

Improving Profits and Operational Efficiency on the Farm

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Each year, nearly 60 million tons of produce worth about \$160 billion is wasted by retailers and consumers.ⁱ Some of that waste occurs on the farm, before crops even hit the market. Some occurs while goods are in transit or storage.

All are critical issues for producers, many of whom are seeing tight profit margins and barely break-even prices.ⁱⁱ To maximize profits from crops, producers must tackle a combination of factors that they can and can't control.

When unexpected droughts or pestilences strike, there is little you can do.

But when regulatory boosts in wages, new overtime rates and overlapping seasons between different growing regions all converge to increase labor costs and competition, new technologies *can* help you optimize labor usage and reduce costs.

And when planning sales and markets for your crops, there is *absolutely something* you can do to ensure that the fruits and vegetables you grow retain freshness and are at their peak quality.

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This paper focuses on controllable processes that reduce costs; and optimize produce quality and profit margins, with emphasis on how you can use software and sensor-based technology to track, monitor and manage produce from farm to market, assuring it meets rigorous retailer requirements and satisfies your customers.

How producers lose profits right on the farm

Quality variation and shelf life variability for fruits and vegetables that impact profitability begin in the field, before your crops even leave for market.

When Zest Labs, a post-harvest AgTech company, performed an analysis of data collected on California strawberries, the analysis revealed that pallets experienced very different cut-to-cool times. Some pallets of product were exposed to high temperatures for long periods of time before reaching the packing house, often due to operational inefficiencies or impacted resources.

There were also other additional in-field factors to consider. For example, strawberries picked in the cool, early morning hours were likely to have longer shelf lives than strawberries picked during the middle of the day, when the heat was most intense. Despite these variegated factors, all of these strawberries shipped out as a single lot and were labeled by the producer with the same "best by" or "harvested on" dates. There was no way of telling through visual inspection which strawberries were picked when, and which were more prone to early spoilage and needed to be moved to market sooner.

These are common situations that producers encounter. These situations are extremely important to address, as the Zest Labs study also revealed the primary impact to produce shelf-life occurs in the first 48 hours after harvest – in the field and at the pack house.

The Zest Labs study also uncovered up to 86% variability in the true “best by” freshness dates that the producer had labelled on strawberry pallets that had all shipped in a same day load. In the Zest Labs study, the strawberries’ optimum freshness capacity was determined to be 14 days. However, that timeline only applied to strawberries that had been properly refrigerated. It didn't apply to strawberries that had encountered more exposure to heat in the field, or to heat on trucks or in packing plants. Heat exposure accelerates spoilage. Consequently, some pallets had an end of life number as low as two days, instead of the 14 day number the producer had labelled them with. Variability like this, when it goes unmitigated, translates into waste and disappoints retailers—and that means rejections, missed profits and unhappy customers.

Another consideration when it comes to cost reductions is resource utilization including:

- How long does it take to load a truck in the field?
- How much time elapses from the field to the pack house?
- How long does it take to unload the truck?
- What’s the cycle time for the truck to return to the field?

If there are bottlenecks, labor and other resources can be wasted, in addition to negative impacts on the freshness of product. How can growers identify where issues that impact costs, quality and operational efficiencies occur, and how can they be addressed and corrected?

How to operationalize production to improve profits

There are two paths toward operationalizing your production to improve profits:

- Improving the efficiency of your operations; and
- Reducing rejection rates for your produce by gaining more direct visibility of your supply chain and improving supply chain performance.

Improving the efficiency of your operations

All growers strive to produce the best possible product and have processes to help ensure this, but how do you measure process adherence? You need the data. You need to know if trucks, forklifts and labor are being used efficiently and for managing freshness. Because of pallet-level variation, you need condition data at the pallet level. You can define that all product should have cut-to-cool times of less than an hour, but how do you know if that’s happening? How do you know how long product sits in the yard? Are there backups during peak periods that impact freshness and increase labor costs? Is the produce properly pre-cooled?



How long will this truck wait to unload?
Data helps improve operational efficiency.

Unfortunately, most growers and suppliers don't collect this data today because they believe it to be either too difficult, labor intensive or costly. New technology changes that.

Reducing rejection rates and gaining more direct visibility of your supply chain

The main thing growers want is to get paid for their products. Unfortunately, retailers can reject shipments and may not even have to provide a reason. Further, once a grower ships a product, they lose visibility as to how it's been handled. For example, what if product is put on a truck with 12 days of shelf-life but the trucker doesn't keep it properly refrigerated? Shelf-life goes down, the product may be rejected and the grower could be viewed as the culprit – even though it wasn't their fault.

Using technology to optimize operations and supply chain visibility

Fortunately, monitoring and intervening as needed to ensure that your product's quality is being maintained in field operations, during shipping, and through storage, distribution and delivery to your customers is a process that can be automated and that can keep you informed every step of the way.

Here's how it works:

At the farm

Place sensors on pallets for freshness, and on vehicles for efficiency

Autonomous, wireless Internet of Things (IoT) temperature sensors, inserted into the pallets at harvest, monitor product condition and processing beginning at the point the product is picked. IoT sensors on vehicles can help identify bottlenecks that reduce productivity and operational efficiency.

Transport data to the cloud

Utilize cloud-based systems, such as the Zest Fresh™ solution from Zest Labs, that autonomously communicates with each sensor to receive readings on real-time product freshness, monitoring elements like temperature from the time that produce is picked and palletized. This also provides the ability to manage and optimize operational efficiencies, such as reducing wait times, to improve quality and reduce labor costs.

Cloud-based systems provide the ability to manage and optimize operational efficiencies that can improve quality and reduce labor costs.

For product freshness, monitor at the pallet level

As product freshness data is transmitted for each pallet to the cloud-based system, a set of proprietary algorithms combine with artificial intelligence and predictive analytics to continuously re-calculate a pallet routing code (such as Zest Intelligent Pallet Routing Code (ZIPR Code) for each individual pallet of produce). The ZIPR Code, for example, is the industry's first freshness metric and is a component of the Zest Fresh™ solution, which includes both pallet-resident sensors and cloud-based analytics software.

Because the ZIPR Code measures freshness for every individual pallet of produce, you and your downstream logistics and storage providers can use pallet freshness scores to

sort pallets so pallets with lower freshness scores can immediately be shipped to nearby markets, while pallets with higher freshness scores can be shipped to more distant markets that require longer ship times and still arrive to meet the retailer's freshness requirements.

The net result is less waste and fewer rejections because you now can route your produce based upon freshness to the most appropriate markets. Your customers are happier, too, because they'll see less waste on their end.

In Your Supply Chain

Set metrics and measure for supply chain results

Using your pallet-level data, you can use the ZIPR Codes to evaluate the performance of your transporters and partners, because you can see where the freshness breakdowns are occurring. This enables you to work with your partners to improve performance. You will also improve profit margins as you reduce waste and rejects.

Producers working with Zest Labs, for example, have seen positive results. Among them are:

- A blueberry producer that managed product from the field to the packaging house by sorting and packing out shipments based on actual freshness indicators for a national grocer;
- A strawberry producer that has reduced cycle times, identified and reduced field truck bottlenecks and improved efficiency of packing and processing operations at multiple facilities;
- A leading provider of California and Arizona grown lettuces and other products that monitored and improved post-harvest processing and packaging based on its impact to shelf life.

Using Zest Fresh™, growers can measure process adherence, freshness and also calculate the ability to maintain this freshness based on different market lead times needed to get product to market for different retailers. Together, these codes trigger optimize the freshness of every pallet of produce you deliver.

ⁱ <https://www.wired.com/2016/07/us-throws-away-much-half-food-produce/>

ⁱⁱ <https://www.the-farmer.com/business/tight-profit-margins-likely-continue-2018>

About Transworld Data

For over 25 years, Transworld Data has delivered consulting, market research, analytics and product evaluations to companies and media outlets in a broad variety of industry sectors on six different continents.

Its president is Mary E. Shacklett mshacklett@twdtransworld.com, who joined Transworld with a background that includes positions as Vice President of Marketing and Technology at TCCU Inc., a financial services firm; Vice President of Software Development at Summit Information Systems, a commercial software house; and Vice President of Strategic Planning, Manufacturing and Technology at FSI International, a multi-national manufacturing company in the semiconductor industry.

In the food and beverage industry, Transworld Data specializes in IT technologies, industry trends, business process engineering, contracts, governance, vendor management and IT project management for projects in the areas of logistics, the supply chain and Internet of Things (IoT) technologies. Transworld Data's corporate telephone number is 360-956-9536.