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Food Waste and Covid-19: Impacts along the Supply Chain

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The Covid-19 pandemic has created massive disruptions in the food system, from farm to fork. In some cases, we have observed and experienced severe food shortages. In others, food cannot reach end consumers and is ultimately wasted. Food waste is not new or novel in our current food system; however, images and reports of whole fields being plowed under and millions of gallons of milk being dumped during a time of such economic hardship and increased food insecurity raises questions about how Covid-19 has impacted food waste along the supply chain.

This article reviews issues of food waste for five different actors along the food supply chain: 1) producers; 2) processors; 3) foodservice operators; 4) retailers; and 5) households. For each actor, we discuss how Covid-19 impacted food waste and why such changes likely happened. We conclude with a discussion of waste mitigation efforts, or "pandemic pivots," that we've seen along the supply chain this year.

Producer-Level Food Waste

At the farm level, food waste is often the result of market factors (for example, price volatility, high labor costs, or lack of labor availability); a product not meeting aesthetic standards for a buyer (most common for grocery retail and foodservice buyers); or damage from weather and pests (Minor et al., 2020). During Covid-19, these factors still contributed to waste, yet another, unforeseen factor significantly increased waste for some growers: specializing in production for the foodservice sector.

The supply chain for food is complex and highly specialized. Producers of perishable products like meat, milk, and fruits and vegetables often grow their crops specifically for either the grocery retail or the foodservice (e.g., restaurants, schools, hospitals, hotels, stadiums, movie theaters) sectors. Buyer specifications for each sector are different. For example, fresh produce (think heads of lettuce) can often be packaged in bulk for foodservice buyers, but for grocery retailers, more individualized packaging is needed (Richards, 2020; Ellison et al., 2020). Further, for field crops, planting is done well in advance of harvest; producers do not have the flexibility to adjust production mid-season when demand disruptions

have become apparent. Similarly, for livestock operations, animals do not stop growing (or producing – milk, eggs, etc.). Thus, for producers who are largely dependent on the foodservice sector, increases in food waste could be quite significant due to Covid-19. Below are just a few examples:

Example 1: Milk - When major buyers of dairy across the country - for example, schools and coffee shops - temporarily closed, the dairy industry suddenly had a surplus of milk on its hands. Cows couldn't stop being milked, so farmers who couldn't find alternative buyers dumped huge quantities of their excess milk. Milk couldn't be quickly re-purposed into other products with longer shelf lives, like cheeses, because of the limited processing capacity and cold storage. To read more about this, see Huffstutter, 2020; Siekierska, 2020; and Yaffe-Bellany and Corkery, 2020.

Example 2: Chicken - Unlike milk, chicken producers did not have trouble finding buyers. Their supply chain issue came in processing. Meat processing plants can have many people working in close quarters, which is not ideal for preventing the spread of Covid-19. Many meat packing firms had outbreaks, leading to reduced labor and slower output. Chicken farmers realized it would be too expensive to raise the quantity of chickens they had planned given the meat processing slow down, and some farmers euthanized their birds. For more, see Parshina-Kottas et al., 2020; Polansek and Huffstutter, 2020; and Jeffery and Newburger, 2020.

Example 3: Onions - About 40 percent of onions produced in the US are destined for restaurants. Although home cooking has increased and consumers are buying more onions for home use, it has not replaced restaurant buyers. This is especially true of large, mild onions intended for restaurants' onion rings (Yaffe-Bellany and Corkery, 2020; Dent, 2020).

Processor-Level Food Waste

Processors are often one of the most efficient nodes in the food supply chain when it comes to food waste. Any waste or trimmings at the processor-level are typically re-purposed for other products (for example, animal feed or bioenergy).

Covid-19 has undoubtedly impacted food processing facilities and most notably, meat processors. Many meat packing plants in the U.S. have experienced outbreaks among workers, which has limited processing capacity for some plants and resulted in temporary closures of others (Tonsor and Schulz, 2020). We are now seeing similar outbreaks in produce packing plants (Rosenberg, Cooke, and Walljasper, 2020). The impact on waste in processing facilities, however, is likely minimal. Processors are unlikely to be the party to incur waste when processing capacity is reduced; rather, producers are more likely to experience the waste because they cannot get the product off the farm and to a processing facility as highlighted in the chicken production example above.

Foodservice-Level Food Waste

The foodservice sector generates waste in both its back-of-house (kitchen waste) and front-of-house (plate waste) operations and can exert more control over back-of-house waste with careful planning and inventory management. However, no amount of planning could prepare foodservice operations for the sudden shuttering of businesses during Covid-19. Many states early on in the pandemic classified restaurants as non-essential, forcing them to close temporarily. For these restaurants, this likely increased food waste in the short term as they were no longer able to use their existing food stocks. As restaurants were allowed to re-open, the uncertainty around consumer demand for dine-in or take-out services may have also contributed to waste, though likely much smaller in magnitude than the initial shock of business closures.

Retail-Level Food Waste

At the retail-level, food waste in grocery stores is often attributed to: over-stocking of perishable products like fruits and vegetables to ensure consumers are satisfied with the product assortment and products reaching or nearing their stated or actual shelf life (Gunders, 2012).

When Covid-19 hit the U.S., the media consistently reported on empty shelves at grocery stores. First, there were shortages of toilet paper and sanitizing wipes, then meat and eggs, then flour, and so on. Household stockpiling behavior likely decreased food waste at the retailer-level overall, though it is

possible waste increased at the retail-level for more expensive products (for example, cuts of meat) as some households experienced negative income shocks such as losing a job or being furloughed and shifted to lower-cost alternatives.

Household-Level Food Waste

Before Covid-19, households were identified as the largest source of food waste along the supply chain in developed countries like the U.S. (Gunders, 2012; Buzby, Wells, and Hyman, 2014). Several factors contribute to household food waste, including poor planning and inventory management, confusion surrounding date labels, and bulk purchasing (Gunders, 2012).

Stockpiling, which has been a common household behavior in response to Covid-19, would be viewed as waste-increasing under normal circumstances because households often mismanage surplus food (Thyberg and Tonjes, 2016). As discussed by Ellison et al. (2020), some households may be willing to incur waste associated with stockpiling if it provides a sense of security in a time of a scarcity or if it allows for more social distancing (fewer trips to the grocery store). However, there are other factors that could decrease household food waste during Covid-19. Namely, unemployment has risen sharply during Covid-19. Households that experience reductions in income will likely have less waste, as food waste is positively related to income. Further, rising food prices during the pandemic are also likely to reduce waste for households at all income levels (Ellison et al., 2020). The net effect on household food waste is unclear, but there is likely to be significant heterogeneity across households.

Efforts to Mitigate Food Waste During Covid-19

Covid-19 has significantly impacted food waste along the supply chain; however, supply chain actors and policymakers have worked to identify “pandemic pivots” to mitigate food waste.

At the farm-level, many farmers donated or sold their products to food banks when possible (Karidis, 2020; Evich, 2020). As food banks are seeing increased use across the country right now, this reallocation of food that would otherwise be wasted seems ideal. However, it is not always feasible, particularly if farmers are expected to incur all the costs of getting the food to the food bank. For farmers who are already operating at a loss this year, adding the cost of harvest labor, packaging, and/or transportation to donate would put them further in debt. Farmers who have highly perishable products and little cold storage may also find this solution infeasible (Evich, 2020). Other farmers, who sold products that needed little or no processing, were able to set up direct to consumer sales through farmers markets, CSAs, or independently through sales online (Danovich, 2020; Flatow, 2020).

Outside of individual producers’ efforts, The U.S. Department of Agriculture started a food box program, which announced a potential purchase of $3 billion of fresh produce, dairy, and meat products, package them, and send them to US families in need. According to their website, 35.6 million food boxes were delivered in round one (May/June), 38.9 million food boxes were delivered in round two (July/August), and 344,000 boxes will be delivered in September (USDA-AMS, 2020). While this effort certainly helps to divert farm-level food waste, critics argue that the program is inefficient and less effective than an expansion of the Supplemental Nutrition Assistance Program (SNAP) in terms of providing much needed food aid during the pandemic (Charles, 2020).

Policies were also enacted to help producers who primarily sold to the foodservice sector make their products available in the grocery retail market. For example, egg regulations were temporarily relaxed so that “breaker eggs”, which are typically sold to foodservice operations, could be sold in the table egg market, as eggs experienced significant demand increases during the early stages of the pandemic (Malone, Schaefer, and Lusk, 2020). The U.S. Food and Drug Administration also relaxed labeling requirements for packaged foods as a way to allow restaurants and other foodservice operators a way to sell off their food stocks when their businesses were shuttered (FDA, 2020).

Concluding Thoughts

Covid-19 has disrupted the entire food supply chain. The disruptions have increased food waste for some supply chain actors, particularly producers who are strongly tied to the foodservice sector and foodservice operators who were forced to abruptly close. Other supply chain actors, including processors and grocery retailers, likely have not experienced such increases in food waste. Empty store shelves may be an

indication that waste decreased for grocery retailers. For households, changes in food waste will depend on several factors such as the extent of stockpiling behavior, food inventory management skills, potential negative income shocks, and sensitivity to rising food prices.

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