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Can RFID Save the Day for Spinach?

Steve Dean, director of business development at RFID systems integrator Franwell, says it can—and explains why.

By Leslie Downey

Nov. 13, 2006—Poor Popeye! Along with millions of other spinach lovers, he was caught by surprise in September when the [U.S. Food and Drug Administration](#) (FDA) halted the sale of all fresh spinach due to an outbreak of *Escherichia coli* O157:H7 (*E. coli*) associated with the product.

On Sep. 29, with the likely source of contamination narrowed down to a grower in California, the FDA lifted its warning on spinach, except for specific brands packaged on certain dates. However, the losses to the spinach industry had already exceeded several hundred million dollars by that point. Even with spinach back on the shelf, the industry may not soon see the revenue it once enjoyed, as consumers reach for substitutes they perceive as being safer. Can RFID save the day for Popeye and his fellow spinach lovers, and for the industry at large?



Leslie Downey

The kind of track-and-trace ability provided by RFID may be the industry's best hope, since the shortage of safety inspectors working to minimize the conditions leading to contamination will probably continue. In a Sept. 22 article entitled "[At E. Coli Hunt's End, a Safety Standards Gap](#)," the *Washington Post* reported that the FDA's 800 inspectors, responsible for inspecting non-meat products throughout the U.S., are able to visit a processing plant, on average, only once every few years.

As such, the article said, they "don't [have the time to] venture onto farms unless there's an outbreak." In contrast, the [U.S. Department of Agriculture](#) (USDA) is staffed to inspect 6,000 processing plants daily. However, even if a legion of inspectors were on hand, there would not be enough data about spinach shipments to support an efficient recall.

How can RFID meaningfully improve this situation? At the RFID Applications 2006 conference, held in September in Washington, D.C., I posed this question to Steve Dean, director of business development at RFID systems integrator [Franwell](#). Before joining Franwell in 1999, Dean spent more than 20 years in the fresh produce industry, first as a USDA fruit and vegetable inspector, then as general manager for a Florida-based fruit and vegetable grower-shipper.

Franwell has been a key player in a high-profile RFID trial led by the [University of Florida](#)'s Research Center for Food Distribution and Retailing (CFDR). The research project was designed to demonstrate the benefits of data sharing between three fresh produce suppliers and a retailer. Known as V2 (Visibility Validated), the project involved reading various kinds of tagged produce at key points from the field to the retailer's distribution center (see [Keeping Fresh Foods Fresh](#)).

The following are my questions to Dean, along with his answers.

If the exact cause of *E. coli* contamination of spinach and other produce is not yet fully understood, can RFID really help?

Dean: RFID can make traceability a timely process anywhere for spinach and all fresh food. Most produce growers already have the capability to track products directly from the field. However, such tracking is manually intensive, so it's impractical. RFID can make this process less manual.



Steve Dean

The thing is, the RFID-tagged product needs to be tracked throughout the entire supply chain—not just by the growers—in order to execute a large-scale recall in a timely manner. A great deal of thought must be given to the infrastructure needed to connect the data from the various parties in this chain. It may very well take the USDA and other government agencies to help establish this infrastructure.

If that had been in place in September, the shipment data being shared by supply-chain partners would have identified the product that needed to be removed, and eliminated the need to remove all products—a huge savings to the industry.

Would RFID bring other benefits to the produce industry and consumers besides efficient recalls?

Dean: Businesses and consumers would benefit every day from reducing waste. Losses to retailers from spoilage can be substantially reduced with actionable data available to make informed decisions about product at the time it is received.

Retailers and wholesalers may buy three or four days of supply, depending on their needs. With RFID tagging, starting in the field, it's possible to identify a pallet of produce that was harvested earlier or exposed to higher temperatures than the other pallets received. This pallet will be shipped out ahead of the others in order to ensure freshness on arrival.

Restaurants and retailers take immediate ownership of the products they receive. So, reducing spoilage would have immediate bottom-line impact for these businesses. But to do this, they not only need to read the RFID tags, but also be able to access the associated data about the shipments they've received. EPCIS [Electronic Product Code Information Service], the standard that [EPCglobal](#) is developing to support EPC-related data sharing by multiple parties, will make this possible.

It's clear that restaurants and retailers would benefit. What about the other parties in the supply chain?

Dean: The shipper can expect to improve its competitive position and increase sales by delivering more consistently fresh produce. The same benefits would flow all the way to growers.

You said that, even without RFID, growers and other companies in the fresh produce supply chain already can track product back to the field. How would this be done?

Dean: In the field, product is harvested and information is collected about how much and which person or crew did what. Product is placed in various containers and transported to a packing house or shipping location. It is then packed, processed, cooled and readied for shipment. Throughout all of these processes, it can be a challenge to maintain the connection between the product and the field it came from. RFID offers the ability to track this data by allowing automatic collection of the data at all points in the process. The secret is in the sharing of data. If I have all of this data and it just stays inside my four walls, there's no benefit to the rest of the supply chain in terms of trace-back or freshness.

How, exactly, would RFID-enabled tracking take place? Can you start with, say, a tote of freshly picked spinach, and describe this?

Dean: First, the totes [containers similar to a commercial bread-baking tray] into which the spinach is picked need to be tagged. Some growers release already-tagged totes to the harvesting crew. Each tag carries a unique

EPC. The grower has been told by the harvester which fields will be picked that day, and so can associate those tags with the harvester and fields. Another method would be to have readers right out in the fields. By reading a tote's tag in a given field, and associating the tag's EPC with the reader location, the grower will know the field in which the spinach was picked.

The shipper can find out the grower, harvester and field information associated with each tote received by performing an inquiry in the EPCIS. The latter is a collection of databases and protocols used by trading partners to learn about shipments. Only parties that have agreed in advance can see the data. For example, one grower cannot see shipment data pertaining to a competing grower.

Knowing the field and grower associated with each tote, the shipper must take care not to mix spinach from different fields. To accomplish this, the shipper must tag the end product—bags or cans—and any containers involved in processing with [unique] EPCs associated with the grower, harvester and field.

When the retailer or restaurant receives and reads the tagged bags or cans of spinach, they, too, can use EPCIS to retrieve information about the associated grower, harvester and field. If there's a recall involving a single grower, harvester or field, they know immediately which bags to pull off the shelf. Even better, if they know about a recall when they receive the product, they can altogether avoid putting it on the shelf. Consumer safety is maximized while preserving revenue for those growers not impacted by the recall.

The ability to conduct an efficient recall would have made a huge difference in September. However, since no one knows when the next *E. coli* outbreak will occur, it's hard to put a value on a technology that can deliver that efficient recall. So, how can RFID implementation be justified?

Dean: We need to focus on the ongoing benefits to producers and buyers. I already mentioned that RFID can substantially reduce spoilage, simply by informing shippers and their customers about the harvest dates associated with shipments. Product freshness can also be improved by combining temperature sensors with RFID.

For example, take strawberries. Bruising can vary a lot according to the temperature at the time of picking. If the data recorded in the field includes temperature along with the time of picking, growers will be able to determine the best times to harvest. They may find that in the morning, when it tends to be cooler, 90 percent of the strawberries picked are not bruised. However, in the afternoon, when temperatures have risen, the opposite occurs—80 percent of the berries picked are bruised. This kind of information can lead to millions [of dollars] more in salable product, not to mention improving consumer satisfaction.

Another benefit has to do with the growing trend toward vendor-managed inventory (VMI). With VMI, shippers are responsible for replenishing stock without receiving orders from customers. Given RFID and data sharing, shippers can more readily observe turnover of their products in a given store or region. Say customers' spinach inventory is moving slowly in the Southeast, but stores in the Midwest have put an item on sale and are seeing sales pick up. The shipper can react quickly and redirect millions of bags to the Midwest. The improved inventory allocation from better visibility boosts revenue.

It appears that the implementation of RFID in the fresh-produce industry will bring significant benefits to the industry and consumers alike. But what about implementation cost?

Dean: Well, of course, you have the tags. At 15 cents each, one can see why there isn't a rush to tag bags of spinach, for example. These products carry a very tight margin. However, as implementation throughout the industry progresses, the cost of tags will drop, and all of the other reasons for tagging will start driving the spinach and all the fresh produce industry toward full adoption of RFID.

The really hard work is in laying the foundation for data sharing. Even after EPCIS becomes a standard, this will not be easy. The fresh produce industry is still pretty fragmented. The USDA could play an active role here

in bringing numerous companies together. Years could be cut out of the timeline to industry-wide implementation.

What incentive would USDA have to invest?

Dean: In addition to increased consumer safety, USDA has an economic incentive. Each day it publishes [Market News](#), showing production of fresh produce in various regions of the country. All this data is compiled through a manually intensive process involving USDA agents calling shippers, who provide or fax back data that then must be entered into USDA's database. With full-scale implementation of RFID, USDA would collect more accurate data automatically, which could be made available in real time.

Of course, a nationwide RFID-enabled solution does not completely solve the consumer-safety challenge involved with fresh produce. Products are also being imported from other countries. But U.S. producers, sellers and consumers will have made a great leap forward.

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