



# Economic Drivers of Food Loss at the Farm and Pre-Retail Sectors: A Look at the Produce Supply Chain in the United States

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## What Is the Issue?

The U.S. Department of Agriculture estimates the value of uneaten food at the retail and consumer levels at around \$161.6 billion annually. While a considerable number of studies have examined this type of food loss, few have analyzed the economic factors that result in loss of food on farms and in distribution channels. This study provides an overview of the drivers of food loss on the farm and other pre-retail sectors with a focus on economic incentives that underlie the way fresh foods are grown, processed, and marketed in the United States. Food loss as it relates to fresh fruits and vegetables is of particular interest because these foods are highly perishable and important to diet quality.

## What Did the Study Find?

The balancing of expected costs, revenues, and risks from the sale of produce by growers and distributors plays a substantial role in what is often described as “loss” at the pre-retail level in the produce supply chain. Examples of factors influencing food loss include:

- **Price volatility**—Prices of fresh produce are volatile. When prices fall below the cost it would take to get additional produce to market, growers may not advance produce through the supply chain because doing so becomes unprofitable. When prices rise, growers harvest more intensively (either by hiring more labor or by lowering product thresholds), and may have the incentive to send lower-cosmetic-quality product to market, which can then be subject to increased loss further down the supply chain.
- **Labor costs and availability**—Labor, particularly harvest labor, constitutes a relatively high share of the cost of growing and marketing fresh produce. Rising wages and labor availability often combine to increase the costs to harvest a field, leading growers to sometimes abandon the crop before harvest and make numerous other production and marketing decisions that directly impact levels of food loss.

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- Supply-chain factors—Investments in infrastructure for produce commodities (e.g., vacuum cooling refrigerated-storage facilities) are large, with benefits often shared across multiple growers. Incurring these costs for crops that would otherwise be discarded and would command (at most) a lower price often is not profitable for a single grower.
- Standards and consumer expectations—Produce that does not meet aesthetic or other requirements, at any stage in the supply chain, is likely to be rejected, either by buyers or by final consumers. Growers, shippers, and retailers make decisions about what and when to cull based on perceived consumer preferences; if any of these supply chain stages anticipate a buyer will not accept their produce, the produce will not be harvested or advanced through the supply chain.
- Contracts—Agreed-upon product quality (i.e., contracting) may reduce some of the variability in returns to growers that would otherwise be inherent in produce markets. However, contracts can also contribute to food loss by acting as barriers to entry for growers who are not already included but might seek access for excess product.
- Policy constraints—Policy (at the State, local, or Federal levels) can play a role in supporting food-loss reduction, recovery, and recycling (e.g., tax incentives for donating food); however, some existing policies may unintentionally serve as barriers (e.g., restrictions on gleaning (collection of excess food for the purpose of donation), supply control through private-public marketing orders) or fail to address the underlying causes of loss. Quality standards such as private and public marketing orders may also impact food loss rates.

While estimates exist of the value of uneaten food at the retail and consumer levels, numerous factors (e.g., data availability, coordination across stakeholders) make it difficult to provide consistent, reliable, national estimates of food loss on the farm and at the pre-retail level. Accurately collecting data on national food loss at the farm and pre-retail sectors would constitute a significant investment that is beyond the scope of this study. Opportunities to reduce food losses and improve farm income have begun to emerge. This study’s findings suggest that successful efforts to mitigate food loss need to be accessible and profitable to growers to reduce losses in the pre-retail supply chain.

## **How Was the Study Conducted?**

This study provides an economic framework for analyzing drivers of onfarm and pre-retail food loss. It collects and synthesizes information about fruit and vegetable food loss from the farm through the pre-retail supply chain gathered from relevant academic research, unstructured (nonsurvey) input from industry representatives, and growers themselves as well as case studies of specific commodities. Informal conversations with growers and other industry representatives are used to help frame the issue and provide insights about the definition, scope, and challenges surrounding issues of food loss in fresh produce. The study presents case studies of several key commodities (fresh field tomatoes, processing tomatoes, potatoes, strawberries, romaine lettuce, and fresh peaches) and summarizes the findings of a book on the topic titled “The Economics of Food Loss in the Produce Industry.”