Food Loss Waste in the United States Food Supply Chain

An Analysis of Its Functions, Oversight, and Recent Impacts from the Coronavirus Pandemic

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Government oversight of the food supply chain consists of a complicated regulatory framework involving multiple executive branch agencies, congressional committees, and state governments. The agencies primarily involved with food safety issues are the Food and Drug Administration (FDA), the Food Safety and Inspection Service (FSIS), the US Department of Agriculture (USDA), the Environmental Protection Agency (EPA), and the National Marine Fisheries Service (NMFS). Although the above entities divide responsibility for different aspects of food safety and quality, according to a 2019 Government Accountability Office (GAO) report, the patchwork of statutes and regulations has led to "inconsistent oversight, ineffective coordination, and inefficient use of resources."[1]

This article focuses on the USDA's oversight of the American food supply chain. Because this topic is so vast, this report narrowly focuses on issues related to food waste in the supply chain and recent developments on this issue. This article also aims to summarize how this aspect of the food supply chain is regulated, which, due to its complexity, has been criticized for lacking transparency.

America's Food Supply System

The American food supply chain is a complex juggernaut with little uniformity across regions and sectors. Generally, the food supply chain begins at a farm. Later stages may include processing; retail; food service; institutional food service for entities like schools, hospitals, and correctional facilities; and households.[2] After the products depart the farm, they can have widely varying routes, depending on the type of product. Highly perishable products generally move faster than storage produce like garlic and potatoes. Additionally, the routes that foods take in the supply chain are highly complex. A recent research study tracking the food supply chain found 9.5 million links between American counties where food products were farmed and how they found their way to retailers.[3] See figure 1 for a visualization of the researchers' findings.

It is important to remember, however, that products generally do not have a direct path from farms to retailers or consumers. As one of the above report's authors explained in a follow-up article, "a shipment of corn starts at a farm in Illinois, travels to a grain elevator in Iowa before heading to a feedlot in Kansas, and then travels in animal products being sent to grocery stores in Chicago."[4] In other words, the supply chain of food across the nation is a complicated, variable maze.

To add to its complexity, one must keep in mind that this research did not account for imports and exports of food products. In 2019, agricultural imports were valued at approximately $131 billion.[5] In April 2020 alone, food exports totaled $10.6 billion, while food imports amounted to $11.4 billion.[6]

Monitoring Food Loss Waste: The USDA and EPA

Although agricultural production and imports are a significant aspect of the US economy, many agricultural products are lost or wasted every year. Food loss has been defined as "the edible amount of food available for human consumption but is not consumed."[7] Food waste is a subset of food loss, and that term refers to "when an edible item goes unconsumed, such as food discarded by retailers due to blemishes or plate waste discarded by consumers."[8] The USDA's Economic Research Service (ERS) estimates that in 2010, the total level of food loss within retail and households was $161 billion.[9] More recent research has revealed that in addition to having significant food loss in certain stages of the supply chain (retail

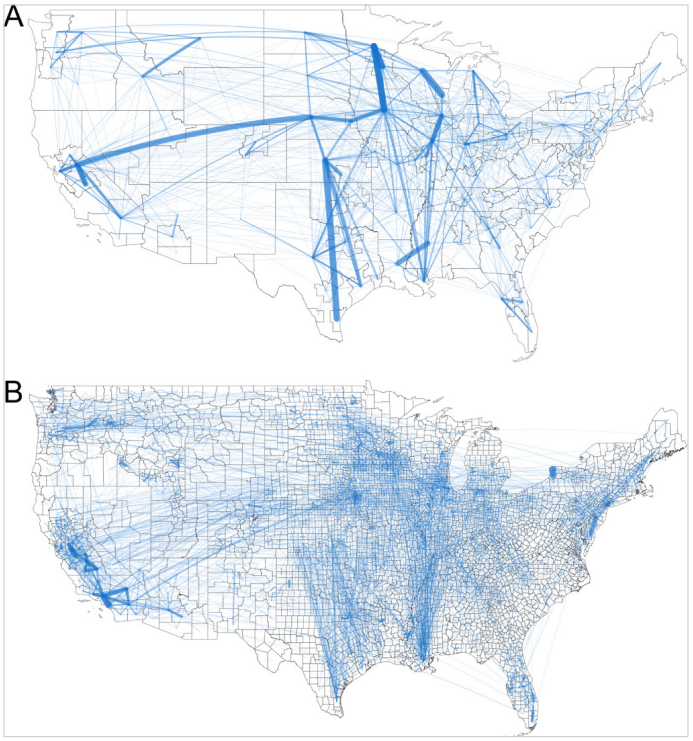

Figure 1. Maps of food flow networks in the US. The images demonstrate total food flows (tons) for the authors' (A) freight analysis framework, tracking where items are shipped around the country and (B) county scale. Image by Xiaowen Lin, Paul J. Ruess, Landon Marston, and Megan Konar from "Food Flows between Counties in the United States," https://iopscience.iop.org/article/10.1088/1748-9326/ab29ae and is licensed under CC-BY-4.0.

and households), earlier stages in the food supply chain are experiencing substantial food loss. One study found that up to 30 percent of food loss related to fruits and vegetables in the United States can be attributed to actions during agricultural production and harvest.[10] See figure 2 for a visual representation of these data.

Many causes have been attributed to these outcomes. According to Minor et al., some of the largest catalysts for this issue are the following:

- Price volatility: Produce prices fluctuate heavily, and farmers are unwilling to sell at a price that is lower than their cost of production and processing.
- Labor costs and availability: Farming depends on manual labor, which is costly, and the cost of production varies during the course of a growing season. Also, the number of available farmworkers has decreased over time, leading to increased applications for migrant laborers.
- Supply chain: Produce is extremely perishable, and if the supply chain breaks down early in the process, it is more likely that these products will perish and be unfit for market.

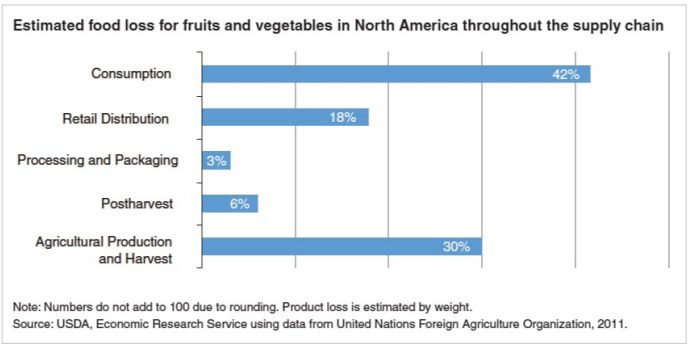

Figure 2. Estimated food loss for fruits and vegetables in North America throughout the supply chain.

- Standards and consumer expectations: Produce must meet retail specifications for appearance and other characteristics, and be appealing to consumers.
- Contracts: To sell their products, farmers enter into contracts with retailers to meet appearance and volume standards, which may lead to over-planting to have a better yield from which to select products.
- Government policies: as an unintended consequence, policies related to farming and food chain supply may incentivize over-planting, leading to more food loss.[11]

Food loss and food waste have become a more popular topic since 2013, when the USDA and the EPA called on participants in the food supply chain to "join the effort to reduce, recover, and recycle food waste."[12] The EPA's stake in policies and legislation related to food waste is related to the topic's apparent environmental impacts. According to one recent study, a reduction of food loss waste by 50 percent in the United States among households, restaurants, and food processing firms could lead to an 8–10 percent reduction of negative environmental impacts caused by the food system, including greenhouse gas emissions, land use, and water use.[13] The United Nations (UN) has adopted seventeen sustainable development goals (SDG), including SDG 12.3, which calls for a 50 percent reduction in food loss waste by 2030.[14] Similarly, the FDA, EPA, and USDA entered into a formal agreement in 2018 to reach similar food loss reduction goals.[15] This formal agreement provides, in part, for the agencies to coordinate efforts related to educating the public about the dangers of food loss waste.

Congressional Response to Food Loss Waste

In addition to the work of executive branch agencies, Congress has undertaken steps to address food waste. In 2008, Congress enacted the Food, Conservation, and Energy Act of 2008, also commonly referred to as the 2008 U.S. Farm Bill.[16] The general

scope of that legislation involved matters related to agricultural programs, including rural development, agricultural research, nutrition, and conservation, among other topics. As enacted, that law briefly discusses food waste, and contemplates that food waste could be used for livestock feed. Specifically, the law defines food waste as "renewable biomass," or, "any organic matter that is available on a renewable or recurring basis from non-Federal land or land belonging to an Indian tribe that is held in trust by the United States or subject to a restriction against alienation imposed by the United States."[17] That statute also references food waste as a resource for advanced biofuel, defined as "fuel derived from renewable biomass other than corn kernel starch . . . [including] biofuel derived from waste material, including crop residue, other vegetative waste material, animal waste, food waste, and yard waste."[18] Although it is not clear based on the records reviewed whether this legislation has had a measurable impact on food loss waste in the US food supply chain since its enactment, it demonstrates that for years policymakers and elected officials have considered the issue of food waste and attempted both to address it and define the term.

In 2016, the House Committee on Agriculture held a hearing on food loss waste across the US food supply chain.[19] Witnesses at the hearing included agricultural industry representatives, scientists, academics, and an executive from Feeding America, an organization that works to end hunger across the nation. Although the witnesses represented different interests, through each of their respective statements it became evident that food waste impacts multiple facets of American life and the US economy. For example, Dana Gunders, then a senior scientist at the Natural Resources Defense Council, provided relatable descriptions of food waste:

> So imagine walking out of the grocery store with five bags of groceries, dropping two in the parking lot, and not bothering to pick them up. It seems crazy but that is essentially what we are doing today across the country where we are wasting 40 percent of all our food. . . .
>
> Now imagine a farm that covers 3/4 of the State of California, and uses as much water as California, Ohio, and Texas combined. When you harvest that farm, it is enough food to fill a tractor trailer every 20 seconds, and then it drives all over the country, except instead of going to people to eat it, it goes straight to the landfill. This is essentially what we are doing today. In fact, food is the number one product entering our landfills today.[20]

Jesse Fink, a co-founder of Priceline.com and appearing as a representative for Rethink Food Waste Through Economics and Data (ReFED), outlined facts and figures before the committee on this topic:

> Addressing food waste can help solve three of our nation's largest problems. First and foremost is hunger. Our research found that solutions feasible today could nearly double the amount of food donated from businesses to hunger relief organizations. Second is economic development. Reducing food waste boosts the economy, with a conservative estimate of 15,000 jobs created from innovation. In addition, solutions available today can create $100 billion of net economic value over the next decade. This includes $6 billion in annual savings for consumers, $2 billion in annual potential profit for businesses, and a reduced burden on taxpayers, including lower municipal disposal costs. . . . Last, is the environment. Commonsense food waste solutions will conserve up to 1.5 percent of our country's fresh waste water, and this is lost on farms. In addition, reducing food waste will decrease methane emissions from landfills, and increase the health of our soils through composting.[21]

Witnesses and panelists in the hearing referenced a bill called the Food Recovery Act of 2015, which focused on various methods of reducing food waste.[22] That bill was introduced in the House and referred to various committees and subcommittees, but never discussed or voted on, on the House floor.[23]

More recently, Congress enacted the Agriculture Improvement Act of 2018, which, in part, called on the USDA Secretary to establish a Food Loss and Waste Reduction Liaison and to "conduct an evaluation of the pilot projects funded under this paragraph to assess different solutions for increasing access to compost and reducing municipal food waste."[24] Additionally, a House Report encouraged various agency heads "to raise consumer awareness surrounding food waste."[25] Actions taken to date by various governmental agencies and branches demonstrate that food waste and its impacts on public health, US agriculture, and the overall economy is a bipartisan issue affecting multiple cross-sections of Americans.

Current Issues Related to Food Loss: Coronavirus and Government Assistance

At the time of this article's drafting, the United States is grappling with the coronavirus pandemic. Along with nearly all

other sectors of American life, the pandemic has impacted rates of food loss waste across the country and the world. According to a report from the UN's Food and Agriculture Organization,

> Disruptions in supply chains resulting from blockages on transport routes, transport restrictions and quarantine measures are resulting in significant increases in food loss and waste, especially of perishable agricultural produce such as fruits and vegetables, fish, meat and dairy products.
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> * * *
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> Even before the COVID-19 pandemic, logistical challenges and weather conditions in developing countries often caused high levels of food loss during transport and in markets. The onset of seasonal harvest gluts in these countries could further exacerbate the high levels of loss sustained in the traditional food supply chains in these countries.[26]

It appears that the United Nations is looking closely at how food supply chains across the world have been impacted by the pandemic.

In response to the coronavirus, the US has put protections in place related to the food supply chain. For example, the USDA's Coronavirus Food Assistance Program provides direct payments to agricultural producers who have been impacted by the pandemic.[27] Additionally, the president issued Executive Order 13917, implementing the Defense Production Act for food supply chains in the beef, poultry, and pork industries.[28] Various bills also have been introduced in Congress regarding protecting the food supply chain and America's food supply, including the Community Meals Fund (H.R. 6384), that would award grants to anti-hunger groups who help those affected by the coronavirus pandemic.[29] A similar bill was introduced in the Senate called the Farmers-Feeding-Families Coronavirus Response Act (S. 3655), which would direct the USDA to buy food from producers affected by the pandemic.[30] Because this pandemic is relatively new, only time will tell what kind of long-term effects it will have across all types of institutions. It is likely that more legislation, programs, agency rules, and other actions will likely be created on this topic in the coming years. It may be worthwhile to follow federal legislation, programs, agency rules, and other actions to see how the federal government responds to its impact on the food supply chain.

Conclusion

Over the past several years, the topic of food loss waste has become a growing concern in both the United States and abroad. With the coronavirus pandemic presenting challenges across the world, the subject of food loss is only going to exacerbate. It is clear that increased education of the public is needed, especially as people are concerned about food scarcity and empty store shelves. Because it is an evolving situation, it may also be an interesting and worthwhile topic for researchers to look at more closely, using the resources listed above.[31]

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