



WHITE PAPER



Today, You Saved \$67,571

How Zest Fresh for Managing the Produce Cold Chain Reduces Waste and Saves Retailers Money...Beginning on Day One

Many of us have been told something like “Today you saved \$12!” as the clerk hands us our receipt at the grocery store. It’s great to know that you saved money by essentially doing something you were already going to do anyway – shop for groceries.

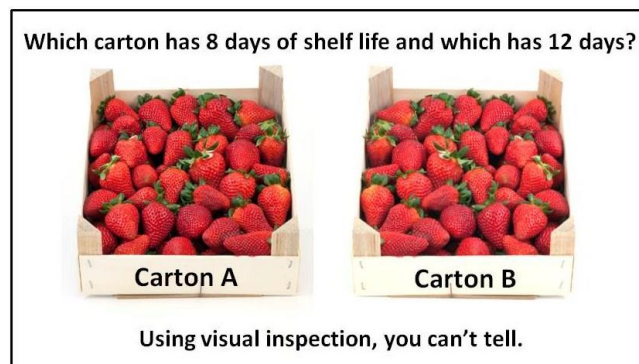
Recent advancements in cold temperature monitoring and management solutions, such as Zest Fresh from Zest Labs offer growers, shippers and retailers essentially the same benefit. Without significant changes in your cold chain processes, you can save money – money that positively impacts your bottom line beginning from Day 1.



That sounds good. But what should really get our attention is considering how much money is being lost today. Every day businesses are essentially flushing tens of thousands of dollars or more away as they needlessly waste product due to spoilage resulting from improper temperature management and the lack of actionable data about the product’s condition from harvest to store. Much of this loss is preventable by implementing pallet-level temperature monitoring in your cold supply chain because, while spoilage can’t be prevented, having actionable data about the condition of your products at the pallet level as product moves through the supply chain helps to ensure delivered freshness, reduce waste and improve revenues and profitability. And, as an added bonus, you can address traceability and compliance simultaneously at no extra charge.

Saving Money Day 1 – The Value of Pallet-level Monitoring

Temperature is perhaps the biggest enemy of produce, yet the temperature and time from harvest-to-cool are common variables which traditionally are NOT monitored on an individual pallet basis. However, both temperature and the amount of time spent at that temperature significantly affect *each pallet* differently and this variation directly impacts the bottom line. **Throughout the cold chain, produce is processed, palletized and shipped primarily on a First-In-First-Out (FIFO) basis, mixing variable shelf life products together, leading to losses that become visible only later in the cold chain.** The reality is that the normal QC visual inspection process is not adequate to see the “invisible” shelf life loss introduced earlier in the supply chain as a result of improper temperature controls. You simply cannot see shrink when you look at it.



Because you can't see shrink, you can't reduce it. If you're relying on visual inspection to determine quality, routing and shipping, you're introducing unnecessary waste into your cold chain processes. This waste occurs at every step of the cold chain, from the field to the retailer. But consider the following example of a controlled study of the impact just of pre-cooling delays on full loads of strawberries, shipped from the west coast of the USA to the east coast.

Let's say that you harvest and ship 24 pallets of strawberries every day. That represents 20,736 clamshells which, at a retail price of \$3.99 per clamshell represents total potential retail revenue of \$82,737 every day. Focusing just on the pre-cool operation, Dr. Jean-Pierre Emond, while at the University of Florida, considered three different pre-cool scenarios and their impact on shrink and lost revenues. In this study the only significant difference between each truck load was pre-cooling. Things to note:

- Every load passed QC at the retailer's distribution center because the shelf life loss was INVISIBLE at that point in the cold chain – the fruit looked fine by visual inspection.
- The difference in remaining shelf life between fruit that was properly pre-cooled and fruit that was not properly pre-cooled was an astounding 81.7%! (91.7% minus 10%). **This amounted to a net loss from the difference of \$67,571!**
- There was no way for the store produce manager to determine if the loss was due to store operations, cold chain operations or poor-quality fruit.
- It gets worse: this data does not reveal what the consumer experienced with product actually sold – that is, what happened once the consumer took the product home?

Economic Implications of Strawberry Pre-cooling and Shipping Trials

Source: University of Florida IFAS - Dr. Jean Pierre Emond - Research Center for Food Distribution & Retailing (CFDR)

West Coast Grower/Shipper & Southeast Retailer ... both World Class Operations
24 pallets per truck ... 20,736 clamshells \$3.99 Retail, \$1.65 Wholesale

	Full Pre-cool No Delay	Full Pre-cool 4 Hr. Delay	No Pre-cool Delay N/A
Arrival Condition at Distribution Center	100%	100%	100%
Day One Loss at Store Display (not saleable)	0.0%	0.0%	41.7%
Day Two Loss at Store Display (not saleable)	10.0%	50.0%	50.0%
Sold %	90.0%	50.0%	8.3%
Waste %	10.0%	50.0%	91.7%
Lost Retail Revenue due to waste (USD)	\$8,274	\$ 41,369	\$ 75,845

\$75,845 is lost if there is no pre-cool. But, even with full pre-cool, when a delay is introduced, the loss is still \$41,369! The key is that you need to have access to the pallet-level temperature data in order to properly manage your cold chain. If you don't, you're flying blind and hoping that your valuable produce gets to the retailer with adequate shelf life. If you're wrong, the produce is rejected or – even worse – spoils when the consumer gets it home creating dissatisfied customers!

Without pallet-level temperature monitoring, you don't know if the produce has been properly pre-cooled. Without creating *pallet-level* temperature visibility throughout the supply chain, it is impossible to determine where the true cause of shrink occurred, so it can't be addressed, fixed or avoided in the future. This affects more than just the profit on any given load, it also affects quality, customer satisfaction, brand image, brand demand and food safety.

This data above is just related to the pre-cooling loop. Yet invisible shelf life loss can be introduced at any of the custody segments within a supply chain. The most likely segments include:

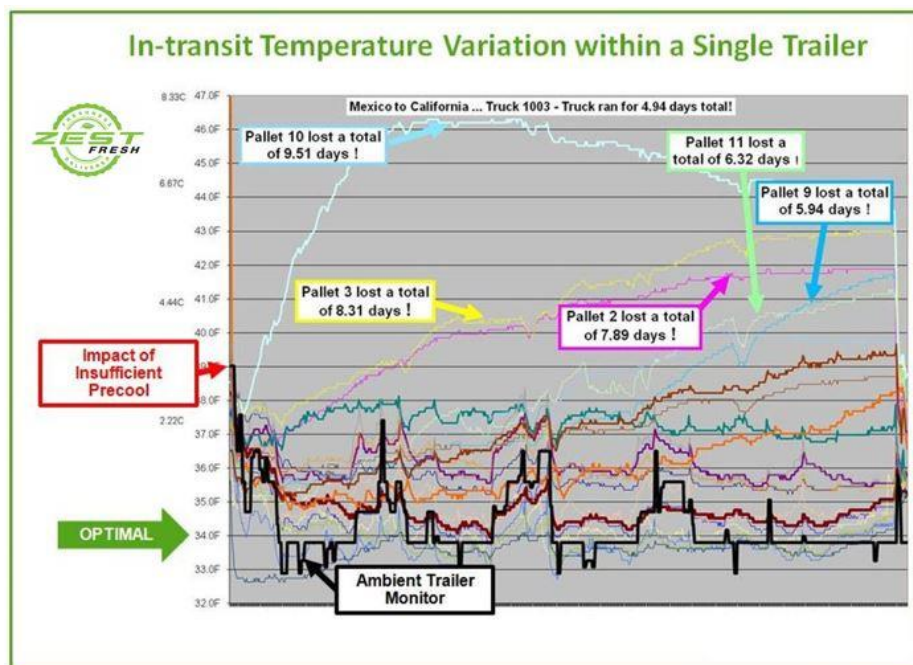
- Cut-to-Cool (Harvest to Pre-Cool)
- Pre-Cooling
- Cold Storage
- In-transit from Pack House to Distribution Centers
- Customs Inspection
- Cross Dock/Transfer points throughout routing between packing, DCs and retailers
- Store Display & Display Rotation

The impact of improper pre-cooling is significant, and it becomes magnified when product is placed into refrigerated trailers for shipment to DCs, further contributing to unnecessary losses.

Why Trailer Level Monitoring is Inadequate

Trailer-level monitoring doesn't capture the necessary temperature information because the temperature inside a trailer can vary significantly and the higher temperature will further reduce shelf life. The black line in the chart below represents what the ambient trailer temperature was for a five day trip from Mexico to Los Angeles. It shows that the temperature in the trailer was generally within the desired range. But note the variation of pallet-level temperatures of the 26 pallets (in this example) in the trailer:

- Pallet 10 lost a total of nearly 10 days over the course of the five day trip (2x expectations).
- Five pallets (2, 3, 9, 10 and 11) aged significantly more than what would have been indicated by the trailer level temperature monitor. This represents potential invisible shrink.



What this chart means is that, if you randomly sample one pallet on the back of the truck and pick a good pallet, you could be distributing five bad pallets to your customers. Pallets that could go bad before the customer can enjoy them. If, on the other hand, you pick one bad pallet at random for QC (say pallet 10) you could reject the entire shipment and waste 21 saleable pallets.

Beyond that, the potential loss of 5 pallets (2, 3, 9, 10 and 11) represents nearly 20% of the shipment...and this is only for one truck. (Results from other trucks were similar.) So, if you sent ten truckloads a day, you may lose 50 pallets (5 pallets/truck x 10 trucks) due to temperature issues. **At \$3447 per pallet, that's \$172,350 in potential losses due to invisible shrink per day related to distribution from the pack house to the DC.**

What's important is cost-effectively monitoring *every pallet* from harvest onward, with an automated data collection process that does not inhibit operations or slow down processing. By doing so, seven advantages can be realized:

- 1) Minimize the cut-to-cool time for each pallet.
- 2) Optimize the pre-cool process: eliminating freezing injury and optimizing product cooling while minimizing energy costs.
- 3) Route shipments using enhanced First Expired, First Out (FEFO+), not First In, First Out (FIFO), to match shelf life with routes ensuring that the pallets with the longer shelf life are sent on the longer routes and those with the shorter shelf life are sent on the shorter routes.
- 4) Include special handling instructions for DC receiving when necessary, allowing the receiving party to rotate the product more efficiently to minimize loss.
- 5) Use the historical data to identify trends and the actual source of shrink: This provides the ability, when possible, to fix the true problems and identify the cause and cost of the shrink.
- 6) Reduce waste and fuel costs: Avoid shipping product with limited remaining shelf life on long shipments, only to dump it later when it is received by the retailer.
- 7) Improve food safety and quality: Proper temperature control not only improves quality but, by improving customer satisfaction, it enhances the brand and increases demand.

The Bottom Line

The data referenced using berries can be applied similarly to other fresh produce such as leafy greens or other soft fruits. By implementing a pallet-level temperature monitoring, such as Zest Fresh, you can reduce shrink and generate an immediate positive impact to your bottom line by reducing unnecessary waste associated with improper temperature handling by having actionable data that enables you to improve packing, shipping and routing.

In the strawberry case study cited, the cost savings due to the reduction in shrink enabled the producer to pay for the solution in a single harvest season based just on the harvest to pre-cool loop alone. The savings start Day 1.

There's an additional benefit too. Zest Fresh temperature tags also automatically create a complete, electronic track and trace record, at no extra charge. The tags automatically record product information (where and when it was harvested), precool information, waypoints (where it's been) as well as the temperature data used to calculate the shelf life indexes for inventory management and routing. This data record, we call it a ZIPR Code (for Zest Intelligent Pallet

Routing), which is stored locally on the tag and exported to the cloud. The ZIPR Code not only provides prescriptive data about the remaining freshness to enable intelligent routing, it also provides traceability information that can be used to comply with food safety regulations like the Food Safety Modernization Act.



Everyone's aware of shrink but most producers significantly under estimate the amount of shrink they're experiencing and don't know how to successfully combat it. Pallet-level temperature monitoring provides a cost-effective method for reducing shrink throughout the cold chain. Less shrink means more revenues and profits without adjusting your workflows. At low volumes or high volumes, the savings can make a significant impact to your bottom line, beginning on day one.

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