

IBM and Walmart suggest a way to achieve timely traceback of contaminated produce from farm to store

Anyone who walked through the produce section of their local grocery in the week before Thanksgiving could not help but be aware that all romaine lettuce and salad mixes that contained romaine lettuce had been removed from the shelves. The stores took this action in response to a November 20, 2018 warning from the US Food and Drug Administration (FDA) and the Centers for Disease Control and Prevention (CDC) that a multi-state outbreak of the Shiga toxin-producing *E. coli* O157:H7 (STEC) had been traced to the eating of romaine lettuce.

As in most cases of a multi-state food borne illness, it took a period of time between the first reported illness and the identification of the food product responsible for the outbreak. The common link in the illnesses was romaine lettuce.

The FDA then worked quickly with romaine producers and distributors who voluntarily withdrew the product from the market to help contain this outbreak. The FDA also launched a traceback effort to determine the source of the contaminated romaine lettuce with the knowledge that they had identified the DNA sequence for the STEC responsible for the illness outbreak.

On December 6, the FDA announced it was continuing the traceback investigation, which involved reviewing shipping records and invoices to trace the romaine, that ill people who are part of this outbreak consumed, backwards through the supply chain to identify where it was grown and where in the supply chain it may have become contaminated. As part of this process they collected romaine lettuce, soil, water, and scat samples.

By December 6 they had narrowed the growing area down to 6 counties in the Central Coast growing regions of northern and central California as the likely source of the outbreak. A week later the list was down to 3 California counties. Other growing areas including Florida, Mexico and the desert growing regions near Yuma, Imperial County, and Riverside County did not appear to be related to the current outbreak.

In the December 13 announcement the FDA reported that investigative teams analyzed romaine lettuce, soil, water, sediment, and animal dropping samples at farms identified by the traceback investigation. Most of these samples tested negative for the outbreak strain.

But the strain of *E. coli* O157:H7 causing the current outbreak was identified in one sample collected in the sediment of an agricultural water reservoir at one ranch owned and operated by Adam Bros. Farming, Inc., in Santa Barbara County. The strain isolated from this sample matched those collected from ill persons in this outbreak using Whole Genome Sequencing (WGS). The FDA was able to confirm that Adam Bros. Farming, Inc. hadn't shipped any romaine since November 20, 2018. Experts continue working with the farm to determine how the contamination occurred and what corrective actions need to be taken before their next growing season.

As of December 16, cases related to this outbreak had been identified in 16 states, all but California and Louisiana were east of the Mississippi River from New Hampshire, to Florida, to Illinois and states in between. There were 56 reported illnesses and 23 hospitalizations.

The traceback process is tedious and takes a considerable amount of time to track the contaminated lettuce from the store where it was purchased, to the distribution center that supplied the store, and eventually the farm where it was grown and harvested. A standardized

identifier for each lot of produce grown would shorten the traceback time considerably and could prevent additional illnesses.

According to NBS News (<https://tinyurl.com/yclz2fsr>), “the FDA has hired Walmart’s vice president of food safety, Frank Yiannas, as deputy commissioner for foods and veterinary medicine. [FDA commissioner Dr. Scott] Gottlieb hopes Yiannas can help persuade the US food industry to adopt a computerized system that keeps track of each head of lettuce, or box of mangoes, or package of chicken parts, along each step of the way from farm to store or restaurant.”

IBM Food Trust has developed a computerized system to track the many links in the chain of transactions from farm to fork. Their system “uses blockchain technology to create unprecedented visibility and accountability in the food supply chain. It is the only network of its kind, connecting growers, processors, distributors, and retailers through a permissioned, permanent and shared record of food system data” (<https://tinyurl.com/ybb54oco>).

Using this technology, once the CDC has identified the pathogen vector (in this case romaine lettuce) and the stores where it was purchased, the blockchain information could instantly identify the location where the pathogen originated. Instead of having to pull all romaine lettuce in the US off grocery shelves, the recall could be limited to specific stores and lot numbers in specific states.

Walmart has already announced that it is in the process of requiring all its produce suppliers to use this technology. In the past we would have had to wait for the FDA or the USDA to develop regulations to require each step in the supply chain to use this kind of technology. Today, the private sector will likely implement this process in less time than it would take to hold the first public hearing on the issue.

Policy Pennings Column 956

Originally published in MidAmerica Farmer Grower, Vol. 37, No. 202, December 28, 2018

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