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## **RFID and Smart Marketing**

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**Radio Frequency Identification**, or RFID, is a developing technology that is revolutionizing food distribution and many other industries. Essentially, in its application to the food industry, the technology involves very small microchips (and getting smaller all the time) with radio signal transponders (combination receiver and transmitters) embedded in labels, packaging, cases, or pallets and radio frequency readers (receive and send radio signals) positioned at strategic points along the supply chain.

These transponders serve three critical functions: receiving data, storing data, and transmitting data about the product. In a produce industry context, these data could include producer name, field and plot location, pick date, ship date, temperatures experienced en route from field to retailer, and much more. The transponder's radio signal can be translated into information by readers located at packers, shippers, processors, manufacturers, consolidators, wholesale distribution centers, and retail stores. Readers will be linked to computer databases where the information can be catalogued and analyzed.

Two major issues are driving the development and adoption of RFID in the food industry. First is the demand for efficiency, driven largely by the impact of Walmart's low cost procurement and distribution model. Walmart itself has accelerated the development and adoption of RFID by mandating compliance by its major suppliers by specific target dates. The

second issue is food safety and security, driven primarily by retailer concern about ensuring the safe handling of food from the point of production to the retail shelf.

The benefits of RFID for the food industry fall into four main categories: improved supply chain information and tracking, lower costs and higher productivity, food safety recall traceability, and reduced shrinkage and spoilage.

While, ultimately, RFID technology might reach the level of consumer packaging, a variety of issues will limit RFID's impact to the case and pallet level where it will significantly impact supply chain costs and controls. Currently, the largest constraint to RFID being used at the consumer package level is cost. However, like all technologically based systems, the costs per RFID tag, per RFID reader, and for RFID system implementation continually decline. So, eventually, the cost barrier will be eliminated.

In the longer run, the tougher issue facing consumer package RFID adoption may revolve around consumer concerns regarding personal privacy. These concerns range from the security of data collected by retailers to fears that RFID signals could be read once the products leave the store, and the myriad of "Big Brother" type scenarios that could spin from those concerns. Some of these concerns have already been addressed (e.g., the RFID tags can be disabled at the point of sale) but the public perception could remain negative for some time as consumer advocacy groups actively trumpet the negative implications of RFID consumer packaging applications.

Supply chain applications alone, however, offer significant benefits in terms of cost savings, eliminating inefficiencies, ensuring quality and safety, and product source tracing related to product recall and food safety issues. For example, an RFID tag affixed to a pallet of broccoli picked in a field in California would maintain a record of the temperature the product experienced throughout transit from field to retail store receiving dock. If the ideal temperature range were violated, the source of the violation would be indicated, and the issue could be addressed at the source of the violation. This will help ensure that product is handled properly throughout the cold chain and that product quality is enhanced while food safety risk is reduced.

Despite the vision for the future, many issues with RFID must be resolved before full implementation is successful, even at the pallet and case levels. Some of these issues involve refinement of the technologies involved to ensure 100% accuracy. Other issues relate to the ability of small- and medium-sized producers, processors, manufacturers, distributors, and others to invest in the equipment, technology, and human resources necessary to function in an RFID-based world.

Remaining technological issues include improving “read rates”, that is, the accuracy of the RFID readers through which pallets of product pass at each stage of the supply chain. While most tests have reported signal reading accuracies of 90+ percent, the goal is 100% accuracy. Some types of products (e.g., high moisture content) and some types of packaging (e.g., metal or nylon) have proven to be harder for RFID signal readers to penetrate and have resulted in reduced read accuracy. Another issue, especially relevant to farm and orchard produce, is that harsh field conditions (e.g., moisture, soil, and temperature extremes) can interfere with current RFID tags. Likewise, the lack of standards for pallets and shipping case materials in the produce industry is not optimal for RFID reader accuracy. Several other related issues are endemic to the produce industry.

While costs will continue to decline, the investment in RFID technology and systems will remain a major challenge for small- and medium-sized producers, processors, and other supply chain participants. The capital requirements may require small producers, for example, to form cooperative ventures to minimize the individual cost of compliance with demands of downstream customers for RFID capability. Cooperative ventures may also help address costly issues such as training and development, software license fees, equipment leases, repairs, and maintenance.

A great resource assessing the implications of RFID for the produce industry is the 2004 Produce Marketing Association (PMA) report entitled “Radio Frequency ID (RFID) in the Produce Supply Chain.” Copies of the report can be purchased from PMA through their website [www.pma.com](http://www.pma.com).

RFID is an inevitable reality of the food industry. The only question is how soon will all producers be expected to comply with RFID expectations of downstream supply chain partners. The good news is that RFID is still more than five years from universal implementation. However, now is the time to become as familiar as possible with RFID and to begin planning for the world according to RFID.

**"Smart Marketing"** is a monthly marketing newsletter for extension publication in local newsletters and for placement in local media. It reviews the elements critical to successful marketing in the food and agricultural industry. Articles are written by faculty members in the Department of Applied Economics and Management at Cornell University.

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