

Outbreaks of Foodborne Disease Associated with Fruit and Vegetable Juices, 1922–2019¹

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In response to several outbreaks of illness in the 1990s associated with raw juices processed at commercial facilities, the US Food and Drug Administration (FDA) introduced regulation (21 Code of Federal Regulations 120; FDA 2001) mandating that all 100% fruit/vegetable juices be produced under a Hazard Analysis and Critical Control Point (HACCP) plan. The juice HACCP regulation applies to domestic and imported 100% juice products and has implications for juice producers in countries that export juice to the United States.

HACCP plans must have supporting good manufacturing practices (GMPs) and sanitation standard operating procedures (SSOPs). In addition, the regulation requires juice processors apply a treatment that results in at least a 5-log reduction of the “pertinent microorganism,” which is defined as “the most resistant microorganism of public health significance that is likely to occur in the juice.” Identification of the pertinent microorganism for a particular juice may be based upon foodborne illness outbreak data or other appropriate information such as survey or recall reports involving isolation of pathogens from juices or the fruits or vegetables used to produce those juices. Currently, *Salmonella* is generally accepted as the pertinent pathogen in citrus juices, whereas *Escherichia coli* O157:H7 as well as

Cryptosporidium parvum are both considered pertinent for apple juice (FDA 2001).



Figure 1. *Salmonella* species on X.L.D. agar.
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Outbreaks reported to the US Centers for Disease Control and Prevention (CDC) are compiled in the CDC National Outbreak Reporting System (NORS) database available at <https://wwwn.cdc.gov/norsdashboard> (CDC 2018).

This tool was used, in part, for the preparation of the table presented here and may also be a useful resource when conducting a hazard analysis. A microbial risk assessment for unpasteurized fruit juices and cider prepared by Health Canada may also be a useful resource (Mihajlovic et al. 2013). This document is intended to highlight juice-related outbreaks, aid juice processors in the identification of “pertinent microorganisms,” and review the locations, venues of juice preparations, and severity of juice-associated outbreaks.

References

- Besser, R. E., S. M. Lett, J. T. Weber, M. P. Doyle, T. J. Barrett, J. G. Wells, and M. P. Griffin. 1993. “An outbreak of diarrhea and hemolytic uremic syndrome from *Escherichia coli* O157:H7 in fresh-pressed apple cider.” *Journal of the American Medical Association* 269:2217–2220.
- Birkhead, G. S., D. L. Morse, W. C. Levine, J. K. Fudala, S. F. Kondracki, H. G. Chang, M. Shaydgani, L. Novick, and P. A. Blake. 1993. “Typhoid fever at a resort hotel in New York: A large outbreak with an unusual vehicle.” *Journal of Infectious Diseases* 167:1228–1232.
- Blackburn, B. G., J. M. Mazurek, M. Hlavsa, J. Park, M. Til-lapaw, M. Parrish, E. Salehi, W. Franks, E. Koch, F. Smith, L. Xiao, M. Arrowood, V. Hill, A. da Silva, S. Johnston, and J. L. Jones. 2006. “Cryptosporidiosis associated with ozonated apple cider.” *Emerging Infectious Diseases* 12:684–686.
- Butler, M. E. 2000. “*Salmonella* outbreak leads to juice recall in Western states.” *Food Chemical News* 42:19–20.
- Buzby, J. C., and S. R. Crutchfield. 1999. “New Juice Regulations Underway.” *Food Review*. <http://ageconsearch.umn.edu/record/266215/files/FoodReview-218.pdf>. Accessed August 7, 2018.
- CDC (Centers for Disease Control and Prevention). 1975. “*Salmonella typhimurium* outbreak traced to a commercial apple cider—New Jersey.” *Morbidity and Mortality Weekly Report* 24:87–88.
- CDC. 1991. “Cholera associated with imported frozen coconut milk—Maryland.” *Morbidity and Mortality Weekly Report* 40:843–844.
- CDC. 1995. “Outbreak of *Salmonella* Hartford infections among travelers to Orlando, Florida.” *EPI-AID Trip Report* 95–62.
- CDC. 1996. “Outbreak of *Escherichia coli* O157:H7 infections associated with drinking unpasteurized commercial apple juice—British Columbia, California, Colorado, and Washington, October 1996.” *Morbidity and Mortality Weekly Report* 45:975.
- CDC. 1997. “Outbreaks of *Escherichia coli* O157:H7 infection and cryptosporidiosis associated with drinking unpasteurized apple cider—Connecticut and New York, October 1996.” *Morbidity and Mortality Weekly Report* 46:4–8.
- CDC. 1999. “Outbreak of *Salmonella* serotype Muenchen infections associated with unpasteurized orange juice—United States and Canada, June 1999.” *Morbidity and Mortality Weekly Report* 48:582–585.
- CDC. 2006. “Botulism associated with commercial carrot juice—Georgia and Florida.” *Morbidity and Mortality Weekly Report* 55:1098–1099.
- CDC. 2010. “Investigation Update: Multistate outbreak of human Typhoid Fever infections associated with frozen mamey pulp.” <http://www.cdc.gov/salmonella/typhoidfever/index.html>. Accessed August 7, 2018.
- CDC. 2018. “National Outbreak Reporting System (NORS).” <https://www.cdc.gov/nors/index.html>. Accessed October 25, 2019.
- CFIA (Canadian Food Inspection Agency). 2014. “Food Recall Warning - Unpasteurized apple cider processed by Rolling Acres Cider Mill recalled due to *E. coli* O157:H7.” <https://web.archive.org/web/20181204022225/http://www.inspection.gc.ca/about-the-cfia/newsroom/food-recall-warnings/complete-listing/2014-10-30/eng/1414720185030/1414720197088>. Accessed August 8, 2018.
- Cody, S. H., K. Glynn, J. A. Farrar, K. L. Cairns, P. M. Griffin, J. Kobayashi, M. Fyfe, R. Hoffman, A. S. King, J. H. Lewis, B. Swaminathan, R. G. Bryant, and D. J. Vugia. 1999. “An outbreak of *Escherichia coli* O157:H7 infection from unpasteurized commercial apple juice.” *Annals of Internal Medicine* 130:202–209.
- Cook, K. A., T. E. Dobbs, W. G. Hlady, J. G. Wells, T. J. Barrett, N. D. Puhf, G. A. Lancette, D. W. Bodager, W. L. Toth, C. A. Genese, A. K. Highsmith, K. E. Pilot, L. Finelli, and D. L. Swerdlow. 1998. “Outbreak of *Salmonella*

serotype Hartford infections associated with unpasteurized orange juice.” *Journal of the American Medical Association* 280:1504–1509.

de Noya, B., Z. Díaz-Bello, C. Colmenares, R. Ruiz-Guevara, L. Mauriello, R. Zavala-Jaspe, J. A. Suarez, T. Abate, L. Naranjo, M. Paiva, L. Rivas, J. Castro, J. Márques, I. Mendoza, H. Acquatella, J. Torres, and O. Noya. 2010. “Large urban outbreak of orally acquired acute Chagas disease at a school in Caracas, Venezuela.” *Journal of Infectious Disease* 201:1308–1315.

Duncan, T. G., J. A. Coull, E. R. Miller, and H. Bancroft. 1946. “Outbreak of typhoid fever with orange juice as the vehicle illustrating the value of immunization.” *American Journal of Public Health* 36:34–36.

Eisenstein, A. B., R. D. Aach, W. Jacobson, and A. Goldman. 1963. “An epidemic of infectious hepatitis in a general hospital.” *Journal of the American Medical Association* 185:171–174.

FDA (US Food and Drug Administration). Federal Register Proposed Rules – 63 FR 20449 April 24, 1998 – HACCP; Procedures for the Safe and Sanitary Processing and Importing of Juice; Food Labeling: Warning Notice Statements; Labeling of Juice Products. Federal Register: April 24, 1998 63:20449–20486. <https://www.federalregister.gov/documents/1998/04/24/98-11025/hazard-analysis-and-critical-control-point-haccp-procedures-for-the-safe-and-sanitary-processing-and>. Accessed August 7, 2018.

FDA. Federal Register Final Rule – 66 FR 6137, January 19, 2001: Hazard Analysis and Critical Control Point (HACCP); Procedures for the Safe and Sanitary Processing and Importing of Juices. *Federal Register*: January 19, 2001 66:6137–6202.

Frank, C., J. Walter, M. Muehlen, A. Jansen, U. van Treeck, A. M. Hauri, I. Zoellner, E. Schreier, O. Hamouda, and K. Stark. 2005. “Large outbreak of hepatitis A in tourists staying at a hotel in Hurghada, Egypt, 2004 – orange juice implicated.” *Eurosurveillance* 10:2720.

INS DOH (Indiana State Department of Health). Summary of Special Disease Outbreak Investigations—1997, Appendix E. <https://web.archive.org/web/20170118103322/http://www.in.gov/isdh/21186.htm>. Accessed October 5, 2011.

IDPH (Iowa Department of Public Health). 2014. Iowa surveillance of notifiable and other diseases: Annual report

2013. http://publications.iowa.gov/17797/1/IDPH_Annual_Rpt_2013.pdf. Accessed August 7, 2018.

Jain, S., S. A. Bidol, J. L. Austin, E. Berl, F. Elson, M. L. Williams, M. Deassy III, M. E. Moll, V. Rea, J. D. Vojdani, P. A. Yu, R. M. Hoekstra, C. R. Braden, and M. F. Lynch. 2009. “Multistate outbreak of *Salmonella* Typhimurium and Saintpaul infections associated with unpasteurized orange juice—United States, 2005.” *Clinical Infectious Diseases* 48:1065–1071.

Katz, D. J., M. A. Cruz, M. J. Trepka, J. A. Sarez, P. D. Filrella, and R. M. Hammond. 2002. “An outbreak of typhoid fever in Florida associated with an imported fruit.” *Journal of Infectious Diseases* 186:234–239.

Krause, G., R. Terzagian, and R. Hammond. 2001. “Outbreak of *Salmonella* serotype Anatum infection associated with unpasteurized orange juice.” *Southern Medical Journal* 94:1168–1172.

Lester, R., T. Stewart, J. Carnie, S. Ng, and R. Taylor. 1991. “Air travel-associated gastroenteritis outbreak, August 1991.” *Communicable Disease Intelligence* 15:292–293.

LSDEPC (Laboratory Surveillance Data for Enteric Pathogens in Canada). “Annual summary 2005.” https://web.archive.org/web/20141201115634/http://publications.gc.ca/collections/collection_2007/phac-asp/HP57-1-2005E.pdf. Accessed August 7, 2018.

Mihajlovic, B., B. Dixon, H. Couture, and J. Farber. 2013. “Qualitative microbiological risk assessment of unpasteurized fruit juice and cider.” *Int. Food Risk Anal. J.* 3:5. <https://doi.org/10.5772/57161>

Millard, P. S., K. F. Gensheimer, D. G. Addiss, D. M. Sosin, G. A. Beckett, A. Houck-Jankoski, and A. Hudson. 1994. “An outbreak of cryptosporidiosis from fresh-pressed apple cider.” *Journal of the American Medical Association* 272:1592–1596.

MDH (Minnesota Department of Health). 2014. “*Escherichia coli* O157 infection and hemolytic uremic syndrome (HUS), 2011.” <https://www.health.state.mn.us/diseases/reportable/dcn/sum11/ecoli.html>. Accessed August 7, 2018.

National Centre for Disease Control/Communicable Diseases Network Australia New Zealand, Australian Department of Health and Aged Care. 1999. “Salmonellosis outbreak, South Australia.” *Communicable Diseases Intelligence* 23 (3): 73.

- Noël, H., A. Hofhuis, R. De Jonge, A. E. Heuvelink, A. De Jong, M. E. Heck, C. De Jager, and W. van Pelt. 2010. "Consumption of fresh fruit juice: How a healthy food practice caused a national outbreak of *Salmonella* Panama gastroenteritis." *Foodborne Pathogens and Disease* 7:375–381.
- Paquet, P. 1923. "Épidémie de fièvre typhoïde: Déterminée par la consommation de petit citre." *Revue d'Hygiène* 45:165–169.
- Parish, M. E. 1998. "Coliforms, *Escherichia coli*, and *Salmonella* serovars associated with a citrus-processing facility implicated in a salmonellosis outbreak." *Journal of Food Protection* 61:280–284.
- Parish, M. 2000. "Relevancy of *Salmonella* and pathogenic *E. coli* to fruit juices. Proceedings IFU-Workshop 'Microbiology.'" *Fruit Processing* 10:246–250.
- Pereira, K. S., F. L. Schmidt, A. M. A. Guaraldo, R. M. B. Franco, V. L. Dias, and L. A. C. Passos. 2009. "Chagas' disease as a foodborne illness." *Journal of Food Protection* 72:441–446.
- Schaffzin, J. K., F. Coronado, N. B. Dumas, T. P. Root, T. A. Halse, D. J. Schoonmaker-Bopp, M. M. Lurie, D. Nicholas, B. Gerzonich, G. S. Johnson, B. J. Wallace, and K. A. Musser. 2012. "Public health approach to detection of non-O157 Shiga toxin-producing *Escherichia coli*: summary of two outbreaks and laboratory procedures." *Emerging Infectious Diseases* 140 (2): 283–289. <https://doi.org/10.1017/s0950268811000719>
- Singh, B. R., S. B. Kulshreshtha, and K. N. Kapoor. 1995. "An orange juiceborne outbreak due to enterotoxigenic *Escherichia coli*." *Journal of Food Science and Technology-India* 34:504–506.
- Steele, B. T., N. Murphy, and C. P. Rance. 1982. "An outbreak of hemolytic uremic syndrome associated with ingestion of fresh apple juice." *Journal of Pediatrics* 101:963–966.
- Tabershaw, I. R., L. L. Schmelzer, and H. B. Bruhn. 1967. "Gastroenteritis from an orange juice preparation." *Archives of Environmental Health* 15:72–77.
- Tamblyn, S., J. de Grosbois, D. Taylor, and J. Stratton. 1999. "An outbreak of *Escherichia coli* O157:H7 infection associated with unpasteurized non-commercial, custom-pressed apple cider – Ontario, 1998." *Canada Communicable Disease Report* 25:113–117; discussion 117–120.
- Taylor, J. L., J. Tuttle, T. Pramukul, K. O'Brien, T. J. Barrett, B. Jolbaito, Y. L. Lim, D. J. Vugia, J. G. Morris, Jr., R. V. Tauxe, and D. M. Dwyer. 1993. "An outbreak of cholera in Maryland associated with imported commercial frozen fresh coconut milk." *Journal of Infectious Diseases* 167:1330–1335.
- Thurston, H., J. Stuart, B. McDonnell, S. Nicholas, and T. Cheasty. 1998. "Fresh orange juice implicated in an outbreak of *Shigella flexneri* among visitors to a South African game reserve." *Journal of Infectious Diseases* 36:350.
- Tsai, H.-C., S. Lee, C.-K. Huang, C.-M. Yen, E.-R. Chen, and Y.-C. Liu. 2004. "Outbreak of eosinophilic meningitis associated with drinking raw vegetable juice in southern Taiwan." *American Journal of Tropical Medicine and Hygiene* 71:222–226.
- Vojdani, J., L. Beuchat, and R. Tauxe. 2008. "Juice-associated outbreaks of human illness in the United States, 1995 through 2005." *Journal of Food Protection* 71 (2): 356–364.

Table 1. Outbreaks of human foodborne disease from various microorganisms associated with juices during the period of 1922–2019.

Type	Product	Year	Pathogen ^a	Location	Venue	Cases (Deaths) ^b	Reference ^c
Açaí	Unspecified	2004	<i>Trypanosoma cruzi</i> ^d	Brazil	Retail	27	Pereira et al. 2009
	Unspecified	2007	<i>Trypanosoma cruzi</i>	Brazil	Retail	25	Pereira et al. 2009
Apple	Unpasteurized	1922	<i>S. Typhi</i>	France	NR ^e	23 (0)	Paquet 1923
	Unpasteurized	1974	<i>S. Typhimurium</i>	US (NJ)	Farm, small retail outlets	296 (0)	CDC 1975
	Unpasteurized	1980	<i>E. coli</i> O157:H7 (suspected)	Canada (ON)	Local market	14 (1)	Steele et al., 1982
	Unpasteurized	1991	<i>E. coli</i> O157:H7	US (MA)	Small cider mill	23 (0)	Besser et al. 1993
	Unpasteurized	1993	<i>Cryptosporidium</i>	US (ME)	School	213 (0)	Millard et al. 1994
	Unpasteurized	1996	<i>C. parvum</i>	US (NY)	Small cider mill	31 (0)	CDC 1997
	Unpasteurized	1996	<i>E. coli</i> O157:H7	US (CT)	Small cider mill	14 (0)	CDC 1997
	Unpasteurized	1996	<i>E. coli</i> O157:H7	US (WA)	Small cider mill	6 (0)	FDA 2001
	Unpasteurized	1996	<i>E. coli</i> O157:H7	Canada (BC), US (CA, CO, WA)	Retail	70 (1)	CDC 1996, Cody et al. 1999
	Unpasteurized	1997	<i>E. coli</i> O157:H7	US (IN)	Farm	6	INS DOH 1997
	Unpasteurized	1998	<i>E. coli</i> O157:H7	Canada (ON)	Farm/Home	14 (0)	Tamblyn et al. 1999
	Unpasteurized	1999	<i>E. coli</i> O157:H7	US (OK)	NR	25 (0)	CDC 2018
	Unpasteurized (ozonated)	2003	<i>C. parvum</i>	US (OH)	Farm/Retail	144 (0)	Blackburn 2006, Vojdani et al. 2008, CDC 2018
	Unpasteurized	2004	<i>E. coli</i> O111 and <i>C. parvum</i>	US (NY)	Farm/Home	212 (0)	Vojdani et al. 2008, Schaffzin et al. 2012, CDC 2018
	Unpasteurized	2005	<i>E. coli</i> O157:H7	Canada (ON)	NR	4	LSDEPC 2005
	Unpasteurized	2007	<i>E. coli</i> O157:H7	US (MA)	NR	9 (0)	CDC 2018
	Unpasteurized	2008	<i>E. coli</i> O157:H7	US (IA)	Fair, festival	5 (0)	CDC 2018
	Unpasteurized	2010	<i>E. coli</i> O157:H7	US (MD)	Retail	7 (0)	CDC 2018
	Unpasteurized	2011	<i>Cryptosporidium</i> , <i>E. coli</i> O111:NM	US (MN)	Farm	14 (0)	MDH 2014, CDC 2018
	Unpasteurized	2011	<i>Cryptosporidium</i>	US (OH)	NR	4 (0)	CDC 2018
	Unpasteurized	2012	<i>E. coli</i> O157:H7	US (MI)	Home	3 (0)	CDC 2018
	Unpasteurized	2013	<i>Cryptosporidium</i>	US (IA)	Home	10 (0)	IDPH 2014, CDC 2018
	Unpasteurized	2013	<i>Cryptosporidium</i>	US (OH)	NR	8 (0)	CDC 2018
	Unpasteurized	2013	<i>S. Typhimurium</i>	US (PA)	NR	10 (0)	CDC 2018

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	Unpasteurized	2014	<i>E. coli</i> O157:H7	Canada (ON)	Farm, cider mill, local farmer's market	3	CFIA 2014
	Unpasteurized	2014	<i>Campylobacter jejuni</i>	US (AZ)	Fair, festival	6 (0)	CDC 2018
	Unpasteurized	2015	<i>E. coli</i> O157	US (MN)	Farm	2 (0)	CDC 2018
	Unpasteurized	2015	<i>E. coli</i> O45	US (MI)	NR	2 (0)	CDC 2018
	Unpasteurized	2016	<i>E. coli</i> O157:H7	US (KS)	Fair, festival	56 (0)	CDC 2018
	Unspecified	2015	<i>E. coli</i> O111:NM	US (CA)	NR	15 (0)	CDC 2018
Carrot	Homemade	1993	<i>C. botulinum</i>	US (WA)	Home	1 (0)	Buzby and Crutchfield 1999
	Pasteurized	2006	<i>C. botulinum</i>	US (FL, GA)	Retail	4 (1)	CDC 2006, CDC 2018
Coconut	Milk ^f	1991	<i>Vibrio cholerae</i>	US (MD)	Home/picnic	4	CDC 1991, Taylor et al. 1993
Guava	Unspecified	2007	<i>Trypanosoma cruzi</i>	Venezuela	School	103 (1)	de Noya et al. 2010
Mamey	Frozen Puree	1999	<i>S. Typhi</i>	US (FL)	NR	16 (0)	Katz et al. 2002, CDC 2018
	Frozen Pulp	2010	<i>S. Typhi</i>	US (CA, NV)	Restaurant	12 (0)	CDC 2010, CDC 2017
Mixed Fruit	Unspecified	2002	<i>Shigella sonnei</i>	Canada, US, UK, British West Indies	Resort	78	CDC 2018
	Açaí, sugar cane	2006	<i>Trypanosoma cruzi</i>	Brazil	NR	94 (6)	Pereira et al. 2009
	Açaí, banana, strawberry, sugar cane	2007	Hepatitis A	US (FL)	Restaurant	3 (0)	CDC 2018
Mixed Fruit / Vegetable	Clover, sweet potato leaf, apple	2001	<i>Angiostrongylus cantonesis</i> ⁹	Taiwan	Home	5	Tsai et al. 2004
Orange	Unpasteurized	1992	Enterotoxigenic <i>E. coli</i>	India	Roadside Vendor	6 (0)	Singh et al. 1995
	Unpasteurized	1995	<i>Salmonella</i> Gaminera, Hartford and Rubislaw	US (FL)	Retail	63 (0)	CDC 1995, Cook et al. 1998, Parish 1998
	Unpasteurized	1995	<i>Shigella flexneri</i>	South Africa	Restaurant	14	Thurston et al. 1998
	Unpasteurized	1996	Virus suspected	US	Food Service	2	Parish 2000
	Unpasteurized	1999	<i>S. Muenchen</i>	Canada and US	Restaurant	398 (0)	CDC 1999, CDC 2018
	Unpasteurized	1999	<i>S. Anatum</i>	US (FL)	Roadside stand	10 (0)	Krause et al. 2001, CDC 2018
	Unpasteurized	1999	<i>S. Typhimurium</i>	Australia	Retail	405 (0)	National Centre for Disease Control 1999
	Unpasteurized	2000	<i>S. Enteritidis</i>	US (6 states)	Retail and Food Service	88	Butler 2000, CDC 2018
	Unpasteurized	2004	Hepatitis A	Egypt	Hotel	351	Frank et al. 2005
	Unpasteurized	2005	<i>S. Typhimurium</i> and <i>S. Saintpaul</i>	US (23 states)	Retail and Food Service	157 (0)	Jain et al. 2009, CDC 2018

Type	Product	Year	Pathogen ^a	Location	Venue	Cases (Deaths) ^b	Reference ^c
	Unpasteurized	2008	<i>S. Panama</i>	The Netherlands	Retail	33	Noël et al. 2010
	Reconstituted	1944	<i>S. Typhi</i>	US (OH)	Hotel	18 (1)	Duncan et al. 1946
	Reconstituted	1962	Hepatitis A	US (MO)	Hospital	24	Eisenstein et al. 1963
	Reconstituted	1965	Unknown	US (CA)	Football game	563	Tabershaw et al. 1967
	Reconstituted	1989	<i>S. Typhi</i>	US (NY)	Hotel	69	Birkhead et al. 1993
	Unspecified	1991	Norwalk-like virus	Australia	Airline	3,053	Lester et al. 1991
Sugarcane	Unspecified	2005	<i>Trypanosoma cruzi</i>	Brazil	Roadside kiosk	25 (3)	Pereira et al. 2009
Watermelon	Homemade	1993	<i>Salmonella</i> spp.	US (FL)	Home	18 (0)	FDA 1998

^aPathogens abbreviated and associated with outbreaks include *S.*—*Salmonella*; *E.*—*Escherichia*; *C. parvum*—*Cryptosporidium parvum*; *C. botulinum*—*Clostridium botulinum*.

^bThe number in parentheses represents the number of deaths, if reported.

^cReferences for each outbreak appears in the following reference list.

^d*Trypanosoma cruzi* is the causative agent of Chagas' Disease.

^eNR—Not Reported

^fCoconut milk is the liquid that is squeezed from the coconut meat; coconut juice or coconut water is the liquid obtained from a whole coconut when one breaks the shell.

^g*Angiostrongylus cantoneses*, also known as rat lungworm, is the major cause of eosinophilic meningitis in the Pacific Islands and southeast Asia.