FOOD LOGISTICS TAPS INTO TECH SOLUTIONS

Smart technology helps cold chain shippers prevent product spoilage and loss

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visibility solutions. An August 2012 salmonella outbreak linked to cantaloupes infected 178 people, resulting in 62 hospitalizations and two deaths, according to the Centers for Disease Control and Prevention.

"A number of variables impact safe food handling during transport from field to table, and all of them are difficult to control," explains Payne. "Nearly every food item has some level of bacteria. It is impossible to remove it all, and cantaloupe is particularly difficult because of the nature of the rind. If handlers store and manage the product properly through the cold chain, however, they can nearly eliminate the risk of bacterial infection."

An unbroken cold chain comprises an uninterrupted series of storage and distribution activities that maintain a given temperature range. It is used to help ensure product safety and extend the shelf life of items such as fresh agricultural produce, seafood, frozen food, photographic film, chemicals, and pharmaceutical drugs.

"The cantaloupe-related outbreak illustrates several cold chain challenges," Payne continues. "One is identifying at-risk product, which results from improper temperature management. Another is speeding the recalls of bad product."

Recent legislation may help shippers and cold chain logistics providers address both challenges. The Food Safety Modernization Act, passed in 2010, requires food facilities to evaluate hazards, implement preventive controls, and create food safety plans.

"The legislation was the first major overhaul to food safety laws since the Food, Drug, and Cosmetic Act in the 1930s," Payne says. "It was long overdue, and changed the philosophy behind food safety from reactive to proactive, which is a fundamental shift."

Today, the proactive approach is to document proper product handling and temperature maintenance from the field through the retailer. A range of new technologies supports these efforts.

Tagging The Goods

The principal tool used for tracking and tracing perishables is the temperature tag, or "temp tag."

"Temperature tags provide real-time temperature data, and allow handlers to respond to any problems," says Rod Bernard, director of quality assurance and food safety at Pompano Beach, Fla.-based produce supplier

Southern Specialties. "They gather data continuously, in contrast to point-driven downloads by data recorders."

Southern Specialties uses a tag called Xsense, manufactured by Israeli technology firm BT9 Ltd. The Xsense system monitors, analyzes, and disseminates relevant shipment data, and recommends how to manage products throughout the entire cold chain, ensuring the viability of a product's optimal environment from start to finish. The data it provides gives cold chain stakeholders transparency and control over their perishables, no matter where they are.

"Xsense communicates with a control unit," Bernard notes. "This is valuable because the tag is placed during packing, so we monitor the shipment's condition from that instant until it arrives at the Southern Specialties facility."

Some companies apply tags only on departure, leaving shippers unable to monitor pre-departure conditions. One shipment of berries arrived at a Southern Specialties facility showing only a two-degree difference in temperature from departure to arrival. The historical data from the temp tags, however, noted a

10-degree shift had occurred in transit.

"This information allows us to adjust how we handle the product, because it will have a shorter shelf life," Bernard says. "We can take action such as shipping shorter distances, cooling the products, and continually monitoring the shipment."

Monitoring perishable products is vital because of the "cliff of spoilage." "When product moves through the supply chain, it doesn't appear to spoil until just before it does," Payne explains. "We call this the cliff of spoilage."

Because of the cliff of spoilage, shipment rejections tend to occur at the end of the supply chain, a cost ultimately borne by the grower. Although growers typically estimate that loss, called shrink, at two to four percent of production, Intelleflex tags have demonstrated that eight to 10 percent may be more accurate—and that loss rates can reach 20 percent for some growers.

"Growers are losing more of their crop than they think," says Payne. "Monitoring temperature allows shippers and cold chain logistics providers to gauge relative shelf life." This allows them to reprioritize

distribution to move product with a short shelf life to market faster.

"Instead of losing 10 percent of a crop to spoilage, cold chain shippers can save all but one or two percent," notes Payne.

Steps Toward Consumer Safety
In addition to preventing shrink, cold chain monitoring tools help minimize consumer health risks. "Using these technologies has allowed us to minimize the food safety risk when transporting fresh and frozen seafood products," says Sal Battaglia, director of operations at Vaughan, Ontario-based Seacore Seafoods.

Seacore uses both GPS tracking and downloadable temperature data loggers on its trucks. "These tools ensure that products remain at the ideal temperature, and that the shipment comes straight to our facility without any delays," he explains. "With these technologies in place, we can tell right away if the inbound logistics played any part in a food safety or product quality issue."

Establishing The Links
One challenge cold chain shippers face is coordinating safe post-harvest handling, freight forwarding, and the latest technology.

"The University of Florida Food Science Technology Center has trained our staff to better understand grower and packer procedures, and how logistics and post-harvest processes can work together to maintain the cold chain and ensure hygiene across the supply chain," says Frank Cascante, head of consumer and perishable logistics at DHL Global Forwarding.

DHL uses GPS-driven data temperature tags based on radio frequency identification technology. "These sensors are not just data recorders; they're data loggers," says Cascante. "Recorders register temperature and humidity at a relay point—such as logistics site, departure point, and destination— but loggers report hourly or even minute-by-minute history."

The data the loggers provide gives shippers and logistics providers valuable insight. "For a shipment of Peruvian asparagus, temperature and humidity monitoring tags were installed as one of our first protocols," Cascante recalls. "The container was exported from a new packing facility in Peru that we hadn't worked with before, and it was an urgent load during the peak of the European season.

"When we downloaded the temp tags in Panama, we determined that the temperature regulations had not been met post-harvest; the proper pre-cooling had not been done at the facility," he continues. "In fact, there was already some odor of decay. Immediately, we notified both origin and destination parties that the product was going to decay extremely fast. The consignee agreed with the shipper not to receive that load."

That critical decision helped DHL avoid a significant claim; because this was the seasonal peak, an asparagus load could have cost $70,000 to $80,000.

Cold chain monitoring detects not only temperature fluctuations, but possible occurrences of intentional shipment contamination.

Beyond Food SAFETY: Food Defense

"The biggest challenge food companies face is 'food defense'— preventing the intentional adulteration of food," says Don Hsieh, director of commercial industrial marketing at Boca Raton, Fla.-based security solutions provider Tyco Integrated Security. "This threat is probably greatest during movement through the supply chain."

The food supply chain has grown increasingly longer over the past few years, primarily because consumers want year-round access to produce that used to be sold seasonally.

To meet this demand, products are being sourced from uncommon areas, such as Asia and the Southern Hemisphere. The longer the supply chain, the greater the exposure and risk.

Cargo theft has also increased. Food and beverage thefts accounted for the highest number of cargo thefts of any industry in 2010 and 2011, according to FreightWatch International, which tracks U.S. cargo theft. This is the first time food and beverage has topped the list, which used to be led by high-value products such as electronics.

Food theft becomes a safety concern for products requiring refrigeration. Thieves steal the product to resell it, but they have no concern that the product stays within the prescribed temperature range. If it is resold into the legitimate supply chain and causes foodborne illness, the manufacturer's reputation suffers.

The same technologies that

ensure temperature integrity of perishables in the cold chain can help track and monitor food defense concerns.

Patterns Of Improvement

Traceability is increasingly important in a food supply chain that is becoming more global in scope. "It isn't sufficient to know where a product was manufactured; you must know the origin of the individual ingredients that make up the finished product, as well as the condition they were kept in at all points along the supply chain," says Keith Sherry, general manager of supply chain services at BT Global Services, a technology provider with U.S. headquarters in Irving, Texas.

A loaf of multigrain bread made in the United States, for example, contains seven ingredients, sourced from 18 different countries. It is sold in 224,000 retail food stores and 935,000 retail food outlets. A contamination issue with any of the bread's ingredients can affect thousands of consumers, so manufacturers must be able to track every component.

Today's technology makes this visibility possible. From monitoring temperatures to detecting shipment tampering, cold chain tracking tools are helping perishables shippers keep their cool.