

## From farm to fork

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### **Bar codes that let shoppers trace their food back to the field**

DESPITE its preoccupation with hygiene, America's dirty secret is that it is one of the most dangerous places in the developed world to eat. Every year 76m Americans become ill because they have consumed contaminated food—a staggering 26,000 cases per 100,000 population. In Britain, where people consume far fewer hamburgers, generally eat out less often and buy nowhere near as many ready-meals, there are 3,400 cases of food poisoning per 100,000 population annually. France is safer still, with only 1,200 annual instances per 100,000 people.

Most cases of food poisoning are mild, with victims recovering in a day or two. Sometimes, however, foodborne illnesses kill or cause permanent health problems. In the United States around 5,000 people die and a further 325,000 wind up in hospital each year as a result of food poisoning. The annual cost to the country, in medical treatment and lost productivity, is more than \$35 billion.

The wave of food scares that has swept America over the past few years has caused a crisis in the country's \$1 trillion food industry. One of the most notorious outbreaks, caused by the virulent *Escherichia coli* O157:H7 bacterium, happened in 1993. Four children died, dozens of people went to hospital with kidney failure and hundreds more became seriously ill after eating undercooked hamburgers from the Jack-in-the-Box chain of restaurants. Since then, the regulations governing the sale of ground beef have been tightened considerably.

The deadliest foods to be found on the stalls in street markets and the shelves of supermarkets, though, are not meat or poultry but leafy vegetables and fruit. That is because unlike ground beef, which is cooked at a temperatures which destroy bugs, fruit and leafy vegetables tend to be eaten raw. The outbreak of O157 in 2006, which killed five people and made a further 205 ill, was tied to raw spinach. Meanwhile, America's largest epidemic of foodborne disease in over a decade—last year's *Salmonella* infection that claimed two lives, hospitalised 250 people and affected more than 1,300 others—was traced back through the supply chain initially to tomatoes and then to jalapeño peppers. Now there are doubts whether either was really to blame.

Tracking down the source of a foodborne infection is notoriously difficult. The vast majority of incidents are transitory in nature—a leaky toilet, a wandering animal, a momentary lapse of hygiene in the field or factory. But mounting concern about this lack of traceability has prompted the food industry itself, as well as the American government, to take action.

In October 2007 producers in the United States and Canada joined forces to launch a plan called the Produce Traceability Initiative. This uses bar-codes to track fruit and vegetables through the distribution system. Although participation in this particular plan is voluntary, it may soon become compulsory to provide traceability of some sort.

That is because lawmakers on Capitol Hill want to give the Food and Drug Administration (FDA) sweeping new powers to oversee food production. A bill introduced in the House of Representatives by John Dingell, a Democratic congressman from Michigan, was passed in July, though it has yet to be taken up by the Senate. But with the White House, the food industry and the FDA behind it, the bill could be law before the end of the year. If it is, then companies selling food in America will have to adopt a tracking system that can identify the farmer, the field, the picker, the packer, the shipper, the wholesaler and the shop—all within two business days of a case of food poisoning being reported.

The technology for doing so is readily available. Radio-frequency identification (RFID) tags used for tracking items like shipping containers and pallets of goods have been around for years. The attraction of these tiny passive chips, which emit a stream of digital data only when energised by a radio beam, is that it is not necessary to see a tag to read it.

Unfortunately, though simple RFIDs cost less than 30 cents apiece, they are still way too expensive for tagging a bag of cut lettuce or a bunch of grapes. By contrast, the bar-codes printed on supermarket products cost less than half a cent each. Their disadvantage is that they have to be scanned physically by a line-of-sight reading device. It is also tricky to capture the data in the field and stick the bar-code labels on the produce as it is picked and packed. Managing the supply-chain database is no trivial matter either.

The Consumers Union, which campaigns on behalf of individual customers, wants Congress to require food producers to use an electronic tracking system like the one Federal Express employs for parcels. But tracking produce is not that simple. A parcel delivered by Federal Express, or any other courier service, stays under one firm's control all the way. By contrast, a bunch of grapes travels from the farm to a packer, to a shipping centre, to a warehouse, to a shop and finally to a consumer's fridge. Each stage is handled by a different organisation with a different way of doing things.

That has created opportunities for new firms like YottaMark of Redwood City, California, and FoodLogiq of Durham, North Carolina. Both have developed sophisticated software for tracing the origin and freshness of food. If their technology is deployed, the next time a big food scare occurs, the damage done to consumers and producers alike should be far more easily contained.

But apart from safety, the new traceability software should also allow packers and shippers to combine their tracking functions with marketing exercises. Both YottaMark and FoodLogiq offer systems that let shoppers type a text code into a mobile phone or home computer, or scan a bar-code using a phone's built-in camera, to find out when the tomatoes on the shelf were picked and which field they came from.

That can be an attractive proposition for producers. YottaMark's traceability label ("HarvestMark") has been attached to almost a billion food items so far. What the food industry has learned in the process is that it not only gives consumers the confidence to buy, but also builds customer loyalty and trust in a particular brand, a region and even an individual producer. Some 85% of consumers polled by YottaMark said that, all things being equal, they would choose a traceable item over an untraceable one.

Bringing the farmer electronically into the kitchen this way can make the experience of buying produce as personal as shopping in a local farmer's market—but with a far wider range of products to choose from. As Elliott Grant of YottaMark observes, marketing foodstuffs these days is becoming more a matter of "locale" and less about being merely "local".