



**E. Coli O157:H7
and Fresh
Vegetables**

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E. coli outbreak traced to prewashed spinach

By Tim Hay, STAFF WRITER
The San Mateo County Times
Wednesday, January 21, 2004

REDWOOD CITY -- The October outbreak of E. coli that caused the deaths of two elderly women and sickened dozens of other residents and staff of the Sequoias Portola Valley retirement home has been traced to prepackaged spinach, County health officials said Tuesday.

The prewashed, raw spinach was served during the first week of October, and sickened at least 16 people, a report by the Health Department's Disease Control and Prevention Unit said.

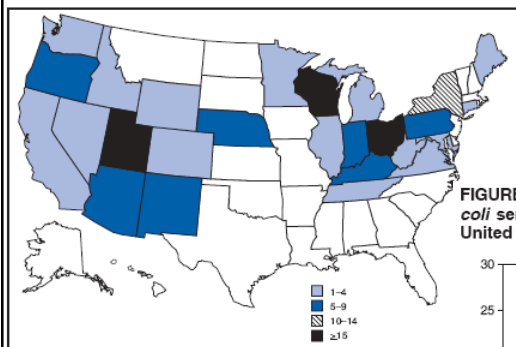
The federal Food and Drug Administration is in the process of tracing the spinach back to its grower and vendors, the report said.

As of Tuesday, the brand of spinach had not been determined, said Dr. Scott Morrow, a County health officer who helped conduct the investigation into the outbreak.

The home's kitchen is run by Sodexo USA, a multinational food service and distribution company that serves more than a million meals a day.

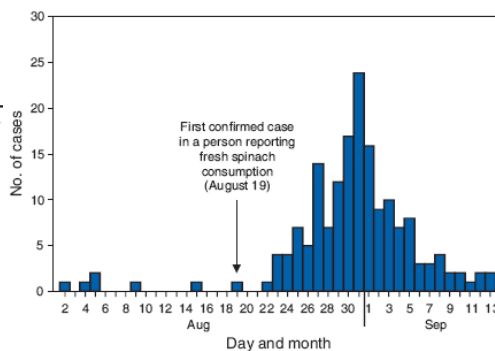
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FIGURE 1. Number of confirmed cases (N = 183)* of *Escherichia coli* serotype O157:H7 infection, by state — United States, September 2006



* Confirmed cases reported as of 1:00 p.m. EDT on September 26, 2006.

FIGURE 2. Number of confirmed cases (n = 171)* of *Escherichia coli* serotype O157:H7 infection, by date of illness onset — United States, August–September 2006




* Confirmed cases with known dates of illness onset reported as of 1:00 p.m. EDT on September 26, 2006.

Health and Behavior Inside News Cars Ev

Washing spinach won't help; health officials struggle to find source of E. coli

Updated 9/15/2006 11:46 PM ET E-mail Save Print RSS



By H. Darr Beiser, USA TODAY

Federal health officials blamed an e.coli outbreak on bagged fresh spinach. "We're advising people not to eat it," one FDA official said.

E.COLI Q&A
Some frequently asked questions about E. coli:
Q: What is Escherichia coli, or E. coli?

WASHINGTON (AP) — Even if you wash the spinach, you still could be at risk.

Sober warnings for salad lovers came from federal health officials Friday as they focused on a possible source of a multistate E. coli outbreak that killed one person and sickened nearly 100 more. Twenty-nine people have been hospitalized, 14 of them with kidney failure.

The outbreak was traced to Natural Selection Foods, a holding company based in San Juan Bautista, Calif., known for Earthbound Farm and other brands. The company has voluntarily recalled products containing spinach.

MORE ON THE OUTBREAK: [Read the warning](#) | [Video](#)

Food and Drug Administration officials stressed that the bacteria had not been isolated in products sold by Natural Selection Foods but that the connection was established by patient accounts of what they had eaten before becoming ill.

The investigation was continuing.

"It is possible that the recall and the information will extend

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Leafy Green Sewage
 By NINA PLANCK
 Published: September 21, 2006

FARMERS and food safety officials still have much to figure out about the recent spate of E. coli infections linked to raw spinach. So far, no particular stomachache has been traced to any particular farm irrigated by any particular river.

[Enlarge This Image](#) 

There is also no evidence so far that Natural Selection Foods, the huge shipper implicated in the outbreak that packages salad greens under more than two dozen brands, including Earthbound Farm, O Organic and the Farmer's Market, failed to use proper handling methods.

Indeed, this epidemic, which has infected more than 100

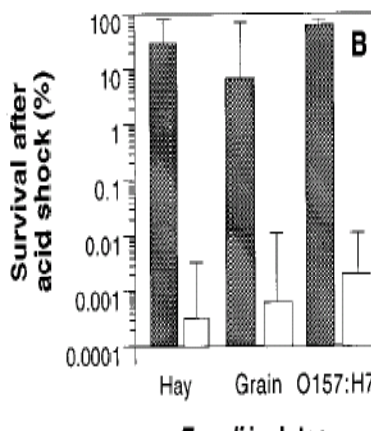
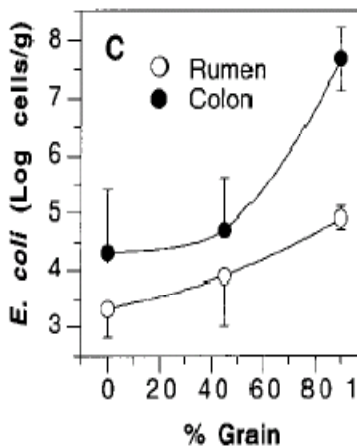
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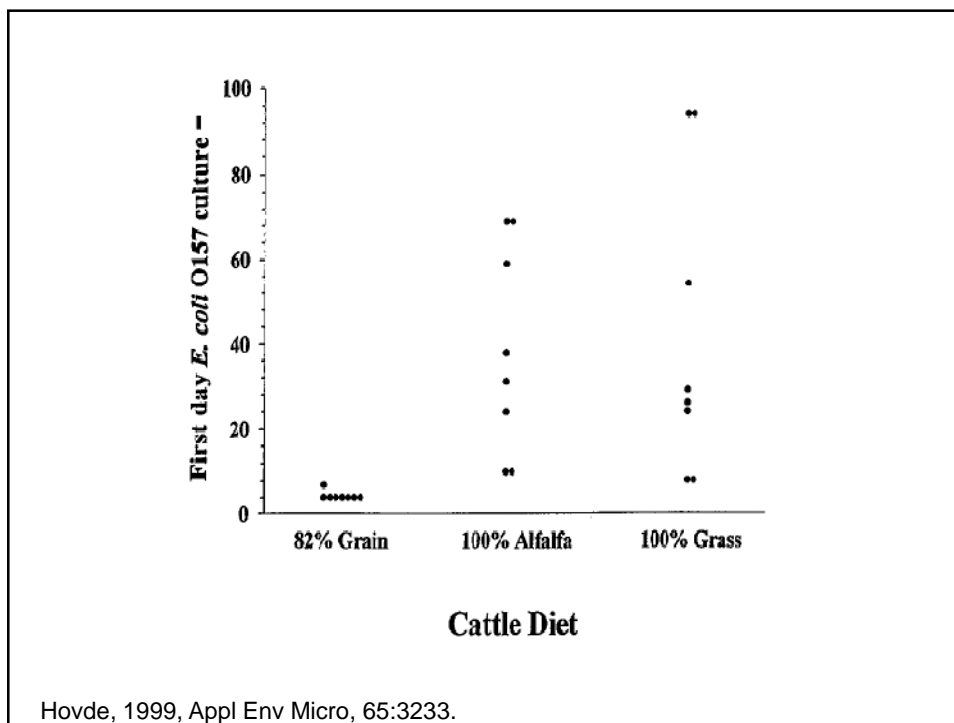
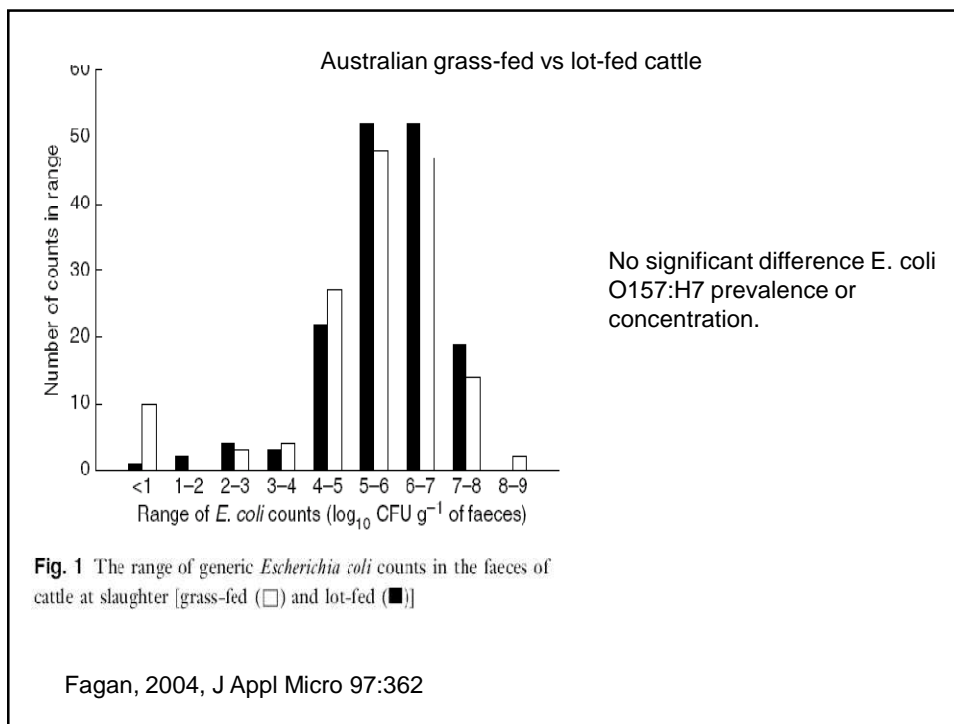
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Origin of the hypothesis that feeding grain to cattle "causes" E. coli O157:H7 problem"



Diez-Gonzalez, Science 281:1666, 1998



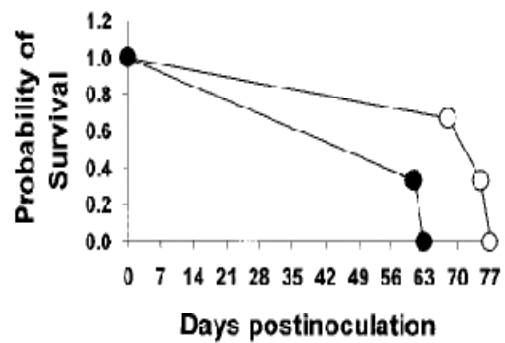
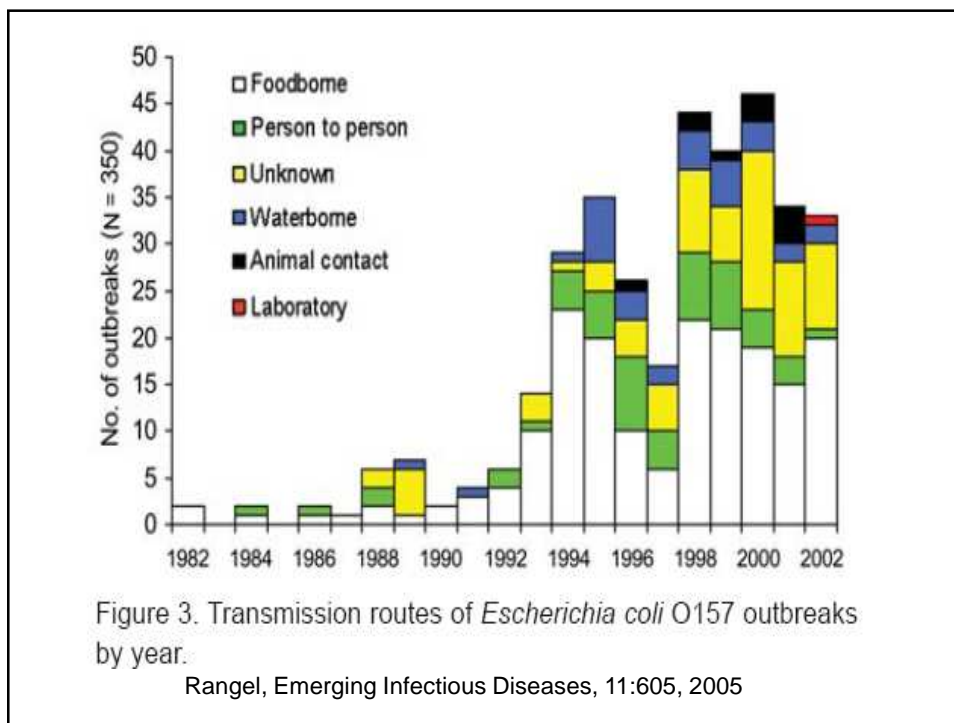
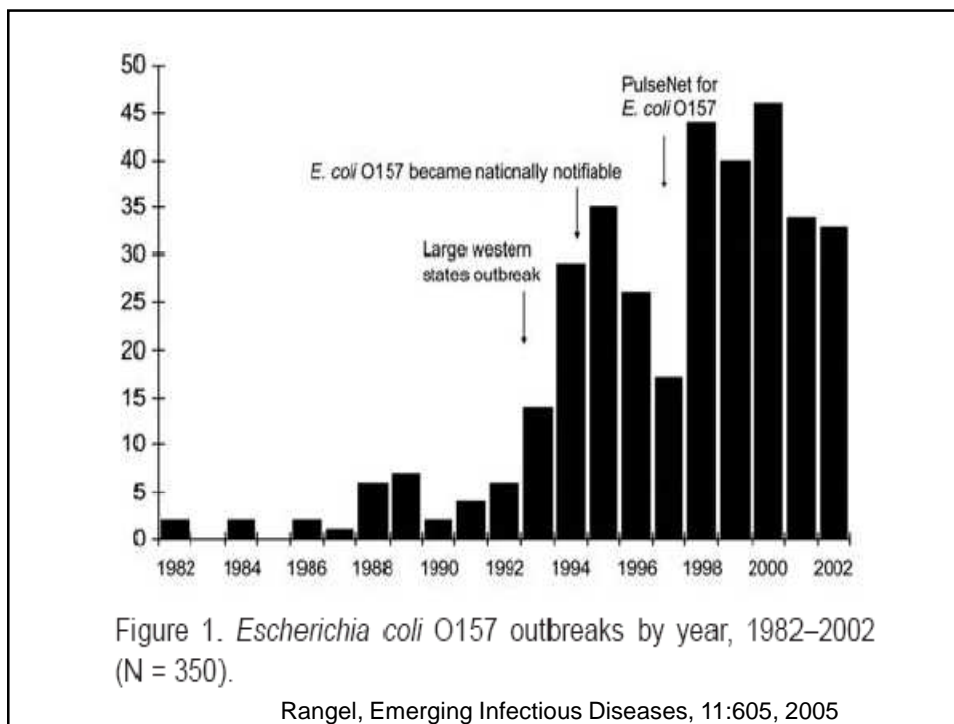


FIG. 1. Duration of *E. coli* O157:H7 shedding in the feces (survival analysis in which the outcome was the final day in the sampling period that an animal shed the organism in the feces) of cattle fed the forage diet with (closed symbols) or without (open symbols) monensin.

Van Baale, 2004, Appl Env Micro 70:5336.

Fecal pathogens on fresh produce: Not an incosequential matter!



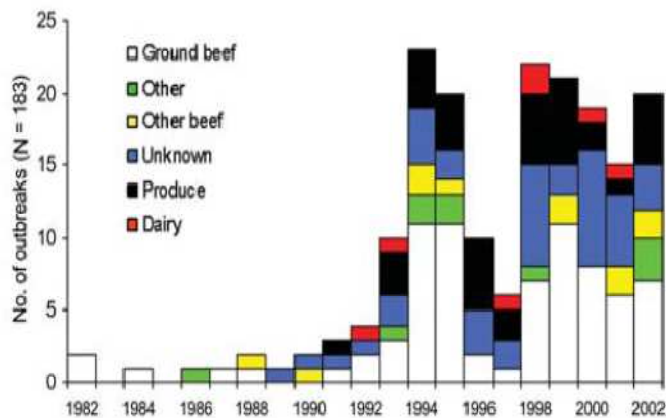
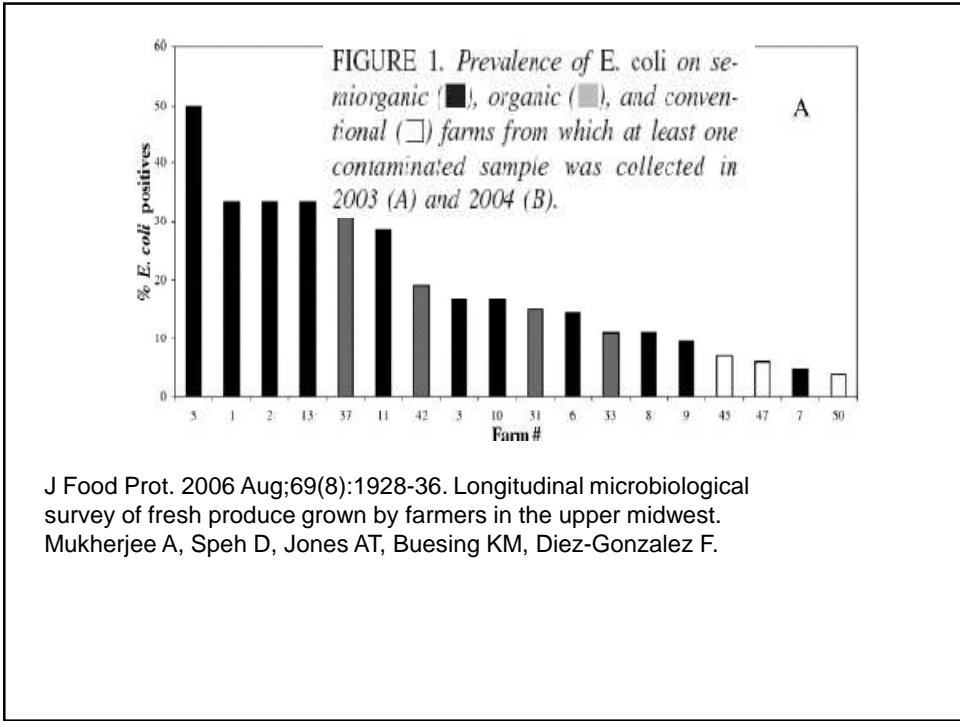


Figure 4. Vehicles of foodborne *Escherichia coli* O157 outbreaks by year.

Rangel, Emerging Infectious Diseases, 11:605, 2005

Do fecal bacteria *really* occur on veges?



J Food Prot. 2006 Aug;69(8):1928-36. Longitudinal microbiological survey of fresh produce grown by farmers in the upper midwest. Mukherjee A, Speh D, Jones AT, Buesing KM, Diez-Gonzalez F.

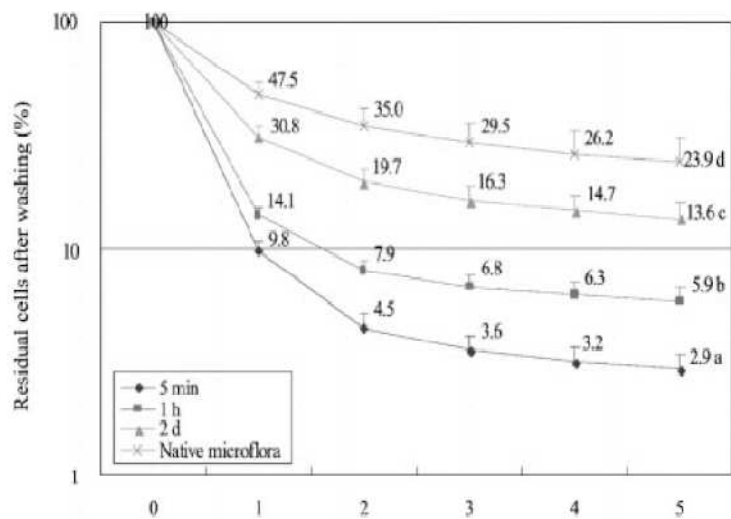
TABLE 5. Prevalence of *E. coli* in different produce types from organic, semiorganic, and conventional farms in 2003 and 2004^a

Produce types	% <i>E. coli</i> -positive samples (no. positive/total)					
	Organic		Semiorganic		Conventional	
	2003	2004	2003	2004	2003	2004
Berries	0 (0/18)	0 (0/7)	0 (0/23)	2.9 (2/69)	0 (0/26)	0 (0/51)
Broccoli	6.7 (1/15)	0 (0/9)	0 (0/21)	5.0 (2/40)	0 (0/6)	0 (0/14)
Cabbages	14.3 (3/21)	3.6 (1/28)	10.0 (4/40)	14.6 (6/41)	3.7 (1/27)	7.3 (3/41)
Cucumber	8.3 (1/12)	12.0 (3/25)	4.3 (1/23)	2.9 (1/34)	0 (0/41)	0 (0/44)
Leafy greens	6.7 (2/30) ^A	9.1 (7/77) ^A	23.9 (17/71) ^B	13.9 (14/101) ^{AB}	25.0 (3/12) ^{AB}	20.0 (1/5) ^{AB}
Lettuces	18.2 (6/33)	22.7 (5/22)	20.0 (7/35)	9.3 (4/43)	0 (0/12)	25.0 (3/12)
Peppers	0 (0/12)	2.3 (1/44)	0 (0/46)	1.3 (1/75)	0 (0/45)	0 (0/60)
Summer squash	0 (0/7)	0 (0/10)	0 (0/19)	2.9 (1/34)	0 (0/16)	5.0 (1/20)
Zucchini	8.3 (1/12)	0 (0/16)	0 (0/29)	0 (0/18)	0 (0/45)	0 (0/35)

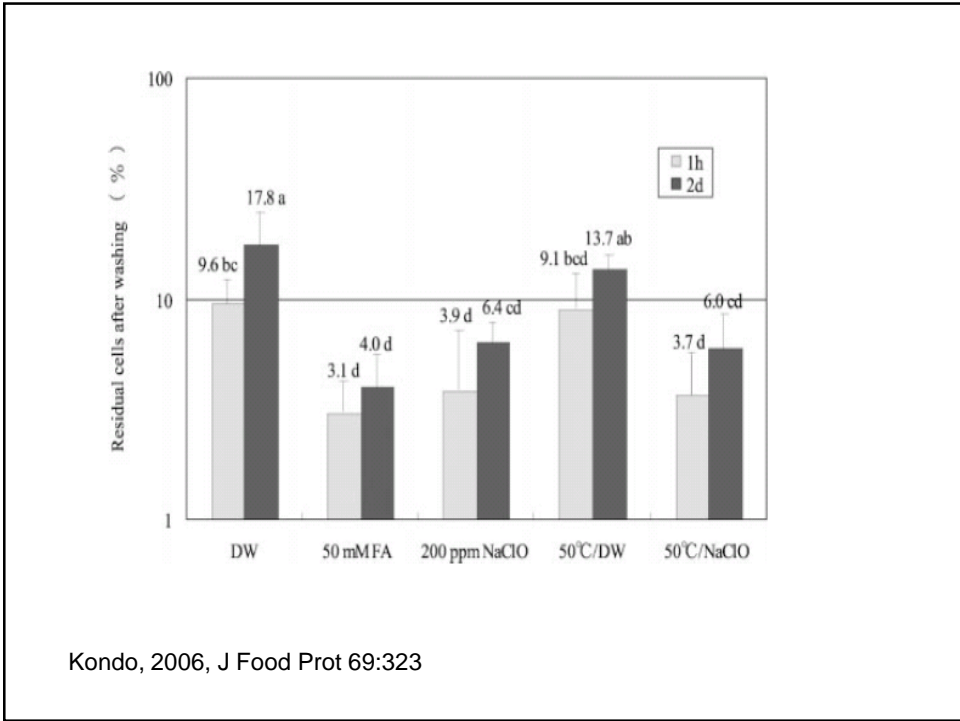
^a For leafy greens, percentages with different letters are significantly different ($P < 0.05$). Percentages in rows without letters are not significantly different.

J Food Prot. 2006 Aug;69(8):1928-36. Longitudinal microbiological survey of fresh produce grown by farmers in the upper midwest. Mukherjee A, Speh D, Jones AT, Buesing KM, Diez-Gonzalez F.

Can we get fecal bacteria off of veges?



Kondo, 2006, J Food Prot 69:323



DeLaquis, 2007, O157 in leafy vnges.pdf - Adobe Reader

Journal of Food Protection, Vol. 70, No. 8, 2007, Pages 1966-1974
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Review

Behavior of *Escherichia coli* O157:H7 in Leafy Vegetables

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MS 07-003: Received 2 January 2007/Accepted 25 March 2007

ABSTRACT

Leafy vegetables, including lettuce and spinach, have been implicated in several outbreaks of foodborne disease caused by *Escherichia coli* O157:H7, a pathogen of increasing public health significance because of the severity of the gastrointestinal illness and long-term, chronic sequelae that can result from infection. A definitive association between the consumption of leafy vegetables and human disease provides implicit evidence of transfer from animal sources to field crops and retail commodities, including minimally processed or fresh-cut products. Understanding the behavior of *E. coli* O157:H7 in leafy vegetables during production, after harvest, in storage, during processing, and in packaged fresh-cut products is essential for the development of effective control measures. To this end, previous research on the fate of the species at each step in the production of market-ready leafy vegetables is reviewed in this study. Several critical gaps in knowledge are identified, notably uncertainty about the location of contaminating cells on or in plant tissues, behavior in packaged products stored at low temperatures, and the influence of environmental stresses on growth and infectivity.

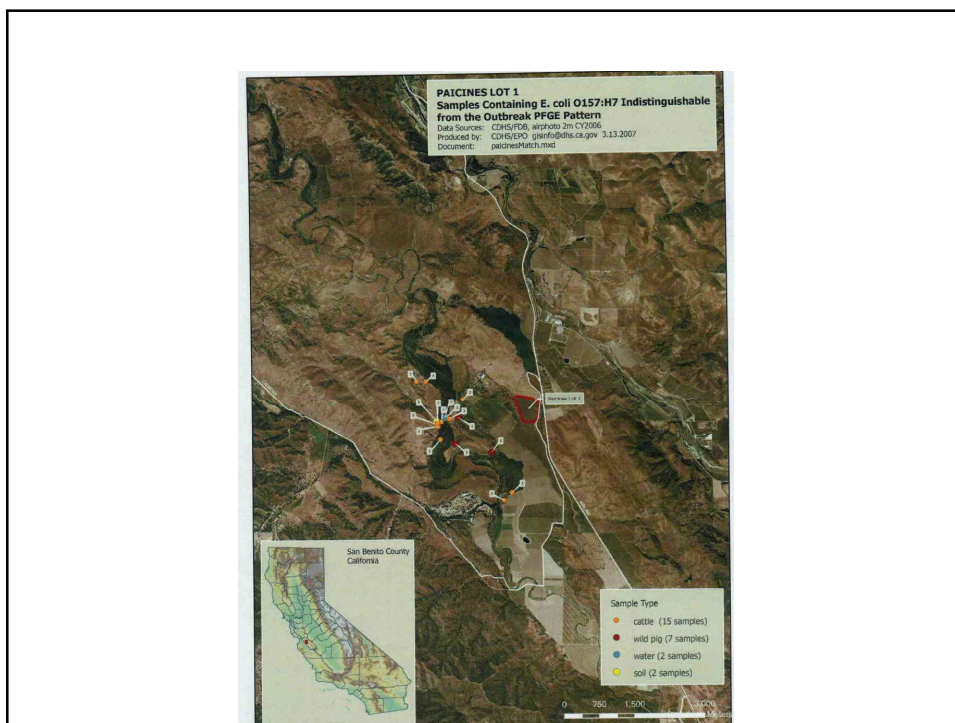
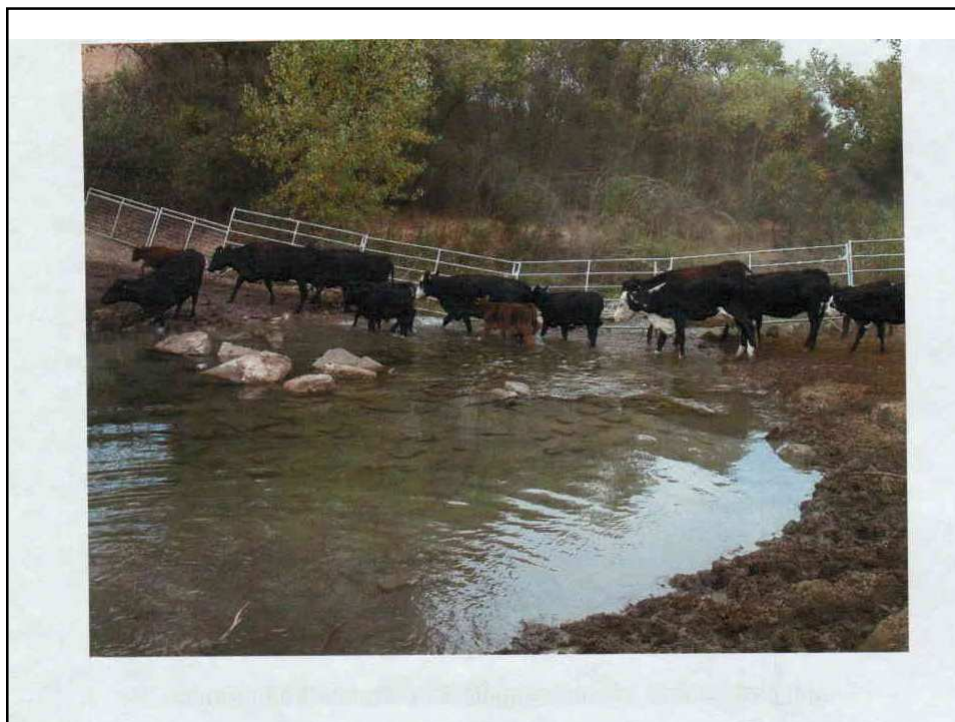
How do veges get contaminated with fecal bacteria?

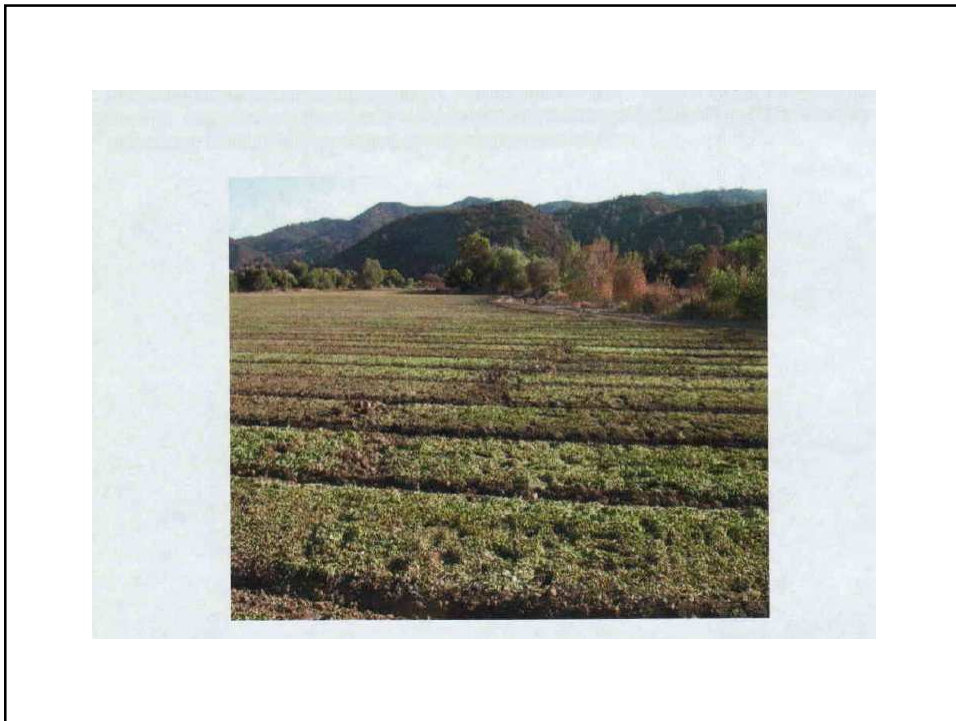
**Investigation of an Escherichia coli O157:H7 Outbreak
Associated with Dole Pre-Packaged Spinach**

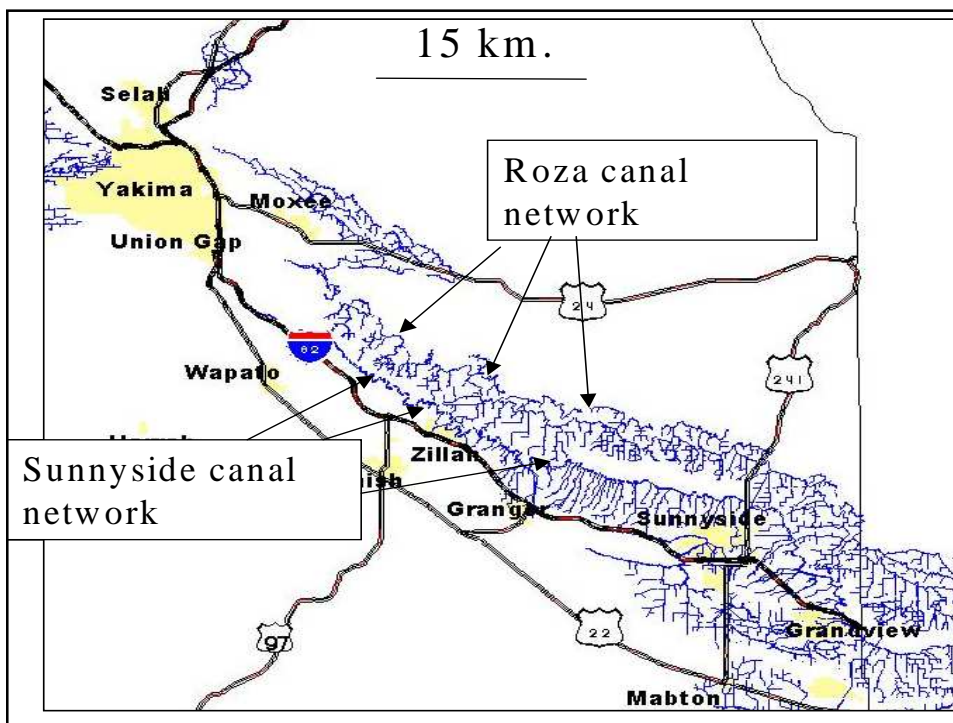
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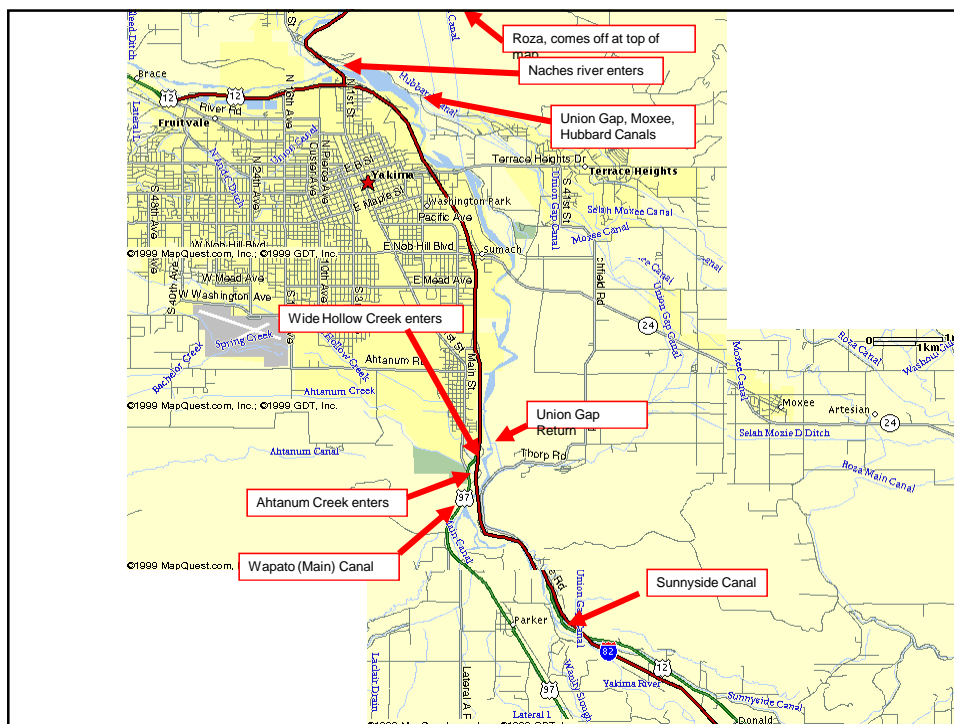
March 21, 2007

<http://www.dhs.ca.gov/ps/fdb/html/food/envinvrpt.htm>

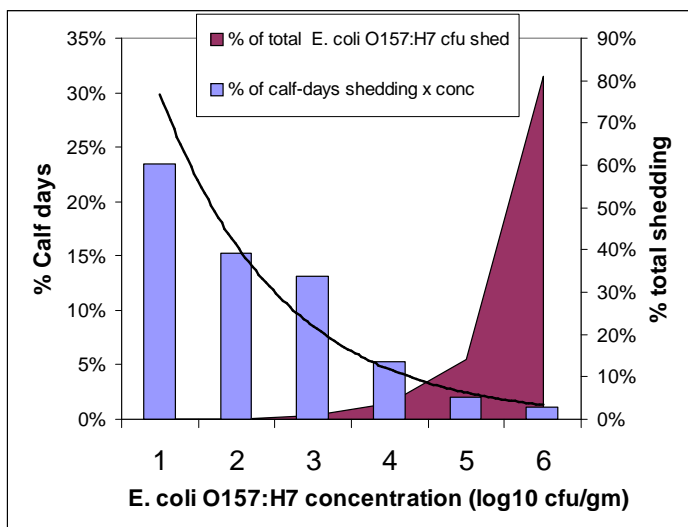


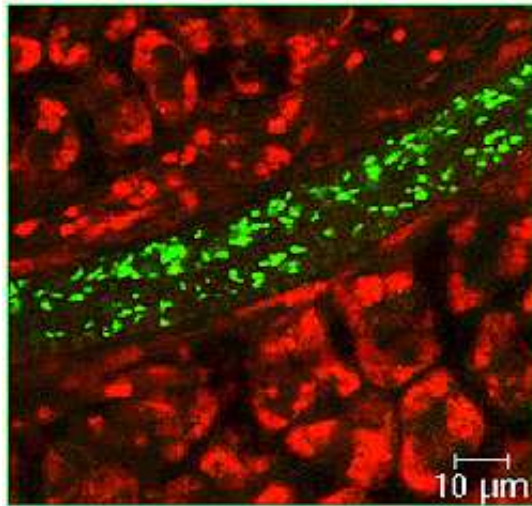






Distribution of shedding concentration of *E. coli* O157:H7 in cattle





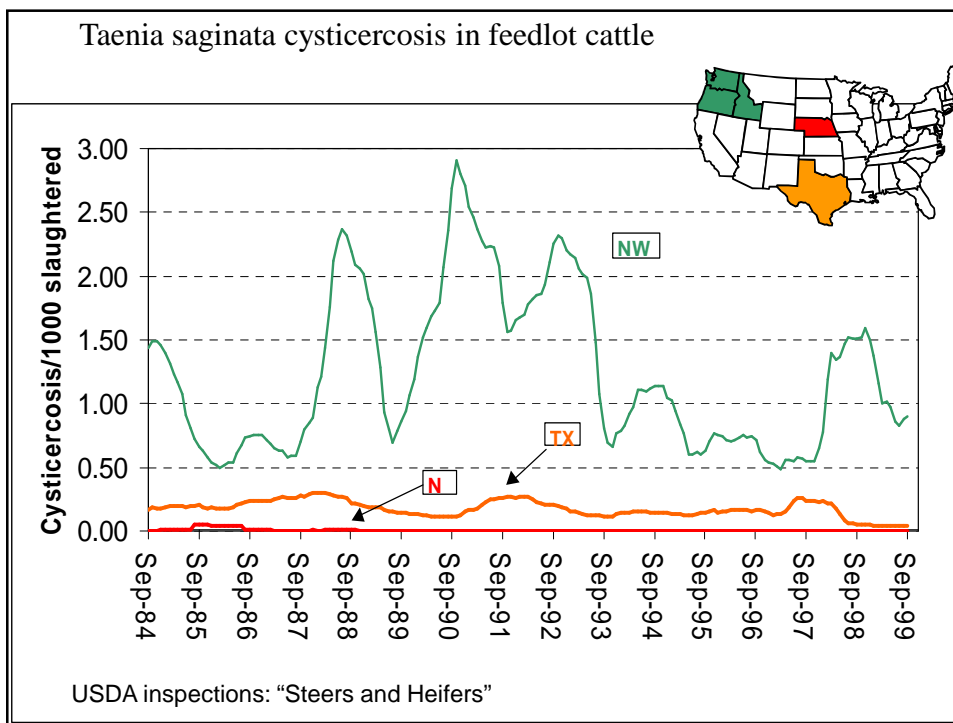
A confocal scanning laser micrograph of fluorescent green *E. coli* gaining access to the xylem of cut leaf lettuce. (Magnification about 1,000x)
Photo by Marian Wachtel.

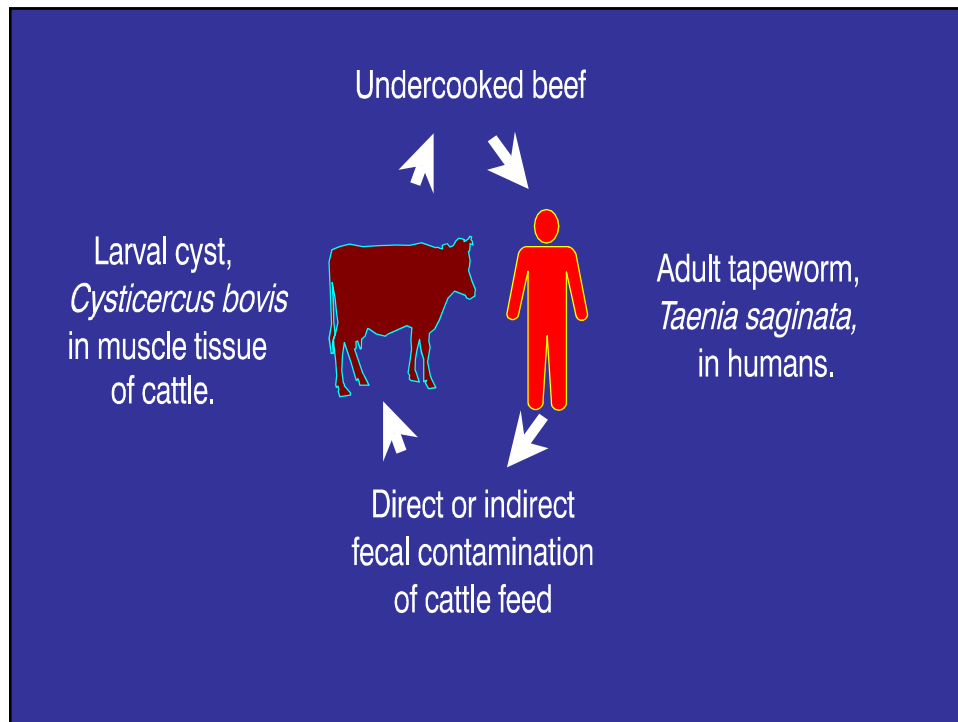


Manure Tea

If you feel that your tomato plants would benefit from a quick boost, then manure tea is a great way to encourage them. Simply put a couple of shovelfuls of manure into a Hessian bag and then steep it like an outside teabag in a garbage bin full of water for a day or two until the water is the colour of weak tea. Don't use it on dry soil, however as it may be too concentrated.

www.bestjuicytomatoes.com/articles.html





Cattle are an important source of *E. coli* O157:H7 for crops. This includes grass fed and grain fed cattle.

Other animals can be colonized with *E. coli* O157:H7 and can even act as a reservoir

Fecal contamination of fresh veges is more common than you would like to think..

E. coli O157:H7 contamination can be via leaf application (e.g., manure or irrigation water) or via uptake by roots

Contamination of surface irrigation water used for raw edibles needs closer scrutiny.

Developed countries such as the USA are not quite as hygienic as you may have thought.