



**WHITE PAPER**



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# Let's Start at the Beginning

## Reducing Shrink Begins at Harvest

It's typically a mistake to try to solve a problem without complete information as to its cause. It would be like an auto mechanic saying you need a new starter without even looking at your car or a detective trying to solve a crime without gathering evidence. Many of us have had the experience where a coworker comes to you in a panic with a problem and asks for your help and immediately jumps to the end of the story. Our typical response is, "Wait, let's start at the beginning" because we require the details of what happened to understand what is causing the problem before we can help them solve it.

## To Solve the Shrink Problem, Start in the Field

The challenge of addressing shrink or waste in the fresh food supply chain is similar. It's critical to start your analysis of the problem in the field, beginning at harvest, to understand where the cause of shrink – when food runs out of shelf-life and must be discarded – begins. There are a lot of variables in play but, by starting at the beginning, you can develop the complete story, so you better understand the cause of the problem and find a solution to fix it – and ensure delivered freshness to the retailer and consumer.

Unfortunately, many people want to start at the end of the supply chain and work backwards. People see the evidence of shrink at the retailer and incorrectly assume that the cause of shrink starts there. They may look for ways to improve refrigeration at the store or adjust receiving procedures – or they may just assume it's a problem that can't be fixed and simply throw product away, creating waste and reducing product margins.

So, let's start at the beginning, when produce is harvested, as that's where the true cause of shrink begins. The freshness of produce is determined by a combination of the product, harvest conditions and time and temperature. Time at a given temperature has significant impact on the shelf-life of a product and the impact varies at the pallet level. Even two pallets harvested in the same field on the same day can have dramatically different remaining shelf-lives.



Zest Labs recently conducted a baseline analysis of freshly harvested strawberries to determine their "freshness capacity" – the maximum shelf-life of the berries in ideal conditions. Zest Labs determined the strawberries' optimum freshness capacity was 14 days. Using our Zest Fresh™ solution, we then found that the delivered strawberries from that producer had shelf-life variability by as much as 12 days! That represents 86 percent of the fruit's total freshness capacity.

The next step to monitor in the supply chain is cut-to-cool (CTC) time and processing. Zest Labs' analysis found that, for strawberries harvested during a two-month period during the summer, the sampled pallets experienced very different CTC times and were exposed to high temperatures for long periods of time before reaching the packing house, which also leads to high variability on remaining shelf-life. Key findings include:

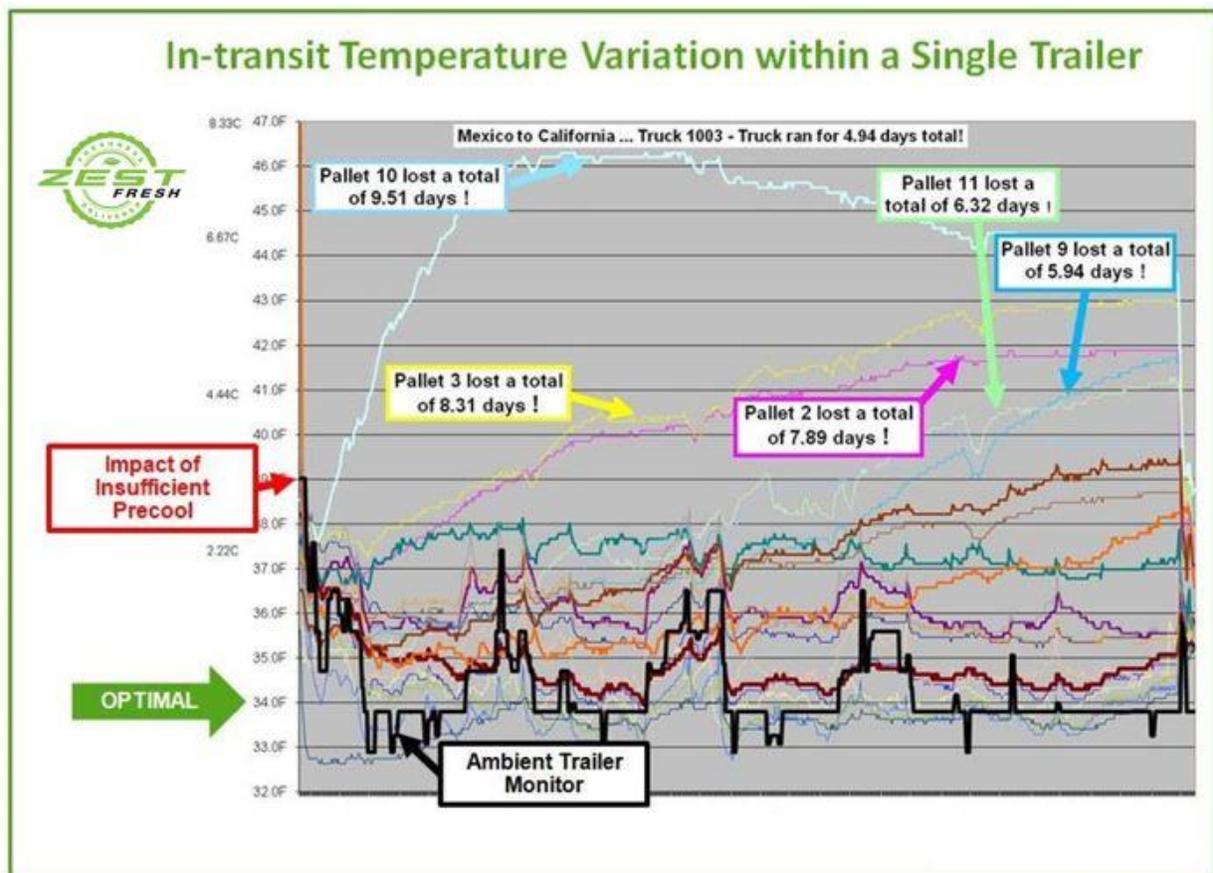
- Growers typically have a target maximum CTC time of 2 hours. The data shows 50.1% of the pallets had CTC times greater than 2 hours with some as high as 7 hours.
- The temperatures experienced by the pallets with CTC times greater than 2 hours ranged from 58.4°F to as much as 96.8°F.

## On the Road

Another place where variability impacts shelf-life is in transit from the packing house to the distribution center. Most companies use a trailer-level monitor to ensure that the carrier has the cooler on throughout the trip to confirm cold chain integrity. Unfortunately, trailer-level monitors are inadequate because temperatures vary at the pallet-level, even while in the trailer. A Zest Labs analysis of blackberries coming from Mexico on a five-day trip showed significant pallet-level variation. While the trailer's temperature was generally within desired temperature range, five of the 26 pallets experienced significant temperature variation – one of them saw up to 9.5 days impact on the pallet's shelf life.

When you monitor temperatures at the pallet-level you're able to come away with some key findings. In the chart below, we can determine that Pallet 10 was not sufficiently pre-cooled and went into the trailer hot. This led to increased product respiration which produced more heat that then impacted adjacent pallets (Pallets 2, 3, 9 and 11). As a result, when delivered, five of the pallets had significant impact on remaining freshness that could lead to waste if not managed. You can't see this visually during a QA inspection but, with IoT condition sensors and shelf-life prediction models you can determine the remaining freshness.

It's also important to note that the trailer itself generally maintained the desired temperature (the black line). So, if you only considered the trailer temperature, you'd accept all 26 pallets, not knowing five were likely to go bad before consumption. This leads to waste and lost product margins. Or, conversely, if you sampled Pallet 10 and determined that the product was spoiling, you'd likely reject the entire shipment, wasting all 26 pallets (even though 21 had adequate shelf-life) leading to potential out-of-stocks for the product and further hits to revenues and profitability. You get the point.



## You Can Manage This

If you try to manage shelf-life and shrink at the point where pallets are received at the distribution center, it's too late to do anything about the remaining freshness of the product. You need to start at the beginning. Growers, packers, shippers and retailers working together and using a shelf-life management solution like Zest Fresh have the ability to monitor and manage each pallet of product from the time it is harvested through to delivery and make intelligent decisions to ensure delivered freshness along the way.

The result is less waste, improved product margins and sustainability, and more satisfied customers.

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