

PolicyPennings by Daryll E. Ray & Harwood D. Schaffer

German E. coli outbreak: Are there lessons to be learned?

In following the story of the E. coli outbreak in Germany, we were intrigued when they declared that they had determined that the point of origin was raw bean sprouts produced on an organic farm despite the fact that tests on bean sprout samples were negative for E. coli O104:H4, the bacteria responsible for 30 deaths in Germany and 1 in Sweden. So far the number of those who have come down with hemolytic uremic syndrome (HUS), permanent damage of the kidneys, is nearing 800 out of 3,000 recorded illnesses.

It turns out that they used a variety of evolving investigative and statistical techniques as they sought to identify the source material. In this column, we will look at the processes they used to investigate the source of the material responsible for the outbreak.

Much of the material in this column is based on documents that can be found on the website of the Robert Koch Institute (RKI), http://www.rki.de/EN/Home/homepage__node.html. The institute is part of the German Federal Ministry of Health. As in the US, responsibility for food-borne illness outbreaks is fragmented among several agencies.

As the outbreak began, RKI together with other federal and state authorities conducted an initial set of interviews and two epidemiological studies to identify the source of the illnesses. The first two studies “showed that [those who became ill] consumed raw tomatoes, cucumbers, and lettuce significantly more often than healthy study participants. These findings were complemented by results of another case-control study conducted among affected customers of a canteen that revealed a strong association between the consumption of foods from the salad bar and [the E. coli infection].”

Because E. coli was found on cucumbers from Spain, they were initially declared the cause of the outbreak. It was later found that the E. coli serotype on the cucumbers was different from the serotype that caused the then growing number of illnesses of people who lived in or had visited northern Germany.

In order to minimize the number of illnesses, health officials need to identify potential disease vectors—sorry for the jargon, in this case we are talking about raw cucumbers, tomatoes, and lettuce—as quickly as possible so they can warn people to avoid these foods. At the same time, a non-specific announcement will have a negative impact on a large number of farmers whose product has nothing to do with the outbreak, except in this case they are all consumed

raw and used to make salads.

When the first two studies failed to identify the source of the growing number of illnesses they conducted a “‘recipe-based restaurant cohort study’ [that allowed German researchers to narrow] down the source of the infection to the consumption of sprouts. It was possible to apply this methodological approach only after a sufficient number of restaurant customers could be identified to ensure adequate statistical power of this analysis.

“To ascertain the consumption of raw fruit and vegetables by patients and controls more objectively and less dependently on memory, RKI used the following approach in the ‘recipe-based restaurant cohort study.’ Five groups (travel groups, clubs, etc.) that comprised a total of 112 participants and included 19 individuals who acquired EHEC infection were questioned regarding the foods they consumed after eating in a common restaurant. Additionally, the menus ordered by the participants were identified by means of order lists and meal receipts. The restaurant kitchen was questioned in detail regarding the preparation and the type and quantity of ingredients in each menu ordered by any of the study participants. Furthermore, available photographs taken by travel group members were analyzed to confirm which food items, including toppings, were seen on the plates. The data thus gathered was analyzed in a cohort approach that permits the retrospective estimation of the relative risk of infection for the restaurant customers. Results of this analysis showed that customers who ate sprouts had an 8.6-fold increased risk [of] illness compared to those who did not. This study also revealed that 100% of those who contracted the illness had eaten sprouts.”

The importance of the follow-up “recipe-based restaurant cohort study” becomes clear because only 3 of 12 patients in the original intensive exploratory interviews reported eating sprouts. Researchers determined that an “under-ascertainment of sprout consumption seemed unlikely since the participants of this survey demonstrated an exceptionally high dietary awareness.” As a result, sprouts were eliminated from the original questionnaires used in the “initial case control studies.”

As RKI reports “So far, the...pathogen O104:H4 [has not been] detected in any food product from the

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retail market. A definitive point of entry of the EHEC pathogen O104:H4 into the food supply chain has not been identified despite intensive efforts of all authorities involved. . . . At present, human introduction of the EHEC pathogen into the agricultural business cannot be excluded. However, water, preceding suppliers, or seeds are also possible sources. These possibilities are currently under investigation through investigations of supply chains and laboratory analyses.”

There are several lessons to be learned from this experience.

In an attempt to minimize the loss of life and the spread of a food-borne illness, classes of products may be indicated rather than the product of specific producers. As we have seen in this incident and similar ones in the US, producers of similar products will be negatively impacted. In general stopping the loss of life and the spread of the disease is of first importance. As a consequence, we may need to think of ways to financially protect producers from the negative impact of a food warning. This may be a place where a federally subsidized insurance product would be important for fruit and vegetable growers.

It is often said that military planners are always planning for the last war. The same can be said for epidemiologists. In both cases, the future problem

may not look like the past and they need to be quick to respond to changed and changing circumstances. As we have seen in this case, the German authorities needed to hone their investigative techniques as early procedures failed to identify the source of the outbreak.

Better coordination among all agencies involved is essential and it would be best if one agency were designated as incident commander with the authority to move resources around as circumstances require. During the initial days, different and incomplete messages from various agencies involved in this outbreak led to some avoidable confusion.

Lastly, it is easy to use this incident as a way to carry forth the battle between organic agriculture—the sprout farm was organic—and conventional/industrial agriculture. Our observation is that both types of agriculture are vulnerable to being the source of food-borne disease outbreaks and the focus for both should be on eliminating the problem.

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