



WHITE PAPER



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**Shelf-life Variability Begins in the Field**  
Produce Pallets Harvested on the Same Day Vary  
by as Much as 86 Percent, Contributing to Shrink  
and Lost Profits

## A Basic Misconception: Shrink Occurs at the Store

Many people believe that waste or shrink occurs at the end of the fresh food supply chain – when it manifests itself at the retail store. But a recent Zest Labs study has shown that the primary impact to shelf-life occurs in the first 48 hours after harvest – in the field and at the pack house. The combination of harvest quality, initial processing and distribution decisions result in significant variability of delivered shelf-life and freshness, even for pallets picked the same day from the same field. This variability results in shrink, which typically appears later in the product's shelf life when at the store or consumer level. This shrink leads to lost profits, out-of-stocks and dissatisfied customers. Managing for and reducing this shrink immediately improves retail profitability.

## What the Data Shows

Zest Labs findings from a recent study of strawberries conducted over a two-month period prove that shrink begins in the field. The study reveals the significant impact of temperature and handling on fresh produce, and that the impact on shelf-life and delivered freshness begins in the field starting when the produce is picked or harvested. The study's findings demonstrate the economic benefits of pallet-level freshness management for growers and retail grocers. The study was conducted in August and September of 2017 with strawberries harvested in California.

When produce is harvested, it has a definable shelf-life, also known as its “freshness capacity,” which can vary based on three primary factors:

- Quality at harvest
- Harvest conditions
- Product temperature.

In the Zest Labs study, the strawberries' optimum freshness capacity was determined to be 14 days. That is, if properly refrigerated and handled from harvest, the product would reach its “end-of-life” at 14 days.

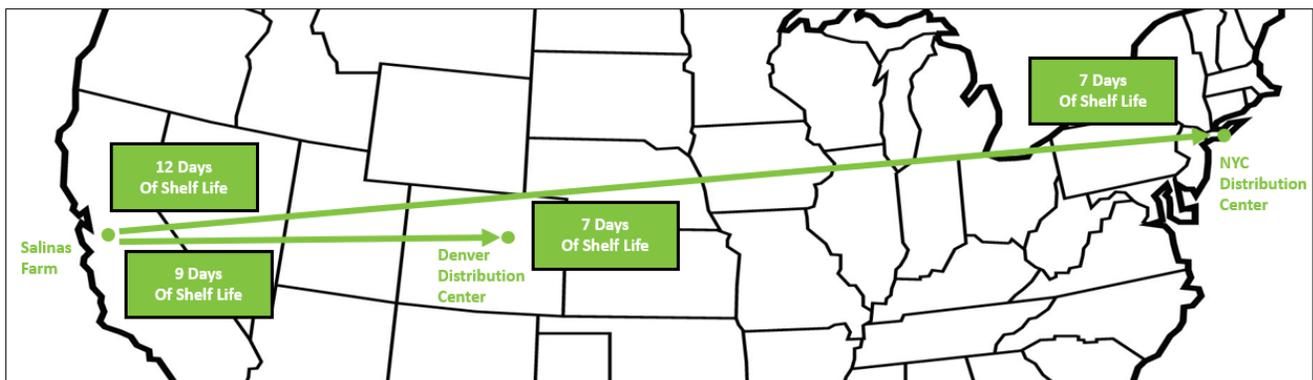
***The delivered strawberries had shelf-life variability by as much as 12 days, representing 86% of the fruit's total freshness capacity***

Using the Zest Fresh™ solution, Zest Labs found that the delivered strawberries had shelf-life variability by as much as 12 days, representing 86% of the fruit's total freshness capacity. Today's fresh food supply chain doesn't account for this variability, as it typically relies on date labels for assessing remaining freshness. These date labels falsely assume that all product picked on that date have the same shelf-life. As a result, the unaccounted for shelf-life variability contributes to a significant portion of the \$161 billion fresh food waste problem in the U.S. due to unanticipated early spoilage.

## Zest Fresh: Reduces Waste, Increases Profitability

Zest Fresh addresses this challenge by managing the variability in freshness capacity at the pallet level, helping growers and retailers reduce waste and deliver an improved customer experience.

Zest Fresh utilizes cloud-based analytics to enable intelligent pallet-routing using the Zest Intelligent Pallet Routing Code (ZIPR Code). The ZIPR Code is dynamically calculated based on the quality at harvest, harvest conditions, and the complete product temperature history since harvest. The ZIPR Code enables growers to identify and ship each pallet based on its actual remaining freshness, matching it to the specific retailer's needs. For example, a pallet with 12 days of remaining freshness could be shipped across country, whereas a pallet with nine days of remaining freshness should be shipped locally. As a result, each retailer receives product with adequate remaining freshness for distribution to the store and sell-through, while still ensuring five days of remaining freshness for the customer. Freshness management based on the ZIPR code helps reduce early spoilage for consumers, reduce grower and retailer shrink (combination of waste and markdowns), and increases profitability.



In the study, wireless IoT sensors were inserted into each pallet of berries in the field at harvest. The tags were then autonomously read at key points through the fresh food supply chain, with final readings taking place at a retail distribution center. At each reading, the ZIPR Code for each pallet was dynamically calculated using AI-based predictive shelf-life analytics. Pallets were then intelligently routed based on their respective ZIPR Codes.

With Zest Fresh and the ZIPR Code, growers and retailers now have insight into the remaining freshness of their produce in real-time to more intelligently route product to prevent waste and ensure happy customers. Zest Fresh can be used for all fresh and perishable products in the fresh food supply chain – including produce, meats, seafood and dairy. For more information about this study, please email [info@zestlabs.com](mailto:info@zestlabs.com).

For more information on Zest Fresh and how it can  
improve your business please contact us at:

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Or visit us at:

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