



# The DATA CAPTURE Report

Since 1977, the premier management & marketing newsletter of automatic data capture: Bar Coding, RF and related technologies.

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January 13, 2012

## Special SCAN: The DATA CAPTURE Report Reprint

### Cold Chain Will Provide Big Sales Opps For All AIDC Vendors

***Intellex documents the cost of cold chain shrink and the value of delivered freshness for produce.***

In mid-November (2011), **Intellex** and **ProWare Services**, a software and services company focused on providing solutions for the fresh food industry, announced the results of a recent pilot program that documented the value of Delivered Freshness™ and quality of produce by dynamically routing product in real-time based on remaining shelf-life. Intellex enables Delivered Freshness through the use of RFID tags that provide actionable data by pallet-level temperature monitoring. This solution has a proven ability to help minimize losses and maximize freshness at the point of delivery.



**Kevin Payne,**  
director of  
marketing,  
Intellex Corp.

Spanning the operations of a major North American berry producer, the program, which incorporated tens of thousands of data points, tracked the temperature of hundreds of pallets of berries in-transit at the pallet-level from local Mexican growers to a packing house and cold-storage facility in Mexico, and then from that

packing facility to three distribution centers in the United States. Data from the program documented how pallet-level temperature monitoring enables the calculation of relative shelf life loss between each pallet to provide actionable data for FEFO+ (enhanced First Expired, First Out) inventory management and dynamic transit routing.

To understand the size of the problem, consider these facts:

- Roughly 1/3 of cold chain products are never sold to the consumer
- More than 50% of post-harvest losses are due to temperature problems
- \$35B or more in annual perishable produce is lost
- Impacts revenue but also delivered freshness, food quality, brand value
- The Primary Culprit: Poor in-transit temperature management.

#### **About the study**

Intellex temperature monitoring tags were initially placed in pallets of berries in the field as they were harvested, and the temperature was recorded by the tags every 15 minutes from the field to the pack house. The distance from the fields to the packing house varied significantly, from an hour to over four hours, and the temperature at harvest varied significantly by the time of day.

After quality control at the pack house, the temperature data was downloaded, and each pallet's relative remaining shelf life index was calculated using ProWare's FreshAware™ software. Each pallet was then intelligently routed to the most

appropriate distribution center based on its unique remaining shelf life index to maximize delivered freshness and reduce waste. The study identified that 30% of the pallets would require prioritized routing to help avoid loss in-transit that would have resulted from delivering spoiled berries.

**“This study by Intellex and ProWare convincingly demonstrates the multiple opportunities to improve the quality of delivered produce in the cold chain. Cold chain suppliers can apply what they’ve learned to their own operations, knowing that they now have the benefit of readily available product to combat losses and document the freshness of their perishables throughout the cold chain and at the point of sale.”**

**ChainLink Research CEO Ann Grackin.**

The program then studied the temperature of the pallets of berries in-transit from Mexico to a distribution center in Southern California to compare the pallet-level temperatures against the ambient temperature in various refrigerated trailers and measure the previously undocumented impact on shelf life. The program revealed that there was as much as 30% difference between the temperature of pallets and the ambient temperature in a single refrigerated trailer. While ambient trailer-level temperature monitors indicated an average temperature of approximately 35 degrees throughout the five-day journey, over 13% of the pallets experienced temperatures higher than 40 degrees Fahrenheit during the trip, losing as much as nine days of shelf life in less than five days of actual transit time.

Other notable findings of the study included:

**Significant Temperature Variation in Harvest-to-Precool:** The pallet temperature and length of time spent prior to precooling varied significantly by pallet, dramatically impacting remaining shelf life. This “invisible shrink” could not be detected or managed by visual inspection of the fruit. By knowing the temperature history of each pallet and calculating its relative remaining shelf life index at the pack house prior to precool, loss could be reduced or avoided.

**Ambient Temperature Monitoring Is Inadequate:** The air temperature outside the pallet (ambient temperature, not product temperature) in-transit from the field, in precool and in-transit to the distribution center, did not reliably correlate to the temperature inside the pallets and therefore did not provide an accurate indication of product condition or relative remaining shelf life. In fact, pallet-to-pallet relative shelf-life loss varied by as much as 40% within a single refrigerated trailer in transit from Mexico to California.

## SCAN The DATA CAPTURE Report

Since 1977, the premier management & marketing newsletter of automatic data capture, including:

- Bar coding, 1-D & 2-D symbologies
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- Magnetic stripe
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**FEFO+ Maximizes Post-Harvest Yield:** Pallet-level temperature data delivers the ability to implement an enhanced First Expired, First Out (FEFO+) inventory management system instead of First In, First Out (FIFO). Growers, packers, and shippers can aggregate pallets based on each pallet's unique remaining relative shelf life index and dynamically route them to the most appropriate destination, based on transit time, to ensure maximum freshness.

Speaking with SCAN/DCR, Intellex Director of Marketing, Kevin Payne, told us, "What is most dramatic about our new solution is that we now have the ability to document nearly all the changes and variables in the cold chain. Many people were suspect as to whether or not RFID could actually accomplish this. Now we know it can. And, we have proven ROI and total value. We believe cold chain participants can recover their implementation costs in one growing season."

**Opportunity for all**

Not long ago, one of our readers said all everyone wants to talk about is RFID. Because of its newness and many flavors, we agree there is a lot of focus on this emerging technology. However, for a bar code vendor to determine from a headline that the story is about RFID and ignore it all together, is short-sighted. People/businesses are not going to give up printed labels and rely only on an RFID tag. When bar codes became popular, it wasn't the end of human readable labels. The labels offered both bar codes and human readable. The same will hold true with RFID.

In the berry tracking solution, printed tags with bar codes are a very critical component in the system. By using RFID, members of the cold chain are able to minimize spoilage/shrink with the use of data gathered from the tags. However, once the software determines the status of a shipment and its best route, the next step is to print out labels for each

pallet with index scores for prioritized routing and special handling.

Portable bar code printers are a must, and as such, so are bar code scanners. The next step is the transfer of the data. Local area networks, wide area networks, and cellular all come into play. So, in addition to the RFID-related technology, we have bar code printing, bar code scanning, specialized software, wireless terminals, and wireless networks. All good reasons to pay close attention to an "RFID" story, even if you're not an RFID vendor. It's all about converging technologies.

[Note: We expect smart phones and tablets to also play an important role.]

**Food for thought**

Leading berry brand owners averaged 7% internal shrink in 2010 for blackberries shipping from Mexico. This 7% internal shrink equates to approximately two pallets for every truckload (27 pallets per load). So, approximately two pallets, or 5,760 6-oz. clamshells, in every truck load were not sold to the retailer customer. And, this does not capture the shrink at the retailer, which can be two to three times that seen by the brand owner.

According to Payne, the goals of the solution are to:

- Build uniform pallets, based on relative remaining shelf life
- Minimal impact on processes/workflow and infrastructure
- Implement dynamic routing by matching relative remaining shelf life against established routing profiles to reduce shrink.

Determining a formula for routing is complicated, but it can be handled with the proper data. On average, it takes two days to ship a load of berries from Mexico to Texas—four to five days to Southern

California—and five days to Pennsylvania. By using historical information collected from RFID monitoring, with a little work and the correct software, the most logical route can be determined. As can be seen from what has been noted above, placing the tags inside the berry packets instead of on the outside of a pallet makes all the difference.

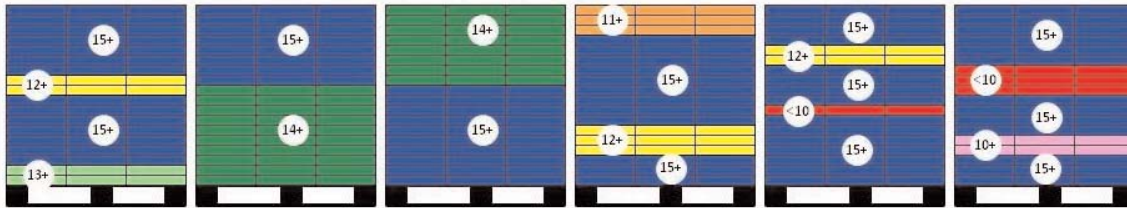
**Due to Temperature Variations and Time Spent at High Temperatures...**



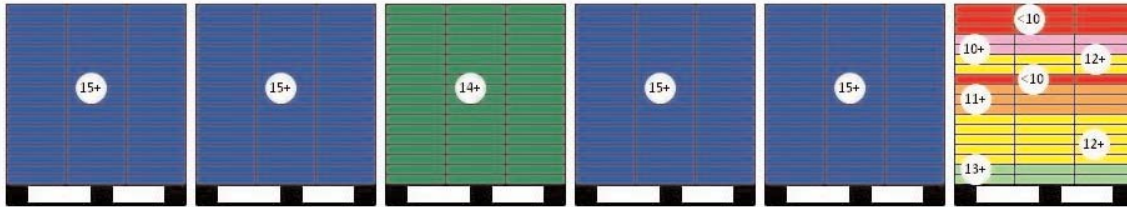
- Pallets requiring Special Handling: 30%
- Pallets received with a shelf life index less than 14 days require special handling.
- Can't be shipped to California or Pennsylvania and meet all of the routing profiles
- Special handling is required to eliminate potential shrink and quality issues
- Pace of shrink accelerates over time.

## Comparing FIFO versus FEFO+ Inventory Management

FIFO: Each pallet has non-uniform aging leading to waste and inconsistent quality.



FEFO+: Pallets are built using remaining shelf life for improved routing and quality



Payne noted, “There are temperature challenges every step of the cold chain. On average, there is between 5-13 days of elapsed time from field to the store. You need to allow two days minimum for selling and two days for consumption. It’s a tight fit with little margin for error. Due to temperature variation, how many days did the berries actually age in transit? Without in-transit temperature monitoring, you are just guessing.

“There are also many variables,” he continued. “Pick times—whether picked in the morning, afternoon, or evening—can make a big difference. Also, the type of truck used from the field to the precooling facility is critical. The average temperature for a refrigerated truck is 38 degrees—95 degrees for an open truck—and 110 degrees for a closed van. Sometimes, even scooters are used. All these things change the shelf life of perishable products.”

After monitoring the time and temperature variations from the field to packing (the grower loop), then the next process begins (the distribution loop). The process is as follows:

- Build Export Pallet
- Pre-Cool
- Cold Storage
- Stage for Shipping
- Truck Loading
- Ship to US WH
- US WH Receiving
- US WH QC (then recycle tag to Mexico)

### Cost versus savings

The program revealed that the cost per case for

pallet-level temperature monitoring from growers to distribution centers was less than two cents per case. The program further revealed a payback period (calculated according to the value of the perishables and the cost of the Intellex XC3 Technology™ RFID readers and tags and ProWare software) of one harvest cycle—based on demonstrated reduced shrink.

Commenting on the study, **ChainLink Research** CEO Ann Grackin stated, “This study by Intellex and ProWare convincingly demonstrates the multiple opportunities to improve the quality of delivered produce in the cold chain. Cold chain suppliers can apply what they’ve learned to their own operations, knowing that they now have the benefit of readily available product to combat losses and document the freshness of their perishables throughout the cold chain and at the point of sale.”

“Until very recently, technology to monitor perishables throughout the cold chain was either too expensive or too difficult to deploy at the pallet level,” said Peter Mehring, CEO of Intellex. “That limited solutions to checking refrigeration compliance rather than monitoring product freshness. Intellex temperature tags combine the ease of wirelessly reading core pallet temperatures, critical to calculating relative remaining shelf life, with a new value point for wireless temperature monitors. For the first time, these combined features deliver a deployable solution that enables fresh produce owners to optimize their cold supply chain management based on actionable product freshness data.”

“Perhaps the greatest value of the study has been in providing information that enables growers, packers and shippers to work within their existing cold chain infrastructure,” added Steve Dean, general manager of ProWare Services. “With the Intellex and ProWare solution, suppliers don’t have to try to ‘fix their cold chain,’ but instead can instantly make more informed decisions by simply having better information about the real-time condition of their products.”

**Closing**

“There are all sorts of benefits to be had from implementing this type of solution,” Payne told us. “First, it will help playes in the cold chain comply with coming requirements in the Food Safety

Modernization Act. By cutting losses, it can reduce how many trucks are needed to meet demand, and in turn, reduce emissions making the world more green. It can also reduce how much land must be cleared to meet food demands.

“The bottom line is: temperature variations are everywhere and can’t be controlled,” he closed. Managing actual freshness ensures delivered quality and avoids losses. Everyone, including consumers, will benefit.”

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