adopting a sustainable diet is to eat less meat. We have already covered the environmental consequences of animal agriculture, however excessive meat consumption also comes with negative human health effects. It is also worth mentioning that unlike plants, human do not need meat to survive, despite its overwhelming presence in American culture and diet. The only nutrient in meat that cannot be obtained elsewhere is vitamin B-12, which we need very little amounts of (Pollan 2009, 165). This is not to say that meat isn't nutritious, it is, however, the amount that Americans consume is out of scale (on average 200 pounds of meat per year), especially when the way this meat is produced is considered. Studies also agree that risk of heart disease and cancer rises with rises in red meat consumption. Reducing meat intake to small amounts can greatly reduce ones risk for these diseases, as well as lower their ecological footprint. It is important to remember that meat is at the top of the food chain. This means that while it accumulates nutrients from the environment, it also accumulates the toxins that come with the industrial production of it (Pollan 2009, 166). The third guideline to follow is to consider how your food is grown/produced, and where it is coming from. It is generally better to eat organic foods that have been grown in healthy soils, and foods that are less processed. When possible, foods should be purchased locally so as to reduce the food miles impact as well as ensure the nutritional quality (170). Lastly, people should try and cook for themselves more

often. This limits our fast food intake, processed food intake, our food waste, and lets us have control over what we are putting into our bodies (197).

It is not expected for the average consumer to understand nutritionism, food science, or all the possible ways their food is negatively impacting the environment. But by following these simple guidelines, people can make better choices both for their health and the environment, and work their way toward something that can be considered a sustainable diet.

Chapter 4. Barriers to Sustainable Diets

There are a variety of factors, both personal and external, that limit behavior change toward a more sustainable diet/ eating less meat. First we will discuss personal factors, which depend on the individual person and their psychology.

Knowledge and Skills. The first personal factor that determines individual behavior is knowledge and skills. In order to consume more sustainably, we need to know what that means. If people do not know the environmental impacts of their food, or the nutritional impact of their food, they will not change. Unfortunately, knowledge of the environmental impacts of producing and consuming meat is low- only 28% of people agree that livestock production has significant impacts on the environment (Stoll-Kleeman and Schmidt 2016, 1265). There is a large gap in public understanding of the role livestock and meat consumption play in climate change. Another issue is that it is difficult to break people out of the frame of mind that meat is necessary for maintaining adequate health. Often times it is believed that a diet that involves little or no meat is not one that is going to provide enough protein, or other adequate nutrients. As discussed in

chapter 3, this is not true— a plant based diet can indeed provide all necessary nutrients for maintaining health, yet the lack of knowledge of the nutritional value of a plant based diet remains a barrier to reducing meat consumption, especially among middle aged people (Stoll-Kleeman and Schmidt 2016, 1266). Even with the plethora of information that demonstrates the significant health and environmental benefits of reducing meat consumption, it is difficult to break these strongly ingrained mental models. There is also simply a lack of knowledge of meat-free recipes, as well as skills required to prepare these recipes.

Personal Values. Personal values also play a role in the reduction, or lack of willing to reduce, meat in a diet. Values allow us to judge situations and determine what is right and wrong. Attitudes are also a factor, and they describe the way people feel about or evaluate a particular thing (Stoll-Kleeman and Schmidt 2016, 1267). Primary motivations for reducing or eliminating meat consumption is concern for animal welfare, concern for other humans (food insecurity), and concern for the environment. If an individual is not particularly morally concerned with these things, they may not change their behavior. Some may be concerned about these issues, but may hold the belief that their actions will not make a difference, causing them to not alter their behavior. Emotion also plays a large role in the decisions people make with regard to food choice. If someone has a strong emotional reaction to the thought of animal suffering, or the destruction of the environment, they are more likely to engage in a new behavior (Stoll-Kleeman and Schmidt 2016, 1267). Several studies also show that the mechanism of cognitive dissonance results in feeling emotionally uninvolved and thus is a barrier to changing meat eating behavior. When someone who eats meat is made aware that their behavior may not be in line with their values and attitudes, it makes sense to relieve this tension by changing

behavior and eating less meat. Many people, however, avoid the information that tells us the negative impacts of meat consumption as it leads to feelings of distress that produce negative feelings of denial in effort to remove guilt from the self. Instead of assuming personal responsibility, people may blame things they can't control, like food industries, or political establishments. These people are unlikely to change their behavior (Stoll-Kleeman and Schmidt 2016, 1268).

Habits and Taste. Habits and taste are another determinant of people's dietary choices, and are among the barriers to reduced meat consumption. Habits are repetitive and routine and it takes a strong willingness and motivation to change them. There is also an attachment to convenience in today's society, which largely influences our food purchasing habits. Many are unwilling to go out of their way to change.

Sociodemographics. Sociodemographic factors, such as socioeconomic status and gender, also shape people's food choices. Gender is a strong predictor of levels of meat consumption. Women are generally more emotionally engaged than men, and show more concern for animals and the environment. Men, however, are less willing to reduce their consumption of meat; they tend to eat more of it and feel less of an obligation to change. In "Food and Femininity", Kate Cairns argues that given that women continue to be the primary food planners, shoppers, and cooks in the home, ethical consumption operates as an extension of their historical responsibility for care work (Cairns 2015, 111). Many of the women she interviewed understood their food choices to be impacting others and wanted to ensure the impact was positive. According to Cairns, given that patriarchal conceptions of politics have tended to devalue contributions from women, women will instead resort to care-working for change. By voting for the type of system

they support through their food choices, women have the sense they have the power to create positive social change (119). A team of scientists at the University of Southampton in the U.K. conducted a year-long study to observe how 22 British male participants ordered food in social settings. Based on their observations, they concluded that men experienced "social isolation" among their friends for wanting to eat less meat. Though their research was limited in scope, it demonstrated that while men may want to adopt a more vegetarian or vegan diet at home, whether for health reasons or a care for the environment, they don't feel comfortable doing the same in public. For example, according to lead researcher Dr. Emma Roe, "A man in his late twenties called himself a vegetarian, yet found it awkward not to join friends in a bacon sandwich after playing football on a Sunday, because that is what they did together after football" (Rense, 2018). Essentially, while many men are interested in eating less meat, they do not have as much social permission as women do to do so.

It's easier for females to be a vegetarian or vegan because it's something that has already been coded as feminine. When a man is vegan or vegetarian, they have to find some way to explain or justify it while keeping the way others perceive them intact, and avoid being emasculated. We know there is a strong connection between meat and masculinity, and this makes it harder for men to forgo their consumption of it. In *Food and Femininity*, Kate Cairns interviewed a male, Ryan, who was a vegetarian. He stated he was vegetarian for environmental reasons, and was sure to make a very clear distinction that it is not because he cares about animals. He explained that people would joke about how he must really like cows, or that if he's vegetarian he must be gay too (Cairns 2015, 116). This further demonstrates the extent to which diet shapes the way males are perceived; it even goes as far to make assumptions about their

sexual orientation. So yes, while males may care about the same issues females do, they are not as inclined to fulfill that role of caring through food, as it threatens their identity.

It is obviously good that we see a lot of food activism among females, however, it becomes problematic when we consider that the food policy, which matters when trying to make a systemic change, is male dominated. More needs to be done to disrupt the gendering of food and power. Cairn's states that "sometimes disrupting gender relations requires an uncomfortable process whereby women take on more responsibility for public realms and men address a historical neglect of social reproduction (129). More needs to be done to combat the social and cultural norms that are limiting sustainable consumption as well as limiting female leadership. More effort should be put into involving men on the personal decision level, and women on the political decision level.

Differences in consumption also vary with age due to generational shifts in attitudes toward meat eating, as well as different motivations for reducing meat consumption. Younger generations are more motivated by moral and environmental reasons, whereas middle aged people are more swayed by health reasons. Overall, people all have a culturally based set of beliefs regarding meat consumption and this determines their attitudes and willingness to change their behavior.

Sociocultural Factors. Cultural and religious traditions, social norms, roles, and relationships, also form potential barriers to behavior change in different ways. As discussed in chapter 2, meat holds a cultural importance for many Americans, as well as many different cultures and religions. Powerful symbolism can be attached to it. Many view eating meat as a cultural norm. While vegetarians and vegans are often questioned about their reasons behind not

eating meat, people are not questioned about their reasons for eating meat as it is what is perceived as the norm in our society.

Corporate Control of Food. So far we have discussed personal and socio cultural barriers to reduced meat consumption, however there are also a variety of external factors including politics, economics, and the overall food environment that influence our behaviors.

Political inaction has been a long standing reason for unsustainable food choices, driven by the fear that attempts to reduce meat consumption would result in serious backlash and protest from powerful interest groups. Animal agribusiness is a \$125 billion industry controlled by a handful of corporations (Stoll-Kleeman and Schmidt 2016, 1270). These corporations use lobbying, lawsuits, financial contributions, public relations, advertising, partnerships and alliances, philanthropy, threats, and biased information to convince congress, federal agency, nutrition and health professionals, and the public that the science relating to health is so confusing that they should not worry about diets. Representatives of food companies and their trade associations repeatedly make claims such as “all foods can be part of healthful diets,” “there is no such thing as good or bad food,” “diets are a matter of personal responsibility and freedom of choice (especially choice to choose their products)”, and “advocacy for more healthful food choices is irrational (if it suggests eating less of their products)” (Nestle 2007, 358). Food industry officials appeal to emotion to argue against something that no nutritionist advocates—the purpose of nutritionists is to educate people that some foods are better for health than others, yet the food industry opposes this and uses its political skills and emotional appeals to discourage consumers from switching up behaviors to eat less, particularly eat less meat (Nestle 2007, 359). We select diets in a marketing environment in which billions are spent to

convince us that nutrition advice is so confusing, and eating healthy is so difficult, that there is no point in bothering to eat less of one or another food product or category. Many are oblivious to the ways food companies are influencing our choices. Many can recognize how food companies advertise to influence our behavior, but it is more complicated and difficult to understand the food industry's influence on congress, federal agencies, courts, universities, and other organizations, and their mission to make diets seem like a matter of personal choice rather than manipulation. People can make better choices, and yes, we have a responsibility to do so. But it is extremely difficult to do that in a society that operates in this way (Nestle 2007, 360) Another issue is food subsidies. Food subsidies provided by industrial countries for livestock based products, including feed for animals and animal products, amount to \$52 billion. These subsidies allow animal based products to be sold at a lower price, and cheap meat is yet another barrier for its reduced consumption, especially for low income communities.

Food Environment. A final external barrier to decrease meat consumption is the food environment in which people live, which encompasses physical surroundings and social climate, and food availability and access. Low income neighborhoods lack the same availability of healthy, fresh food that is abundant in higher income neighborhoods. Rather than produce oriented grocery stores, poor neighborhoods most commonly have small grocery stores (bodegas) and fast food restaurants, which often do not provide healthy food options, but rather help perpetuate an unhealthy lifestyle by focusing their advertising on items like cigarettes, alcohol and soda, and a meat dense menu. In these areas, "food deserts" are often formed, where fairly priced, good quality healthy food is unavailable (Segal 2010, 197).

In a report intended to measure and understand the consequences of food deserts, it was found that better access to a supermarket or large grocery store is associated with healthier food intakes, while low access is associated with decreased health. Studies have also found that greater availability of fast food restaurants and lower prices of fast food are related to poor diet. The relationship between food access and nutrition is also rooted in evidence that shows health disparities across race, ethnicity, and socioeconomic status, and these differences may contribute to these health disparities (Ver Ploeg et al. 2009, 51).

How is it that food deserts came to exist? The answer to this primarily lies in the government subsidization of cheap commodities such as corn and soy. This inexpensive food is overproduced and ends up in store as packaged snacks high in saturated fat, sugar, and calories. More of this unhealthy food can be bought with a smaller amount of money than fresh produce or other healthy foods. In this sense, it is the government that plays a large role in depriving underprivileged communities of healthy food at a reasonable price, since they are subsidizing large scale food production rather than small scale farming. The Department of Agriculture could invest to improve the diets of thousands of poor citizens instead of subsidizing the food industry (Segal 2010, 207).

Access is not the only issue when it comes to food choice. Good and healthy food is expensive. Dr. Adam Drewnowski, Director of the Center for Public Health Nutrition at the University of Washington, calculated, "a 2,000-calorie diet would cost just \$3.52 a day if it consisted of junk food, compared with \$36.32 a day for a diet of low-energy dense foods." Even with people eating a mix of foods, Dr. Drewnowski notes that most Americans spend approximately \$7 a day on food, whereas low-income people spend about \$4. It is easier to

overeate the unhealthy, energy-saturated food because it often tastes better and is more satiating in volume for its cost. In this sense, access may not necessarily be the cause of food deserts, but price and demand could have more of an effect (Segal 2010, 208).

The concept of food deserts leaves us with a question that has not yet been examined fully enough: Is it supply or demand that explains why people in low income areas consume less nutritious foods? While it is clear that without access to healthy food, people cannot eat healthily, this may not be the sole reason that nutritional inequalities exist. It is important, and may even be more valuable, to examine the issue from a demand side as well. This was demonstrated by a 2017 paper in which Allcott, Diamon, and Dube try to determine why food deserts exist.

The authors use nationwide household grocery purchase data from 2004-2015 and assign health index scores based on proportions of “healthy” versus “unhealthy” macronutrients. Items for sale in low-income neighborhoods had lower health index scores, including more sugar, fewer whole grains, and less produce. Low-income neighborhoods also had more convenience stores and bodegas, which provide less nutritious food than supermarkets available in higher income areas (Allcott et al. 2017).

Do differences in supply cause the income nutrition discrepancy, or could they result from low- and high-income households having systematically different food preferences? To separate the effects of supply and demand, the researchers tracked the impact of two events: a household moving to a more affluent county, and a supermarket located nearby. These events both allow an examination of the effects of changing the local environment while keeping the household constant. It was found that in the years before and after a move, household

consumption did not change to match the new county's patterns. Store entry affected *where* people bought groceries, however not *what* they bought. It did not improve healthy food purchases. Instead of reducing convenience store buys, people reduced spending at supermarkets that were further away and bought the same foods at the closer store. Each of these results contradict a supply-side explanation for the nutrition-wealth relationship, as people maintained similar nutritional purchases despite changes in their shopping environment (Allcott et al. 2017).

Suppose poor and rich neighborhoods faced the same food prices and availability. A study found that equalizing supply would close the gap in healthy eating between low- and high-income households by only less than 10 percent. A subsidy for healthy groceries, however, could increase low-income households' healthy eating to the level of high-income households at about 15 percent of the cost of the SNAP program. A full market analysis to determine what market failures would occur is still necessary, however these results suggest that policymakers should redirect efforts from supply-side policies toward means-tested subsidies (Allcott et al. 2017).

Overall, the exact cause of nutritional inequality has not yet been completely pinpointed. Reducing nutritional inequality by altering local food supply does not have a large impact on healthful eating, therefore supply oriented policy may be misguided. While increasing food access helps those without means of transportation it may not necessarily improve eating habits. Nutritional inequalities must be tackled more broadly, with solutions such as public education and poverty reduction offering the most hope for change.

Chapter 5. Driving Change

How are we to create a more sustainable food system? Is it really all up to the individual consumer? This concept of eating for change involves individual consumers taking personal responsibility for the flaws of our unsustainable food system— and this is good, because making more sustainable choices and reducing meat intake can have a great positive impact. The worrying aspect of this, however, is that the individualization of responsibility could be stifling collective action, perhaps minimizing the issue and making people feel that they can create enough change by simply eating or shopping better. And what are we to do in the face of all the barriers that restrict individuals from making more sustainable choices? Sustainable consumption is largely feminized, and yet those in positions of power to make more systemic political or corporate changes are generally men more often than not. Despite these challenges we must remember that consumers *can* drive systemic changes, and systemic changes can drive consumer behavior as well. In order for a more sustainable consumption, both sides of the equation must be addressed: top down and bottom up action.

Food Movements. The modern food movement is creating an important cultural shift by changing the way Americans both eat and think about food. There are several social movements that are continuously growing, that offer us lots of hope, such as the Slow Food Movement, the Reducetarian movement, and Meatless Monday campaign. According to the Values Institute at DGWG, a social science research company, the “flexitarian diet” also called the “Reducetarian diet” by the Reducetarian movement is a major health trend, which can be partly attributed to the Meatless Monday movement (Hauter 2012, 279). The Meatless Monday movement is a prime example of how we can use marketing principles to shift culture in a positive way. It was the

brainchild of Sid Lerner, the developer of the “Don’t squeeze the Charmin” commercials. Lerner remembered the idea of “meatless monday” from his childhood when it was introduced by the federal government during WWII as a rationing effort. Meatless Monday has now proven to be a first step for many people to move on to political engagement (280).

A more recent movement that has been gaining popularity is the Reducetarian movement. Like the Meatless Monday movement, it is built upon the principle that people don’t have to go totally meatless- just cutting out some helps (and is usually a gateway to full vegetarianism or veganism). The Reducetarian Foundation also serves as a vehicle for spreading the personal, environmental, and animal welfare benefits of eating fewer animal products and for conducting empirical studies on how to best communicate this information to consumers, business leaders, and policy makers (Reducetarian).

The Slow Food Movement has been around for 30 years now, and its mission is to inspire individuals and communities to change the world through food that is good, clean, and fair for all. While its mission is good and has inspired many, the higher cost and inconvenience of adopting the “slow food” style preclude choices for many people. This is why structural changes to society and to farm and food policy must be made. A Robust regional food system that benefits eaters and farmers cannot be achieved in a marketplace that only scale, rather than innovation, quality, or sustainability (Hauter 2012, 288).

Once people are more informed about the impacts of animal agriculture, they still need to know what they should eat. It can be very hard given the amount of choice and the seemingly conflicting information available to us. The truth is that it is not that hard at all to eat a more sustainable diet, people just are not well informed. We cannot rely solely on ethical consumers to

fix our food system. The government must do its part to create an economy in which sustainable diets are promoted, and not obscured by the governments close relationship with large food corporations and meat producers. There are many ways in which they can respond to this issue:

Government Subsidies. The government must limit the subsidization of grain for livestock consumption. This money should be used to subsidize food that can be readily consumed by humans. It does not make sense to use more land to feed our food than we do to feed ourselves. The government also needs to take more responsibility and cut its close ties with large meat corporations, and start taking action to lower demand for meat, thereby lowering its production. One way to do this would be a price increase on beef, perhaps by either pricing it with full cost pricing, or by imposing a tax on it to reflect its cost to the environment. In short, our government must prioritize the environment over profit and power. Currently, the meat industry has too much of a political sway, and U.S. government does not prioritize the environment and therefore will not sacrifice its relationships with the meat industry. The government must take a stand and commit itself to both public and environmental health.

Reductions in animal agriculture's climate footprint will only come about with policy changes in our federal, state and local governments that support a rapid transition away from the factory farm system. According to Food and Water Watch, this will require additional funding and support for research on greenhouse gas emissions generated by different agricultural systems and methods, a ban on new factory farms and on the expansion of existing ones, federal, state and local governments enforcing environmental laws that hold factory farms accountable for their pollution, and finally, technical assistance and funding from federal and state governments

that promote integrated crop and animal operations and build the infrastructure to support them (Factory Farm Nation 2015).

Reducing Economic Inequality. The harsh truth is that healthier and more sustainable food is more expensive than junk food and cheap meat. Government interventions including Green Carts, subsidized supermarkets, and healthy corner store initiatives have attempted to address this issue with little success. Many children in low income communities grow up on unhealthy food, and many people do not have the time or the money to buy and prepare meals for their families with fresh produce. The only way to really solve this problem is to attack it at its core: poverty and economic inequality. Education and healthy food in schools can only go so far when children from low income communities go home every day to face the same limited options. Unfortunately, the current programs in place to increase access to healthy food is only managing poverty, and not addressing it at its core (Hauter 2012, 305).

Regulating Advertising. As discussed in chapter 4, advertising plays a large role in perpetuating a dysfunctional food system. The marketing of fast food and junk food, particularly to children, should be regulated; otherwise, marketing geared toward healthier, more sustainable options will not stand a chance. Children are essentially exploited for their impressionability, and then develop eating habits that last well into the rest of their lifetime, harming their health, the health of our food system, and the health of the environment. Marion Nestle summarizes this issue well: “The intent of the First Amendment was to protect political and religious speech. I cannot believe that the intent of the First Amendment was to protect the right of food companies to market junk food to kids...it should be stopped, and it’s the government’s responsibility to do it” (Hauter 2012, 306). When we see food being marketed, we can ask ourselves important

questions to determine validity and trustworthiness: Do they avoid inappropriate targeting of children? Do they emphasize products of high nutritional quality? Do they disclose the contents of the product? Do they avoid making inappropriate or misleading health claims? Do they avoid exerting inappropriate pressure on officials in legislative, judiciary, and executive branches of government? Do they avoid exerting pressure on nutrition and food professionals to engage in activities that give rise to conflicts of interest? (Nestle 2007, 372).

Sustainable Dietary Guidelines. As discussed in chapter 3, the USDA releases dietary guidelines every five years to provide a framework for what the American people should be eating in order to live a healthy lifestyle. While the 2015 Dietary Guidelines made some progress in emphasizing the importance of eating more fruits and vegetables as opposed to meat, and offered a few eating patterns that are more healthy and sustainable than the typical American diet, including the including the Healthy USDA-style Pattern, the Healthy Vegetarian Pattern, and the Healthy Mediterranean-style Pattern, the USDA could go further to provide guidelines that fully consider the environmental impacts of different foods, and emphasize why this is important. Dietary guidelines should be developed by experts from a variety of fields such as agriculture, economics, environmental science, nutritional science, and social science. New dietary guidelines that take sustainability into account must be available and accessible to the public. They should do the following:

New dietary guidelines should involve a wide range of independent expertise spanning health, the environment, social science and economics in their development. They should involve consultation with government bodies, but only *after* development by independent experts. The guidelines should be accompanied by information highlighting the links between food, health,

the environment, social justice and economics, so that people understand the problems of current dietary patterns and the need for dietary change. After these guidelines are developed, they should be disseminated to the public, health professionals, consumer organizations, and those working in the food sector. The new guidelines should have clear guidance on: limiting meat consumption, focusing on dietary diversity while explaining the impacts for health and the environment, and how to make dietary changes that are appealing and accessible. Also addressed should be the environmental impacts of excessive consumption and food waste. They should also provide guidance on shopping, encourage home or community growing, safe and energy efficient food preparation and highlight the importance of food planning and the social and cultural importance of food in lives. These guidelines can be used as a first step to develop and implement food policies.

Education. Another barrier that needs to be overcome if we are to see any positive changes in consumer behavior is the knowledge gap. As discussed in the previous chapter, consumers will have no motivation to change their behavior if they do not even know of the harmful ecological impacts of industrial animal agriculture. Therefore, implementing educational initiatives is a necessity. There should be government mandated education-based initiatives implemented in schools that inform students about food production systems and the impacts different systems have on both human health and the environment. This could become part of the nutrition units in health and wellness classes, or could be part of a new required environmental education program. Students should be well informed about where their food is coming from and what the implications of it are, so that they no longer make food choices in ignorance. It would also be wise to extend education outside of the classroom into cafeterias. Cafeterias are a

common place where food is marketed to children. This marketing can change to be more educational not only about the nutrition and health of the food the kids are eating, but where their food comes from, and what the benefits of a plant based diet are for both health and the environment.

Advocacy organizations also play a role in this. Children are easily influenced by the advertisements of large food corporations trying to sell sugary, fatty, unhealthy foods. This suggests that children can be influenced by campaigns from advocacy organizations to eat more sustainable diets too. If students are adequately informed of the importance of a sustainable diet, and what that sustainable diet can consist of, perhaps we can shape the behavior of coming generations. While increasing education may not directly alter behavior, it can change attitudes and increase knowledge, leading to heightened support for economic, organizational, and policy interventions that could be more effective in driving change in the long run (Joyce et al. 2012).

School Food. In “Rethinking School Food: The Power of the Public Plate,” the school food service is described as a “litmus test of a society’s political commitment to sustainable development because it caters to young and vulnerable people whose physical tastes and habits of thought are still being formed” (Morgan & Sonnino 2010, 69). Delivering a sustainable school food, service, however, is not as easy as it sounds. In order for a school food system to be effective at changing culture around food, change must be implemented throughout the entire school system, from the classroom to the cafeteria (69).

Schools are part of their communities, therefore they cannot solve societal problems on their own, especially when it comes to something as complex as someone’s dietary habits. Campaigns promoting “healthy eating” have been largely unsuccessful for two main reasons:

they are overwhelmed by the junk food message, and they have assumed that putting the right information out there is enough for behavior change on its own. Healthy eating cannot just be something that is promoted in school cafeterias, but something that is tied into the wider educational package that stresses the positive links between food, health, physical and mental well-being, and environmental sustainability. It must permeate every aspect of the school environment—the classroom, the cafeteria, the vending machine, and the school grounds, to ensure that the entire school is consistent in its messaging. It could be included in morning announcements, school assemblies, materials sent home to parents and guardians, staff meetings, and parent-teacher meetings. These strategies can help reinforce messages about nutrition and sustainability and help ensure that students see and hear consistent information about healthy eating across the school and at home. This whole-school approach can raise knowledgeable consumers who care about where their food comes from, and the impact that it has on their health and the environment.

Typically, we don't associate school food with sustainable, farm-to-table, healthy food. This is why school food reform is a necessary tool that can develop new supply chains of fresh, locally produced foods. The Farm-to-School movement is an information, advocacy and networking hub for communities working to bring local food sourcing, school gardens and food and agriculture education into schools and early care and education settings. Farm to school empowers children and their families to make informed food choices while strengthening the local economy and contributing to vibrant communities. The National Farm to School Network provides vision, leadership and support at the state, regional and national levels to connect and expand the farm to school movement, which has grown from a handful of schools in the late

1990s to approximately 42,000 schools in all 50 states as of 2014 (National Farm to School Network). As Congress begins the next Child Nutrition Act Reauthorization (CNR), The Farm to School Network has an opportunity to leverage federal policy to support and grow farm to school activities. FTS is calling on Members of Congress to show their commitment to the well-being of the nation's children, family farmers, and food-producing communities by strengthening farm to school opportunities in the next CNR. This includes: The Farm to School Act of 2019, which is needed because while communities have already benefited greatly from the USDA Farm to School Grant Program, demand for this impactful program significantly outweighs current funding. Since 2013, USDA has received more than 1,900 applications requesting over \$141 million, but was able to make only 437 awards from \$30 million available. Congress must build on the success of farm to school by strengthening the grant program's scope and providing \$15 million per year in mandatory funding. Also of importance in the Kids Eat Local Act. The Kids Eat Local Act will bring more local food into school meal and child nutrition programs, reduce burdensome red tape, making it easier for schools to source local food, and provide market opportunities for local family farmers, ranchers and fishermen (Farm to School Advocacy, 2018).

Even more could be achieved if the programs like this were implemented across the entire spectrum of the public sector—in hospitals, nursing homes, colleges, universities, prisons, government offices, etc. Community food planning could play an invaluable role in promoting human health, social justice, and environmental sustainability (Morgan & Sonnino 2010, 74).

Marketing and the Media. It is largely our culture which hinders us from attaining more healthy and sustainable dietary norms. So how do we shift this culture? The media has always

been a highly effective tool in shaping cultures: it paints pictures of how people live, broadcasts social norms, models behaviors, acts as a vehicle of marketing, and distributes news and information. In the same way media has functioned to promote and shape our current culture around food, it can be used to change it. Media can start to question our culture of consumerism and instead promote sustainability. This would require a large shift, but the media has this power (Assadourin 2010, 151).

As discussed in chapter 2, the 1950's experienced a massive influx of consumerism. But if marketers were able to motivate a massive reorientation of cultural values and behaviors in the 50's, who is to say they can't do it again, this time, in a more socially responsible way? Social marketing, or marketing that is used to change social behavior rather than sell a product, has the potential to drive a new set of values that could lead to lifestyle and political changes around food. This won't be easy, but there are many opportunities.

Social marketing has a 40-year history of experience to draw upon, plus there are many lessons to learn by observing traditional consumer marketing. The internet has leveled the playing field in the media marketplace by reducing distribution costs and removing barriers of traditional corporate gatekeepers who limited the broadcast of messages that ran counter to their own. The emergence of social media has resulted in a "viral" distribution model through which inspiring messages can move almost instantly and at nearly no cost. For social marketers to play a role in the transition to a more sustainable culture around food, they will need to draw on the main lesson learned by consumer marketing in the 1950s: facts do not sell behavior change, but storytelling does (Sachs & Finkelpearl 2010, 152).

Communications Techniques. Consumers are generally going to respond better to campaigns emphasizing their personal health rather than environmental benefits. Everyone has different motivations, so not everyone is going to respond the same way to a certain communication approach, however mass media promotion campaigns from advocacy groups can have a positive impact on people's food choices. Behavioral change principles were used in a successful mass media promotion campaign to increase fruit and vegetable consumption in Western Australia. It was discovered in the formative research of a study that while people realized the benefit of increased fruit and vegetable consumption, they still had incorrect perceptions of recommended serving size, and lack of time and knowledge about how to prepare meals with vegetables. This was one of the barriers mentioned in the previous chapter. If the marketing messages directly target these barriers, however, they can be overcome. Population surveys found that over time, the media campaigns that directly targeted these barriers in Western Australia resulted in an increased consumption of fruit and vegetables. This is evidence that well-developed messages based on a thorough understanding of the determinants of behavior can influence dietary patterns (Joyce et al. 2012).

Storytelling for Behavior Change. Emotional storytelling connects people with causes. In traditional marketing, storytelling and using emotion to connect the consumer to a brand has always been critical in the selling of a product and building brand preference and loyalty. This same concept can be used in social marketing to shift culture in favor of sustainable food choices.

When it comes to issues such as the climate crisis, people are often bombarded by statistics and facts that can be overwhelming and cause people to become passive or feel

hopeless about the issue. This is an ineffective way of communicating and inspiring action and change. Humans are emotional beings. Therefore, the actions we take are largely driven by our emotions. A survey of the Web communications of the “environmental G8,” the foremost international nongovernmental organizations addressing climate change, revealed an approach that is still heavily devoted to the facts of the climate crisis, its dire consequences, and current policy proposals to address it. This information is not always very user-friendly, and far from inspiring. Emotional appeals are lacking. A recent study by the Yale Project on Climate Change and George Mason University’s Center for Climate Change Communication signals that the time for a fact-alone approach has passed. Seventy percent of Americans already believe climate change is a problem, therefore NGOs must shift gears to inspire action, not merely persuade people that climate change exists through presenting facts (Sachs & Finkelpearl 2010, 152). That being said, people knowing that factory farming is a problem is not enough to inspire action. We must tell the stories of the people who are impacted by its ill effects the most: the farmers, those without access to healthy food, etc. We must also tell the stories of those who are already fighting to change the factory farming system: success stories of small farms, innovations, steps in the right direction, etc.

Individual consumer choice most likely is not going to be enough to transform our unsustainable food system. What it can do, however, is create demand for and drive economic, organizational, educational, and policy interventions on a broader scale, that can eventually make the systemic change our food system needs. “Voting with our forks” must extend beyond individual choice to larger political arenas. Interdisciplinary collaboration is absolutely vital for success, because as discussed, food and dietary sustainability by no means belongs to just one

discipline. The problem is multifaceted, therefore, the solutions must be as well. It is going to take everyone: those in the natural sciences, those in the social sciences, individual consumers, policymakers, advocates, organizations, governments, and communities.

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