

Appendix C: Kentucky Field Guide for Foodborne and Waterborne Diseases



KENTUCKY FIELD GUIDE FOR FOODBORNE AND WATERBORNE DISEASES:

(Organized Alphabetically by Agent)

Agent ¹	Usual Incubation Period (Range) ²	Symptom Profile	Duration of Illness ³	Period of Communicability	Characteristic Foods ⁴	Criteria for Confirmation: Type and amount of specimens and handling requirements for shipping to DLS ⁵
<i>Bacillus cereus</i> "emetic" variety)	2 - 4 hours (1 - 6 hours)	Vomiting, with nausea and diarrhea (abrupt onset)	24 hours	Not communicable (preformed enterotoxin)	Fried rice, meats, vegetables	- Isolation of 10³ <i>B. cereus</i>/gm of implicated food, OR Isolation of <i>B. cereus</i> from stool or vomitus of ill person. - Enteric pathogens kit with Cary-Blair preservative. Must be refrigerated. Outreach requisition or Form 219
<i>Bacillus cereus</i> ("diarrheal" variety)	6 - 24 hours	Cramps and diarrhea	24 - 48 hours	Not communicable (enterotoxin formed in vivo)	Fried rice, meats, vegetables	- Isolation of 10³ <i>B. cereus</i>/gm of implicated food, OR Isolation of <i>B. cereus</i> from stool of ill person. - Feces, rectal swabs, vomitus. - Enteric pathogens kit with Cary-Blair preservative. Must be refrigerated. Outreach requisition or Form 219 - Can only report <i>Bacillus</i> sp. For food. No toxin confirmation available.
<i>Campylobacter jejuni</i>	48 hours - 5 days (24 hours - 10 days)	Cramps and diarrhea (sometimes bloody), with vomiting and fever	48 hours - 10 days	2 - 7 weeks	Raw milk, poultry, water	- Isolation of <i>C. jejuni</i> from implicated food, OR Isolation of <i>C. jejuni</i> from stool or blood of ill person - Feces, rectal swabs

¹ The Kentucky Field Guide to Foodborne and Water-Borne Diseases is based on the Oregon Health Services Compendium of Acute Food-borne Diseases and a similar Table developed by epidemiologists at the Foodborne and Diarrheal Disease Branch, Division of Bacterial and Mycotic Diseases, National Center for Infectious Diseases, Centers for Disease Control and Prevention, and on Tauxe RV, Hughes JM. Foodborne Disease. In: Mandell GL, Benne HJE, Dolin R. Principles and Practice of Infectious Disease 4th ed. NY: Churchill Livingstone; 2015, page 1288-1289 (Table 103-3).

² CDC. Diagnosis and Management of Foodborne Illnesses: A Primer for Physicians and Other Healthcare Professionals. MMWR 2004; 53(RR04). Reprinted with the permission of the American Medical Association; the Center for Food Safety and Nutrition, FDA and the Food Safety Inspection Service, USDA. Available online at <https://www.cdc.gov/mmwr/preview/mmwrhtml/r5304a1.htm>.

³ CDC. Guidelines for Confirming Cause of Foodborne Disease Outbreaks at https://www.cdc.gov/foodsafety/outbreaks/confirming_diagnosis.html. Heymann, DL, Ed. Control of Communicable Disease Manual. Washington, D.C.: American Public Health Association, 2013.

⁴ CDC. Diagnosis and Management of Foodborne Illnesses: A Primer for Physicians and Other Healthcare Professionals. MMWR 2004; 53(RR04). Reprinted with the permission of the American Medical Association; the Center for Food Safety and Nutrition, FDA and the Food Safety Inspection Service, USDA. Available on-line at <https://www.cdc.gov/mmwr/preview/mmwrhtml/r5304a1.htm>.

⁵ "Characteristic foods" for each foodborne and water-borne agent are based on epidemiological data gathered by epidemiologists in the Acute and Communicable Disease Program, Center for Disease Control and Epidemiology, Oregon Health Division, and on Tauxe RV, Hughes JM. Foodborne Disease. In: Mandell GL, Benne HJE, Dolin R. Principles and Practice of Infectious Disease 4th ed. NY: Churchill Livingstone; 2015, page 1288-1289 (Table 103-3).

⁶ Division of Laboratory Services, Kentucky Department for Public Health Division of Laboratory Services - Cabinet for Health and Family Services (ky.gov). (502)564-4446. 504 Form /Chain of Custody needs to be completed to proceed with any testing for food samples.

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Ciguatera poisoning	1 - 6 hours; usually within 24 hours	Diarrhea, nausea, vomiting, paresthesias, reversal of temperature sensation	Days to weeks to months	Not communicable	Large ocean fish (grouper, amberjack, barracuda, snapper)	- Enteric pathogens kit with Cary-Blair preservative. Must be refrigerated. Do not freeze food samples if possible. Outreach requisition or Form 219 - Demonstration of ciguatera toxin in epidemiologically implicated fish, OR clinical syndrome among persons who have eaten a type of fish previously associated with ciguatera fish poisoning - Collect epidemiologically implicated fish - Food testing not available at DLS.
<i>Clostridium botulinum</i>	12 - 48 hours (2 hours to 8 days)	Nausea, vomiting, diarrhea, with or just before onset of descending paralysis	Days to months	Not communicable (preformed enterotoxin)	Improperly canned or similarly preserved foods; honey (infants)	- Detection of <i>C. botulinum</i> toxin from implicated food, OR Detection of <i>C. botulinum</i> toxin from human sera, or feces, OR Isolation of <i>C. botulinum</i> from stool of persons with clinical syndrome, OR Consistent clinical syndrome in persons known to have eaten same food as persons with laboratory proven cases. 25 - 50 gm feces, 10 mL sera in red top tube⁶ - Sterile, leak-proof unbreakable container. Outreach requisition or Form 219
<i>Clostridium perfringens</i>	10 - 12 hours (6 - 24 hours)	Cramps and diarrhea	24 - 48 hours	Not communicable (enterotoxin formed in vivo)	Meat, poultry, gravy, Mexican foods	- Isolation of >10⁶ <i>C. perfringens</i>/gm of implicated food, OR Isolation of <i>C. perfringens</i> in stool of ill persons, OR Detection of enterotoxin by latex agglutination (from stool extracts or culture isolates). 5 - 50 gm stool - Kit #10

⁶ DLS staff must be contacted before any specimens for botulism will be tested.

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<i>Cronobacter sakazakii</i>	6-8 hours	Infants (less than one year old)- fever, poor feeding, excessive crying, low energy, seizures; can lead to meningitis or sepsis People of all ages- wound infections, UTI, no symptoms; can lead to meningitis or sepsis				- Sample must be received by DLS is 24hr from onset (48hrs by CDC). - Aerobic conditions are best for best for this organism. Toxin testing not available for food.
<i>Cryptosporidium parvum</i>	2 - 10 days (usually 7 days)	Profuse watery diarrhea, abdominal cramps, nausea, low-grade fever, anorexia, vomiting (Some infected individuals have no symptoms at all)	2 - 3 weeks	Unknown if communicable; mostly found in the environment Weeks to months	Powdered infant formula, powdered milk, herbal teas, starches Fruits, produce, or water	- Treated as a regular miscellaneous specimen. - Specimen needs to be an isolate. - Demonstration of <i>C. parvum</i> oocysts from implicated food, OR demonstration of <i>C. parvum</i> oocysts from stool of ill persons, OR Demonstration of <i>C. parvum</i> in intestinal fluid, or small bowel biopsy specimens, OR Demonstration of <i>C. parvum</i> antigen in stool by a specific immunodiagnostic test (e.g., enzyme-linked immunosorbent assay (ELISA)). - Walnut-sized stool 10% formalin - Food testing not available at DLS.

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<i>Cyclospora cayentanensis</i>	1 – 14 days (usually 7 days)	Diarrhea, nausea, anorexia, weight loss, cramps, gas, fatigue, low-grade fever; may be relapsing or protracted	3 – 5 weeks if untreated, symptoms can return	Direct Fecal-Oral does not occur, shredded oocysts need 1 – 2 weeks to mature in environment before infectious.	Raspberries, basil, snow peas, mesclun lettuce	- Demonstration of the parasite by microscopy or molecular methods in stool or in intestinal aspirate or biopsy specimens from two or more ill persons OR - Demonstration of the parasite in epidemiologically implicated food - Food testing not available at DLS.
<i>Escherichia coli</i> Enteroinvasive (EIEC)	12 - 48 hours	Cramps and diarrhea, with fever, headache	5 - 10 days	Weeks to months	Uncooked vegetables, salads, water, cheese	- Demonstration of <i>E. coli</i> of same serotype in implicated food and stools in persons, OR Isolation of <i>E. coli</i> of the same serotype shown to be enteroinvasive or enterotoxigenic from stool of ill persons - Feces, rectal swabs - Enteric pathogens kit with buffered glycerol saline. Must be refrigerated. Outreach requisition or Form 219
<i>Escherichia coli</i> enterotoxigenic (ETEC) ⁷	24 - 48 hours (21 - 68 hours)	Cramps, watery diarrhea, some vomiting Usual symptom profile: diarrhea 80-100% cramps 82% vomiting <50% nausea <50% fever <50% myalgia <50% headache <50%	24 hours - 11 days (medium 3 days)	Weeks to months	Seafood (crab, shrimp and scallops), salads and other foods served cold	- Demonstration of <i>E. coli</i> of same serotype in implicated food and stools in persons, OR Isolation of <i>E. coli</i> of the same serotype shown to be enteroinvasive or enterotoxigenic from stool of ill persons - Feces, rectal swabs - Enteric pathogens kit with buffered glycerol saline. Must be refrigerated. Outreach requisition or Form 219

⁷ Symptom profiles and characteristic foods are taken from Dalton CB, Mintz ED, Wells JG et al. Outbreaks of enterotoxigenic *Escherichia coli* infection in American adults: a clinical and epidemiologic profile. *Epidemiol Infect* 1999; 123:9-16.

⁸ Period of Communicability and Characteristic Foods are taken from Los Angeles County Department of Public Health. *GIARDIASIS*. *Acute Communicable Disease Control Manual* (B-73). October 2018.



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<i>Escherichia coli</i> enterohemorrhagic (<i>E. coli</i> O157:H7 and others)	48 hours - 8 days (24 hours - 10 days)	Bloody diarrhea, with cramps, vomiting, fever; hemolytic uremic syndrome (2 - 7% of cases)	5 - 10 days	1 - 4 weeks	Beef, venison, raw milk, water, produce	- Demonstration of <i>E. coli</i> isolates from stools that are enterotoxigenic or enterohemorrhagic. - Feces, rectal swabs - Enteric pathogens kit with buffered glycerol saline. Must be refrigerated. Form 219 - STEC, O157 and certain non-O157 food testing available. Lab needs to be informed of the non-O157 varieties ASAP so kits can be obtained for testing.
Free Living Ameba – <i>Acanthamoeba</i> spp., <i>Balamuthia mandrillaris</i> , <i>Naegleria fowleri</i> (referenced below in its own section), <i>Sappina</i> spp.	Weeks- several years	<i>Acanthamoeba</i> spp. - inflammation of lungs or sinuses, skin infections/lesions/abscesses, neurological impairment, ocular symptoms (eye pain, swelling, redness, excessive tearing, light sensitivity) <i>Balamuthia mandrillaris</i> - similar to <i>Acanthamoeba</i> spp.; plaque like lesions on skin and face, headache, vomiting, lethargy, fever, seizures, paralysis, confusion	<i>Acanthamoeba</i> spp.- several weeks to months <i>Balamuthia mandrillaris</i> - usually fatal	Not communicable	<i>Acanthamoeba</i> spp.- Soil, fresh, brackish, and seawater, field grown vegetables, swimming pool, tap water <i>Balamuthia mandrillaris</i> - soil, dust	- Clinical testing is performed at CDC and requires pre-approval. - Food testing not available at DLS. <i>Acanthamoeba</i> spp- brain tissue is preferred specimen type (will also accept cerebrospinal fluid [CSF], corneal scraping, and skin tissue for certain subtypes); 0.2 tissue, 1 mL fluids, 5 mm corneal scraping; must be refrigerated or frozen. <i>Balamuthia mandrillaris</i>- brain tissue is preferred specimen type(will also accept cerebrospinal fluid, and skin tissue for certain subtypes); 0.2 g tissue, 1 mL fluids; must be refrigerated or frozen. - Demonstration of the parasite in stool or small-bowel biopsy specimen of two or more ill persons - Food testing not available at DLS.
<i>Giardia intestinalis</i> ^d	3 - 25 days (usually 7 days)	Diarrhea, gas, cramps, nausea, fatigue	2 - 6 weeks	Variable, as long as carrier status persists	Water, direct fecal oral, food contaminated by ill handler	
Heavy Metals (antimony, arsenic, cadmium, copper, iron, lead, mercury, tin, zinc)	5 minutes - 8 hours (usually <1 hour)	Vomiting, with nausea, cramps, and diarrhea	Usually self-limited	Not communicable	Acidic foods and beverages prepared, stored or cooked in containers coated, lined or contaminated with offending metal	- Demonstration of high concentration of metal in epidemiologically implicated food - Collect suspect food or metal container

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<i>Listeria monocytogenes</i>	24 hours (2-3 weeks)	Fever, with diarrhea, myalgia, headache Usual symptom profile: fever 72% diarrhea 68% myalgia 56% cramps 55% vomiting 35%	3 - 7 days	Not known	Inadequately pasteurized milk, precooked meat	- Isolation of <i>Listeria monocytogenes</i> of the same serotype from two or more ill persons exposed to epidemiologically implicated food or to food from which the same type <i>Listeria monocytogenes</i> has been isolated - Isolation from a normally sterile site: blood, CSF, amniotic fluid, fetal/placental tissue - Enteric pathogens kit with Cary-Blair preservative. Must be refrigerated. Outreach requisition or Form 219
Naegleria fowleri- primary amebic meningoencephalitis (PAM)	1-12 days (Average 5 days)	Stage 1: Severe frontal headache, fever, nausea, vomiting Stage 2: stiff neck, seizures, altered mental status, hallucinations, coma, death	1-18 days (almost always fatal)	Not communicable	Lakes, rivers, hot springs, warm water discharge from industrial and power plants, poorly maintained swimming pools, water heaters, soil, rarely tap water *has to enter the body nasally to infect people.*	- Clinical testing is performed at CDC and requires pre-approval. CSF is preferred specimen type. Also accept fresh or frozen brain tissue. 0.2 mL (CSF); 1mL preferred. 0.1 g brain tissue; 0.2 g preferred. - Must be refrigerated or frozen. - Food testing not available at DLS.
Norovirus and other caliciviruses	24 - 48 hours (10 - 72 hours)	Vomiting, with diarrhea, headache and myalgia Usual symptom profile: diarrhea 80% vomiting 60% nausea 75% fever 30%	24 - 72 hours	Duration of vomiting and diarrhea	Shellfish, water, salads, frosting, "handled" foods	- Diagnosed is often based on symptoms, onset times, and ruling out other enteric pathogens, OR Identification of virus in stool by polymerase chain reaction (PCR). - Stool of ill person - Sterile, leak-proof container without preservatives. Must be refrigerated. Form 275 - Food testing not available at DLS.

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30 minutes – 3 hours	Parosities, feeling of floating, loss of balance, dry mouth, double vision, dysarthria, shortness of breath	Days	Not communicable	Clams, mussels, cockles	- Detection of toxin in epidemiologically implicated fish, OR detection of large numbers of shellfish-poisoning associated species of dinoflagellates in water from which epidemiologically implicated mollusks are gathered - Collect epidemiologically implicated fish - Food testing not available at DLS
Paralytic shellfish poisoning					
<2 hours	Vomiting, diarrhea, confusion, visual disturbances, salivation, diaphoresis, hallucinations, disulfiram-like reaction	Usually self-limited	Not communicable	Wild mushrooms	- Clinical syndrome among persons who have eaten mushroom identified as toxic type, OR demonstration of toxin in epidemiologically implicated mushroom or food containing mushrooms - Collect mushrooms or food containing mushrooms - Food testing not available at DLS
Poisonous mushrooms (muscimol, muscarine, psilocybin, coprinus artementaris, ibotenic acid)					
12 - 36 hours (6 hours – 10 days)	Cramps and diarrhea, with vomiting and fever	4 - 7 days	Several days to several years, depending on type Concentrations/ infectivity typically higher when symptomatic	Poultry, eggs, meat, raw milk (cross contamination important)	- Isolation of <i>Salmonella</i> from implicated food or water, OR Isolation of <i>Salmonella</i> from stool from ill persons. - Feces, rectal swabs - Enteric pathogens kit with buffered glycerol saline. Outbreak requisition or Form 219
<i>Salmonella</i> spp (non-typhoidal)					
1 minute – 3 hours; usually within 6 hours	Cramps, diarrhea, headache, nausea, flushing, urticaria	3 - 6 hours	Not communicable	Mishandled fish (mahi-mahi, tuna, mackerel, bluefish, salmon, bonito, skipjack)	- Demonstration of histamine in epidemiologically implicated fish, OR clinical syndrome among persons who have eaten a type of fish previously associated with histamine fish poisoning (fish of order Scombroidei) - Collect epidemiologically implicated fish - Food testing not available at DLS
Scombroid fish poisoning (histamine fish poisoning)					

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Shellfish poisoning (diarrhetic, neurotoxic, amnesic)	20 minutes - 2 hours	Cramps, diarrhea, headaches, vomiting, amnesia, seizures	Days	Not communicable	Mussels, oysters	- Detection of toxin in epidemiologically implicated food OR detection of large numbers of shellfish-poisoning associated species of dinoflagellates in water from which epidemiologically implicated mollusks are gathered - Collect any amount of epidemiologically implicated shellfish - Food testing not available at DLS
<i>Shigella</i>	24 - 48 hours (12 hours - 6 days)	Cramps and diarrhea (may be bloody), with fever	4 - 7 days	4 weeks after illness	Eggs, salads, lettuce	- Isolation of <i>Shigella</i> from implicated food, OR Isolation of <i>Shigella</i> from stool of ill persons. - Feces, rectal swabs - Enteric pathogens kit with buffered glycerol saline. Outreach requisition or Form 219
<i>Staphylococcus aureus</i>	2 - 4 hours (30 minutes - 8 hours)	Vomiting, with nausea, cramps, and diarrhea (abrupt onset)	24 - 48 hours	Not communicable (preformed enterotoxin)	Sliced/chopped ham and meats, custards, cream fillings, mushrooms, egg salad	- Isolation of an enterotoxin producing strain of <i>S. aureus</i> in implicated food, OR Isolation of enterotoxin producing strain of <i>S. aureus</i> from stool of ill persons <i>Staphylococcus aureus</i> Feces, rectal swabs - Enteric pathogens kit with buffered glycerol saline. Form 219 - Quantification/culture and toxin testing available for food. Lab needs to know ahead of time which test is being requested to determine testing procedure

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<i>Vibrio cholerae</i> non-O1 and non-O139	12 - 24 hours (12 hours - 5 days)	Profuse watery diarrhea and vomiting, which can lead to severe dehydration and death within hours	72 hours - 7 days; causes life threatening dehydration	Several days	Shellfish	- Isolation of <i>V. cholerae</i> non-O1 or non-O139 from stool of ill person. Isolation of <i>V. cholerae</i> non-O1 or non-O139 from implicated food is supportive evidence. - Feces, rectal swabs - Enteric pathogens kit with Cary-Blair preservative. Must be refrigerated. Form 219 - All Vibrio testing is currently sent from DLS to FDA lab for food testing. FDA needs to approve testing before samples can be sent.
<i>Vibrio cholerae</i> O1 and O139	24 - 72 hours (12 hours - 5 days)	Diarrhea, vomiting water	72 hours - 7 days	Usually a few days after recovery except carrier state	Shellfish, water or foods contaminated by infected food handlers	- Isolation of toxigenic <i>V. cholerae</i> O1 or O139 from implicated food, OR Isolation of <i>V. cholerae</i> O1 or O139 from stool or vomitus of ill persons, OR Significant rise (fourfold) in vibriocidal antibodies. - Feces, rectal swabs - Enteric pathogens kit with Cary-Blair preservative. Must be refrigerated. Form 219 - All Vibrio testing is currently sent from DLS to FDA lab for food testing. FDA needs to approve testing before samples can be sent.
<i>Vibrio parahaemolyticus</i>	12 - 24 hours (2 - 48 hours)	Cramps watery diarrhea, with nausea, vomiting, and fever	2 - 5 days	Not communicable	Seafood, especially crabs and oysters	- Isolation of 10/g <i>V. parahaemolyticus</i> from implicated food (usually seafood), OR Isolation of <i>V. parahaemolyticus</i> from stool of ill persons. - Feces, rectal swabs - Enteric pathogens kit with Cary-Blair preservative. Must be refrigerated. Form 219 - All Vibrio testing is currently sent from DLS to FDA lab for food testing. FDA needs to approve testing before samples can be sent.

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<i>Vibrio vulnificus</i>	12 - 72 hours	Fever, diarrhea, abdominal cramps, nausea, vomiting hypotension, septicemia in individuals with chronic liver disease, chronic alcoholism, hemochromatosis, or immunocompromising conditions		Not communicable	Seafood	- Isolation of <i>V. vulnificus</i> from implicated food (usually seafood) OR Isolation of <i>V. vulnificus</i> from a clinical specimen (blood, wound, stool). - Feces, rectal swabs - Enteric pathogens kit with Cary-Blair preservative. Must be refrigerated. Form 219 - All <i>Vibrio</i> testing is currently sent from DLS to FDA lab for food testing. FDA needs to approve testing before samples can be sent.
<i>Yersinia enterocolitica</i>	36 - 48 hours (24 hours – 10 days)	Cramps, diarrhea, fever, headache, vomiting, pseudoappendicitis	1 - 3 weeks	2 - 3 weeks	Milk, tofu, pork	- Isolation of organism from clinical specimens from two or more ill persons OR isolation of organism from epidemiologically implicated food - Feces, rectal swabs - Enteric pathogens kit with Cary-Blair preservative. Must be refrigerated. Outreach requisition or Form 219

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Scombroid fish poisoning (histamine fish poisoning)	1 minute–3 hours; usually within 6 hours	Cramps, diarrhea, headache, nausea, flushing, urticaria	3-6 hours	Not communicable	Mishandled fish (mahi-mahi, tuna, mackerel, bluefish, salmon, bonito, skipjack)	- Demonstration of histamine in epidemiologically implicated fish, OR clinical syndrome among persons who have eaten a type of fish previously associated with histamine fish poisoning (fish of order Scombroidei) - Collect epidemiologically implicated fish Food testing not available at DLS
Heavy Metals (antimony, arsenic, cadmium, copper, iron, lead, mercury, tin, zinc)	5 minutes - 8 hours (usually <1 hour)	Vomiting with nausea, cramps, and diarrhea	Usually self-limited	Not communicable	Acidic foods and beverages prepared, stored or cooked in containers coated, lined or contaminated with offending metal	- Demonstration of high concentration of metal in epidemiologically implicated food - Collect suspect food or metal container
Shellfish poisoning (diarrhetic, neurotoxic, amnesic)	20 minutes - 2 hours	Cramps, diarrhea, headaches, vomiting, amnesia, seizures	Days	Not communicable	Mussels, oysters	- Detection of toxin in epidemiologically implicated food OR detection of large numbers of shellfish-poisoning associated species of dinoflagellates in water from which epidemiologically implicated mollusks are gathered - Collect any amount of epidemiologically implicated shellfish Food testing not available at DLS

¹ *The KY Field Guide to Foodborne and Water-Borne Diseases* is based on the *Oregon Health Services Compendium of Acute Foodborne Diseases* and a similar table developed by epidemiologists at the Foodborne and Diarrheal Disease Branch, Division of Bacterial and Mycotic Diseases, National Center for Infectious Diseases, Centers for Disease Control and Prevention, and on Tauxe RV, Hughes JM. Foodborne Disease. In: Mandell GL, Benne HJE, Dolin R. Principles and Practice of Infectious Disease 4th ed. NY: Churchill Livingstone; 1995, page 1017 (table 6).

² CDC. Diagnosis and management of foodborne illness: a primer for physicians. MMWR 2001; 50(RR2). Reprinted with the permission of the American Medical Association; the Center for Food Safety and Nutrition, FDA and the Food Safety Inspection Service, USDA. Available on-line at <https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5002a1.htm>

CDC. Guide to confirming the diagnosis in Foodborne diseases at https://www.cdc.gov/foodsafety/outbreaks/investigating-outbreaks/confirming_diagnosis.html Chin, J, Ed. Control of Communicable Disease Manual. Washington, D.C.: American Public Health Association, 2000.

³ CDC. Diagnosis and management of Foodborne illness: a primer for physicians. MMWR 2001; 50(RR2). Reprinted with the permission of the American Medical Association; the Center for Food Safety and Nutrition, FDA and the Food Safety Inspection Service, USDA. Available on-line at <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5002a1.htm>

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⁵ Division of Laboratory Services, Kentucky Department for Public Health <https://chfs.ky.gov/agencies/dph/dls/Pages/default.aspx> 1-502-564-4446.



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Agent ¹	Usual Incubation Period (Range) ²	Symptom Profile	Duration of Illness ³	Period of Communicability	Characteristic Foods ⁴	Criteria for Confirmation: Type and amount of specimens and handling requirements for shipping to DLS ⁵
Paralytic shellfish poisoning	30 minutes–3 hours	Paresthesias, feeling of floating, loss of balance, dry mouth, double vision, dysarthria, shortness of breath	Days	Not communicable	Clams, mussels, cockles	- Detection of toxin in epidemiologically implicated fish, OR detection of large numbers of shellfish-poisoning associated species of dinoflagellates in water from which epidemiologically implicated mollusks are gathered - Collect epidemiologically implicated fish Food testing not available at DLS
Ciguatera poisoning	1-6 hours; usually within 24 hours	Diarrhea, nausea, vomiting, paresthesias, reversal of temperature sensation	Days to weeks to months	Not communicable	Large ocean fish (Grouper, amberjack, barracuda, snapper)	- Demonstration of ciguatera toxin in epidemiologically implicated fish, OR clinical syndrome among persons who have eaten a type of fish previously associated with ciguatera fish poisoning - Collect epidemiologically implicated fish Food testing not available at DLS
Poisonous mushrooms (muscimol, muscarine, psilocybin, coprinus, atromentaris, ibotenic acid)	<2 hours	Vomiting, diarrhea, confusion, visual disturbances, salivation, diaphoresis, hallucinations, disulfiram-like reaction	Usually self-limited	Not communicable	Wild mushrooms	- Clinical syndrome among persons who have eaten mushroom identified as toxic type, OR demonstration of toxin in epidemiologically implicated mushroom or food containing mushrooms - Collect mushrooms or food containing mushrooms Food testing not available at DLS
<i>Bacillus cereus</i> ("emetic" variety)	2-4 hours (1-6 hours)	Vomiting with nausea and diarrhea (abrupt onset)	24 hours	Not communicable (preformed enterotoxin)	Fried rice, meats, vegetables	Isolation of 10⁵ <i>B. cereus</i>/gm of implicated food, OR isolation of <i>B. cereus</i> from stool or vomitus of ill person. Enteric pathogens kit with Cary-Blair preservative. Must be refrigerated. Outreach requisition or Form 219
<i>Staphylococcus aureus</i>	2-4 hours (30 minutes–8 hours)	Vomiting with nausea, cramps, and diarrhea (abrupt onset)	24-48 hours	Not communicable (preformed enterotoxin)	Sliced/chopped ham and meats, custards, cream fillings, mushrooms, egg salad	- Isolation of an enterotoxin producing strain of <i>S. aureus</i> implicated food, OR isolation of enterotoxin producing strain of <i>S. aureus</i> from stool of ill persons <i>Staphylococcus aureus</i> feces, rectal swabs - Enteric pathogens kit with buffered glycerol saline, Form 219 Quantification/culture and toxin testing available for food. Lab needs to know ahead of time which test is being requested to
Agent ¹	Usual Incubation Period (Range) ²	Symptom Profile	Duration of Illness ³	Period of Communicability	Characteristic Foods ⁴	Criteria for Confirmation: Type and amount of specimens and handling requirements for shipping to DLS ⁵
						determine testing procedure

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<i>Cronobacter sakazakii</i>	6-8 hours	Infants (less than one year old)- fever, poor feeding, excessive crying, low energy, seizures; can lead to meningitis or sepsis People of all ages- wound infections, UTI, no symptoms; can lead to meningitis or sepsis		Unknown if communicable; mostly found in the environment	Powdered infant formula, powdered milk, herbal teas, starches	Treated as a regular miscellaneous specimen. Specimen needs to be an isolate.
<i>Bacillus cereus</i> ("diarrheal" variety)	6-24 hours	Cramps and diarrhea	24-48 hours	Not communicable (enterotoxin formed in vivo)	Fried rice, meats, vegetables	- Isolation of 10^5 <i>B. cereus</i>/gm of implicated food, OR Isolation of <i>B. cereus</i> from stool of ill person. - Feces, rectal swabs, vomitus. - Enteric pathogens kit with Cary-Blair preservative. Must be refrigerated. Outreach requisition or Form 219 Can only report <i>Bacillus</i> sp. For food. No toxin confirmation available.
<i>Clostridium perfringens</i>	10-12 hours (6-24 hours)	Cramps and diarrhea	24-48 hours	Not communicable (enterotoxin formed in vivo)	Meat, poultry, gravy, Mexican foods	- Isolation of $>10^6$ <i>C. perfringens</i>/gm of implicated food, OR Isolation of <i>C. perfringens</i> in stool of ill persons, OR Detection of enterotoxin by latex agglutination (from stool extracts or culture isolates). 5 - 50 gm stool - Kit #10 - Sample must be received by DLS is 24hr from onset (48hrs by CDC).
<i>Vibrio cholerae</i> non-O1 and non-O139	12-24 hours (12 hours-5 days)	Profuse watery diarrhea and vomiting, which can lead to severe dehydration and death within hours	72 hours-7 days; causes life threatening dehydration	Several days	Shellfish	- Isolation of toxigenic <i>V. cholerae</i> 01 or 0139 from implicated food, OR Isolation of <i>V. cholerae</i> 01 or 0139 from stool or vomitus of ill persons, OR Significant rise (fourfold) in vibriocidal antibodies. - Feces, rectal swabs - Enteric pathogens kit with Cary-Blair preservative. Must be refrigerated. Outreach requisition or Form 219 All Vibrio testing is currently sent from DLS to FDA lab for food testing. FDA needs to approve testing before samples can be sent.
<i>Vibrio parahaemolyticus</i>	12-24 hours (2-48 hours)	Cramps, watery diarrhea with nausea, vomiting, and fever	2-5 days	Not communicable	Seafood, especially crabs and oysters	Isolation of 10^6 <i>V. parahaemolyticus</i> from implicated food (usually seafood), OR Isolation of <i>V. parahaemolyticus</i> from

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<i>Salmonella</i> spp (non-typhoid)	12-36 hours (6 hours-10 days)	Cramps and diarrhea, with vomiting and fever	4-7 days	Several days to several years, depending on type Concentrations/infectivity typically higher when symptomatic	Poultry, eggs, meat, raw milk (cross contamination important)	• stool of ill persons. • Feces, rectal swabs • Enteric pathogens kit with Cary-Blair preservative. Must be refrigerated. Outreach requisition or Form 219 All <i>Vibrio</i> testing is currently sent from DLS to FDA lab for food testing. FDA needs to approve testing before samples can be sent. • Isolation of <i>Salmonella</i> from implicated food or water, OR Isolation of <i>Salmonella</i> from stool from ill persons. • Feces, rectal swabs • Enteric pathogens kit with buffered glycerol saline. Outreach requisition or Form 219
<i>Clostridium botulinum</i>	12-48 hours (2 hours to 8 days)	Nausea, vomiting, diarrhea, with or just before onset of descending paralysis	Days to months	Not communicable (preformed enterotoxin)	Improperly canned or similarly preserved foods; honey (infants)	• Detection of <i>C. botulinum</i> toxin from implicated food, OR Detection of <i>C. botulinum</i> toxin from human sera, or feces, OR Isolation of <i>C. botulinum</i> from stool of persons with clinical syndrome, OR Consistent clinical syndrome in persons known to have eaten same food as persons with laboratory proven cases. • 25 - 50 gm feces, 10 mL sera in red top tube⁶ Sterile, leak-proof unbreakable container. Outreach requisition or Form 219
<i>Escherichia coli</i> Enteroinvasive (EIEC)	12-48 hours	Cramps and diarrhea with fever, headache	5-10 days	Weeks to months	Uncooked vegetables, salads, water, cheese	• Demonstration of <i>E. coli</i> of same serotype in implicated food and stools in persons, OR Isolation of <i>E. coli</i> of the same serotype shown to be enteroinvasive or enterotoxigenic from stool of ill persons • Feces, rectal swabs • Enteric pathogens kit with buffered glycerol saline. Must be refrigerated. Outreach requisition or Form 219
<i>Vibrio vulnificus</i>	12-72 hours	Fever, diarrhea, abdominal cramps, nausea, vomiting hypotension, septicemia in individuals with chronic liver disease, chronic alcoholism, hemochromatosis, or		Not communicable	Seafood	• Isolation of <i>V. vulnificus</i> from implicated food (usually seafood) OR Isolation of <i>V. vulnificus</i> from a clinical specimen (blood, wound, stool). • Feces, rectal swabs • Enteric pathogens kit with Cary-Blair preservative. Must be refrigerated.

⁶ DLS staff must be contacted before any specimens for botulism will be tested.

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KENTUCKY FIELD GUIDE FOR FOODBORNE AND WATERBORNE DISEASES¹

(Organized by Incubation Period)

		Immunocompromising conditions					
<i>Listeria monocytogenes</i>	24 hours (9-50 hours)	Fever with diarrhea, myalgia, headache Usual symptom profile: fever 72% diarrhea 68% myalgia 56% cramps 55% vomiting 35%	3-7 days	Not known	Inadequately pasteurized milk, precooked meat	- Outreach requisition or Form 219 All Vibrio testing is currently sent from DLS to FDA lab for food testing. FDA needs to approve testing before samples can be sent. - Isolation of <i>Listeria monocytogenes</i> of the same serotype from two or more ill persons exposed to epidemiologically implicated food or to food from which the same-type <i>Listeria monocytogenes</i> has been isolated - Isolation from a normally sterile site: blood, CSF, amniotic fluid, fetal/placental tissue Enteric pathogens kit with Cary-Blair preservative. Must be refrigerated. Outreach requisition or Form 219	
<i>Escherichia coli</i> enterotoxigenic (ETEC) ⁷	24-48 hours (21-68 hours)	Cramps, watery diarrhea, some vomiting Usual symptom profile: diarrhea 80-100% cramps 82% vomiting <50% nausea <50% fever <50% myalgia <50% headache <50%	24 hours-11 days (average 3 days)	Weeks to months	Seafood (crab, shrimp and scallops), salads and other foods served cold	- Demonstration of <i>E. coli</i> of same serotype in implicated food and stools in persons, OR Isolation of <i>E. coli</i> of the same serotype shown to be enteroinvasive or enterotoxigenic from stool of ill persons - Feces, rectal swabs Enteric pathogens kit with buffered glycerol saline. Must be refrigerated. Outreach requisition or Form 219	
Norovirus and other caliciviruses	24-48 hours (10-72 hours)	Vomiting, with diarrhea, headache and myalgia Usual symptom profile: diarrhea 80% vomiting 60% nausea 75% fever 30%	24-72 hours	Duration of vomiting and diarrhea	Shellfish, water, salads, frosting, "handled" foods	- Diagnosed is often based on symptoms, onset times, and ruling out other enteric pathogens, OR Identification of virus in stool by polymerase chain reaction (PCR). - Stool of ill person - Sterile, leak-proof container without preservatives. Must be refrigerated. Outreach requisition or Form 275	
<i>Shigella</i>	24-48 hours (12 hours-6 days)	Cramps and diarrhea (may be bloody) with fever	4-7 days	4 weeks after illness	Eggs, salads, lettuce	Food testing not available at DLS. - Isolation of <i>Shigella</i> from implicated food, OR Isolation of <i>Shigella</i> from stool of ill persons. - Feces, rectal swabs Enteric pathogens kit with buffered glycerol saline. Outreach requisition or Form 219	

⁷ Symptom profiles and characteristic foods are taken from Dalton CB, Mintz ED, Wells JG et al. Outbreaks of enterotoxigenic *Escherichia coli* infection in American adults: a clinical and epidemiologic profile. *Epidemiol Infect* 1999; 123:9-16.

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<i>Vibrio cholerae</i> O1 and O139	24-72 hours (12 hours-5 days)	Diarrhea, vomiting water	72 hours-7 days	Usually a few days after recovery except carrier state	Shellfish, water or foods contaminated by infected food handlers	- Isolation of toxigenic <i>V. cholerae</i> O1 or O139 from implicated food, OR isolation of <i>V. cholerae</i> O1 or O139 from stool or vomitus of ill persons. OR Significant rise (fourfold) in vibriocidal antibodies. - Feces, rectal swabs - Enteric pathogens kit with Cary-Blair preservative. Must be refrigerated. Outreach requisition or Form 219 All Vibrio testing is currently sent from DLS to FDA lab for food testing. FDA needs to approve testing before samples can be sent. - Clinical testing is performed at CDC and requires pre-approval. - CSF is preferred specimen type. Also accept fresh or frozen brain tissue. 0.2 mL (CSF); 1mL preferred. 0.1 g brain tissue; 0.2 g preferred. - Must be refrigerated or frozen. - Food testing not available at DLS.
<i>Naegleria fowleri</i> -primary amebic meningoencephalitis (PAM)	1-12 days (Average 5 days)	Stage 1: Severe frontal headache, fever, nausea, vomiting Stage 2: stiff neck, seizures, altered mental status, hallucinations, coma, death	1-18 days (almost always fatal)	Not communicable	Lakes, rivers, hot springs, warm water discharge from industrial and power plants, poorly maintained swimming pools, water heaters, soil, rarely tap water *has to enter the body nasally to infect people.	- Isolation of <i>C. jejuni</i> from implicated food, OR isolation of <i>C. jejuni</i> from stool or blood of ill person - Feces, rectal swabs - Enteric pathogens kit with Cary-Blair preservative. Must be refrigerated. Do not freeze food samples if possible. Outreach requisition or Form 219 - Demonstration of <i>E. coli</i> isolates from stools that are enterotoxigenic or enterohemorrhagic. - Feces, rectal swabs - Enteric pathogens kit with buffered glycerol saline. Must be refrigerated. Form 219 - STEC, O157 and certain non-O157 food testing available. Lab needs to be informed of the non-O157 varieties ASAP so kits can be obtained for testing.
<i>Campylobacter jejuni</i>	48 hours-5 days (24 hours-10 days)	Cramps and diarrhea (sometimes bloody) with vomiting and fever	48 hours-10 days	2-7 weeks	Raw milk, poultry, water	- Isolation of <i>C. jejuni</i> from implicated food, OR isolation of <i>C. jejuni</i> from stool or blood of ill person - Feces, rectal swabs - Enteric pathogens kit with Cary-Blair preservative. Must be refrigerated. Do not freeze food samples if possible. Outreach requisition or Form 219 - Demonstration of <i>E. coli</i> isolates from stools that are enterotoxigenic or enterohemorrhagic. - Feces, rectal swabs - Enteric pathogens kit with buffered glycerol saline. Must be refrigerated. Form 219 - STEC, O157 and certain non-O157 food testing available. Lab needs to be informed of the non-O157 varieties ASAP so kits can be obtained for testing.
<i>Escherichia coli</i> enterohemorrhagic (<i>E. coli</i> O157:H7 & others)	48 hours-8 days (24 hours-10 days)	Bloody diarrhea with cramps, vomiting, fever; hemolytic uremic syndrome (2-7% of cases)	5-10 days	1-4 weeks	Beef, venison, raw milk, water, produce	- Isolation of <i>C. jejuni</i> from implicated food, OR isolation of <i>C. jejuni</i> from stool or blood of ill person - Feces, rectal swabs - Enteric pathogens kit with Cary-Blair preservative. Must be refrigerated. Do not freeze food samples if possible. Outreach requisition or Form 219 - Demonstration of <i>E. coli</i> isolates from stools that are enterotoxigenic or enterohemorrhagic. - Feces, rectal swabs - Enteric pathogens kit with buffered glycerol saline. Must be refrigerated. Form 219 - STEC, O157 and certain non-O157 food testing available. Lab needs to be informed of the non-O157 varieties ASAP so kits can be obtained for testing.
<i>Cyclospora cayentanensis</i>	1 – 14 days (usually 7 days)	Diarrhea, nausea, anorexia, weight loss, cramps, gas, fatigue, low-grade fever; may be relapsing or	3 – 5 weeks If untreated, symptoms can return	Direct Fecal-Oral does not occur, shredded oocysts need 1 – 2 weeks to mature in environment	Raspberries, basil, snow peas, mesclun lettuce	Demonstration of the parasite by microscopy or molecular methods in stool or in intestinal aspirate or biopsy specimens from two or more ill persons

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		protracted		before infectious.		OR
<i>Cryptosporidium parvum</i>	2-12 days (usually 7 days)	Profuse watery diarrhea, abdominal cramps, nausea, low-grade fever, anorexia, vomiting (Some infected individuals have no symptoms at all.)	1-2 weeks	Weeks to months	Fruits, produce, or water	- Demonstration of the parasite in epidemiologically implicated food - Food testing not available at DLS. - Demonstration of <i>C. parvum</i> oocysts from implicated food, OR Demonstration of <i>C. parvum</i> oocysts from stool of ill persons, OR Demonstration of <i>C. parvum</i> in intestinal fluid, or small bowel biopsy specimens, OR Demonstration of <i>C. parvum</i> antigen in stool by a specific immunodiagnostic test (e.g., enzyme-linked immunosorbent assay (ELISA)). - Walnut-sized stool 10% formalin - Food testing not available at DLS.
<i>Giardia intestinalis</i> ^a	3 – 25 days (usually 7 days)	Diarrhea, gas, cramps, nausea, fatigue	2 – 6 weeks	Variable, as long as carrier status persists	Water, direct fecal oral, food contaminated by ill handler	- Demonstration of the parasite in stool or small-bowel biopsy specimen of two or more ill persons - Food testing not available at DLS.

^aPeriod of Communicability and Characteristic Foods are taken from Los Angeles County Department of Public Health. GIARDIASIS. Acute Communicable Disease Control Manual (B-73). October 2018.

	Weeks- several years	<i>Acanthamoeba</i> spp.- inflammation of lungs or sinuses, skin infections/lesions/abscesses, neurological impairment, ocular symptoms (eye pain, swelling, redness, excessive tearing, light sensitivity)	<i>Acanthamoeba</i> spp.- several weeks to months <i>Balamuthia mandrillaris</i> - usually fatal	Not communicable	<i>Acanthamoeba</i> spp.- Soil, fresh, brackish, and seawater, field grown vegetables, swimming pool, tap water <i>Balamuthia mandrillaris</i> - soil, dust	- Clinical testing is performed at CDC and requires pre-approval. - Food testing not available at DLS. <i>Acanthamoeba</i> spp- brain tissue is preferred specimen type (will also accept cerebrospinal fluid [CSF], corneal scraping, and skin tissue for certain subtypes); 0.2 tissue, 1 mL fluids, 5 mm corneal scraping; must be refrigerated or frozen. <i>Balamuthia mandrillaris</i>- brain tissue is preferred specimen type(will also accept cerebrospinal fluid, and skin tissue for certain subtypes); 0.2 g tissue, 1 mL fluids; must be refrigerated or frozen.
Free Living Ameba -- <i>Acanthamoeba</i> spp., <i>Balamuthia mandrillaris</i> , <i>Naegleria fowleri</i> (referenced above in its own section), <i>Sappina</i> spp.						

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KENTUCKY FIELD GUIDE FOR FOODBORNE AND WATERBORNE DISEASES¹ (Organized by Symptomology)

Agent ¹	Usual Incubation Period (Range) ²	Symptom Profile	Duration of Illness ³	Period of Communicability	Characteristic Foods ⁴	Criteria for Confirmation: Type and amount of specimens and handling requirements for shipping to DLS ⁵
Agents typified by nausea and vomiting, without fever, within 8 hours of consuming.						
<i>Bacillus cereus</i> ("emetic" variety)	2-4 hours (1-6 hours)	Vomiting, with nausea and Diarrhea (abrupt onset)	24 hours	Not communicable (preformed enterotoxin)	Fried rice, meats, vegetables	- Isolation of 10⁵ <i>B. cereus</i>/gm of implicated food OR Isolation of <i>B. cereus</i> from stool of ill person. - Enteric pathogens kit with Cary-Blair media. Refrigerate. Outreach requisition or Complete Form 219.
<i>Staphylococcus aureus</i>	2-4 hours (30 minutes-8 hours)	Vomiting, with nausea, cramps, and diarrhea (abrupt onset)	24-48 hours	Not communicable (preformed enterotoxin)	Sliced/chopped ham and meats, custards, cream fillings, mushrooms, egg salad	- Isolation of an enterotoxin producing strain of <i>S. aureus</i> in implicated food OR Isolation of enterotoxin producing strain of <i>S. aureus</i> from stool of ill persons. <i>Staphylococcus aureus</i> Feces, rectal swabs - Enteric pathogens kit with buffered glycerol saline. Outreach requisition or Form 219 - Quantification/culture and toxin testing available for food. Lab needs to know ahead of time which test is being requested to determine testing procedure

¹ The *KY Field Guide to Foodborne and Water-Borne Diseases* is based on the *Oregon Health Services Compendium of Acute Foodborne Diseases* and a similar table developed by epidemiologists at the Foodborne and Diarrheal Disease Branch, Division of Bacterial and Mycotic Diseases, National Center for Infectious Diseases, Centers for Disease Control and Prevention, and on Tauxe RV, Hughes JM. Foodborne Disease. In: Mandell GL, Benne HJE, Dolin R. Principles and Practice of Infectious Disease 4th ed. NY: Churchill Livingstone; 1995, page 1017 (table 6).

² CDC. Diagnosis and management of foodborne illness: a primer for physicians. MMWR 2001; 50(RR2). Reprinted with the permission of the American Medical Association; the Center for Food Safety and Nutrition, FDA and the Food Safety Inspection Service, USDA. Available on-line at <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5002a1.htm>

³ CDC. Guide to confirming the diagnosis in Foodborne diseases at https://www.cdc.gov/foodsafety/outbreaks/investigating-outbreaks/confirming_diagnosis.html Chin, J, Ed. Control of Communicable Disease Manual, Washington, D.C.: American Public Health Association, 2000.

⁴ CDC. Diagnosis and management of Foodborne illness: a primer for physicians. MMWR 2001; 50(RR2). Reprinted with the permission of the American Medical Association; the Center for Food Safety and Nutrition, FDA and the Food Safety Inspection Service, USDA. Available on-line at <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5002a1.htm>

⁵ "Characteristic foods" for each foodborne and water-borne agent are based on epidemiological data gathered by epidemiologists in the Acute and Communicable Disease Program, Center for Disease Control and Epidemiology, Oregon Health Division, and on Tauxe RV, Hughes JM. Foodborne Disease. In: Mandell GL, Benne HJE, Dolin R. Principles and Practice of Infectious Disease 4th ed. NY: Churchill Livingstone; 1995, page 1017 (table 6).

⁵ Division of Laboratory Services, Kentucky Department for Public Health <https://chfs.ky.gov/agencies/dph/dls/Pages/default.aspx> 1-502-564-4446.



KENTUCKY FIELD GUIDE FOR FOODBORNE AND WATERBORNE DISEASES¹

(Organized by Symptomology)

Agent ¹	Usual Incubation Period (Range) ²	Symptom Profile	Duration of Illness ³	Period of Communicability	Characteristic Foods ⁴	Criteria for Confirmation: Type and amount of specimens and handling requirements for shipping to DLS ⁵
Agents typified by abdominal cramps and diarrhea, without fever, within 24 hours of consuming.						
<i>Bacillus cereus</i> ("diarrheal" variety)	6-24 hours	Cramps and diarrhea	24-48 hours	Not communicable (enterotoxin formed in vivo)	Fried rice, meats, vegetables	- Isolation of 10³ <i>B. cereus</i>/gm of implicated food, OR Isolation of <i>B. cereus</i> from stool of ill person. - Feces, rectal swabs, vomitus. - Enteric pathogens kit with Cary-Blair preservative. Must be refrigerated. Outreach requisition or Form 219 - Can only report <i>Bacillus</i> sp. For food. No toxin confirmation available.
<i>Clostridium perfringens</i>	10-12 hours (6-24 hours)	Cramps and diarrhea	24-48 hours	Not communicable (enterotoxin formed in vivo)	Meat, poultry, gravy, Mexican foods	- Isolation of > 10⁵ <i>C. perfringens</i>/gm of implicated food, OR Isolation of <i>C. perfringens</i> in stool of ill persons, OR Detection of enterotoxin by latex agglutination (from stool extracts or culture isolates). 5 - 50 gm stool - Kit # 10 - Sample must be received by DLS is 24hr from onset (48hrs by CDC). Anerobic conditions are best for this organism. Toxin testing not available for food.

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Agents typified by abdominal cramps and diarrhea, with fever, within 12-48 hours of consuming.						
<i>Campylobacter jejuni</i>	48 hours- 5 days (24 hours-10 days)	Cramps and diarrhea (sometimes bloody) with vomiting and fever	48 hours- 10 days	2-7 weeks	Raw milk, poultry, water	- Isolation of <i>C. jejuni</i> from implicated food, OR Isolation of <i>C. jejuni</i> from stool or blood of ill person - Feces, rectal swabs Enteric pathogens kit with Cary-Blair preservative. Must be refrigerated. Do not freeze food samples if possible. Outreach requisition or Form 219
<i>Cyclospora cayentanensis</i>	1 – 14 days (usually 7 days)	Diarrhea, nausea, anorexia, weight loss, cramps, gas, fatigue, low-grade fever; may be relapsing or protracted	3 – 5 weeks If untreated, symptoms can return	Direct Fecal-Oral does not occur, shed oocysts need 1 – 2 weeks to mature in environment before infectious.	Raspberries, basil, snow peas, mesclun lettuce	- Demonstration of the parasite by microscopy or molecular methods in stool or in intestinal aspirate or biopsy specimens from two or more ill persons OR - Demonstration of the parasite in epidemiologically implicated food - Food testing not available at DLS.
Agent¹	Usual Incubation Period (Range)²	Symptom Profile	Duration of Illness³	Period of Communicability	Characteristic Foods⁴	Criteria for Confirmation: Type and amount of specimens and handling requirements for shipping to DLS ⁵

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	12-48 hours	Cramps and diarrhea with fever, headache	5-10 days	Weeks to months	Uncooked vegetables, salads, water, cheese	- Demonstration of <i>E. coli</i> of same serotype in implicated food and stools in persons, OR Isolation of <i>E. coli</i> of the same serotype shown to be enteroinvasive or enterotoxigenic from stool of ill persons - Feces, rectal swabs - Enteric pathogens kit with buffered glycerol saline. Must be refrigerated. Outreach requisition or Form 219
<i>Escherichia coli</i> Enteroinvasive (EIEC)						
<i>Salmonella</i> spp (non-typhoid)	12-36 hours (6 hours-10 days)	Cramps and diarrhea with vomiting and fever	4-7 days	Several days to several years, depending on type Concentrations/ infectivity typically higher when symptomatic	Poultry, eggs, meat, raw milk (cross contamination important)	- Isolation of <i>Salmonella</i> from implicated food or water, OR Isolation of <i>Salmonella</i> from stool from ill persons. - Feces, rectal swabs - Enteric pathogens kit with buffered glycerol saline. Outreach requisition or Form 219
<i>Shigella</i>	24-48 hours (12 hours-6 days)	Cramps and diarrhea (may be bloody) with fever	4-7 days	4 weeks after illness	Eggs, salads, lettuce	- Isolation of <i>Shigella</i> from implicated food, OR Isolation of <i>Shigella</i> from stool of ill persons. - Feces, rectal swabs - Enteric pathogens kit with buffered glycerol saline. Outreach requisition or Form 219
<i>Vibrio parahaemolyticus</i>	12-24 hours (2-48 hours)	Cramps watery, diarrhea with nausea, vomiting, and fever	2-5 days	Not communicable	Seafood, especially crabs and oysters	- Isolation of 10/g <i>V. parahaemolyticus</i> from implicated food (usually seafood), OR Isolation of <i>V. parahaemolyticus</i> from stool of ill persons. - Feces, rectal swabs - Enteric pathogens kit with Cary-Blair preservative. Must be refrigerated. Outreach requisition or Form 219 All Vibrio testing is currently sent from DLS to FDA lab for food testing. FDA needs to approve testing before samples can be sent.

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KENTUCKY FIELD GUIDE FOR FOODBORNE AND WATERBORNE DISEASES¹

(Organized by Symptomology)

Agent ¹	Usual Incubation Period (Range) ²	Symptom Profile	Duration of Illness ³	Period of Communicability	Characteristic Foods ⁴	Criteria for Confirmation: Type and amount of specimens and handling requirements for shipping to DLS ⁵
<i>Vibrio vulnificus</i>	12-72 hours	Fever, diarrhea, abdominal cramps, nausea, vomiting, hypotension, septicemia in individuals with chronic liver disease, chronic alcoholism, hemochromatosis, or immunocompromising conditions		Not communicable	Seafood	- Isolation of <i>V. vulnificus</i> from implicated food (usually seafood) OR Isolation of <i>V. vulnificus</i> from a clinical specimen (blood, wound, stool). - Feces, rectal swabs - Enteric pathogens kit with Cary-Blair preservative. Must be refrigerated. - Outreach requisition or Form 219 - All Vibrio testing is currently sent from DLS to FDA lab for food testing. FDA needs to approve testing before samples can be sent.
<i>Yersinia enterocolitica</i>	36-48 hours (24 hours-10 days)	Cramps, diarrhea, fever, headache, vomiting, pseudoappendicitis	1-3 weeks	2-3 weeks	Milk, tofu, pork	- Isolation of organism from clinical specimens from two or more ill persons OR isolation of organism from epidemiologically implicated food - Feces, rectal swabs - Enteric pathogens kit with Cary-Blair preservative. Must be refrigerated. - Outreach requisition or Form 219
Agents typified by abdominal cramps and diarrhea, without fever, within 72-96 hours of consuming.						
<i>Giardia intestinalis</i> ⁶	3 – 25 days (usually 7 days)	Diarrhea, gas, cramps, nausea, fatigue	2 – 6 weeks	Variable, as long as carrier status persists	Water, direct fecal oral, food contaminated by ill handler	- Demonstration of the parasite in stool or small-bowel biopsy specimen of two or more ill persons - Food testing not available at DLS.

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Agents typified by vomiting, diarrhea, cramps, myalgias, and headache with fever, within 24 hours of consuming.					
<i>Listeria monocytogenes</i>	24 hours (9-50 hours)	Fever with diarrhea, myalgia, headache Usual symptom profile: fever 72% diarrhea 68% myalgia 56% cramps 55% vomiting 35%	3-7 days	Not known	Inadequately pasteurized milk, precooked meat Isolation of <i>Listeria monocytogenes</i> of the same serotype from two or more ill persons exposed to epidemiologically implicated food or to food from which the same-type <i>Listeria monocytogenes</i> has been isolated Isolation from a normally sterile site: blood, CSF, amniotic fluid, fetal/placental tissue Enteric pathogens kit with Cary-Blair preservative. Must be refrigerated. Outreach requisition or Form 219
Agent ¹	Usual Incubation Period (Range) ²	Symptom Profile	Duration of Illness ³	Period of Communicability	Characteristic Foods ⁴
Criteria for Confirmation: Type and amount of specimens and handling requirements for shipping to DLS ⁵					
Agents typified by vomiting, diarrhea, cramps, myalgias, and headache without fever, within 24-48 hours of consuming.					
Norovirus and other caliciviruses	24-48 hours (10-72 hours)	Vomiting, with diarrhea, headache and myalgia Usual symptom profile: diarrhea 80% vomiting 60% nausea 75% fever 30%	24-72 hours	Duration of vomiting and diarrhea	Shellfish, water, salads, frosting, "handled" foods Diagnosed is often based on symptoms, onset times, and ruling out other enteric pathogens, OR Identification of virus in stool by polymerase chain reaction (PCR). Stool of ill person Sterile, leak-proof container without preservatives. Must be refrigerated. Outreach requisition or Form 275 Food testing not available at DLS.
Agents typified by watery diarrhea and headache without fever, within 24-48 hours of consuming.					

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<i>Escherichia coli</i> enterotoxigenic (EPEC)	24-48 hours (21-68 hours)	Cramps, watery diarrhea, some vomiting Usual symptom profile: Diarrhea 80-100% cramps 82% vomiting <50% nausea <50% fever <50% myalgia <50% headache <50%	24 hours- 11 days (medium 3 days)	Weeks to months	Seafood (crab, shrimp and scallops), salads and other foods served cold	- Demonstration of <i>E. coli</i> of same serotype in implicated food and stools in persons, OR Isolation of <i>E. coli</i> of the same serotype shown to be enteroinvasive or enterotoxigenic from stool of ill persons - Feces, rectal swabs - Enteric pathogens kit with buffered glycerol saline. Must be refrigerated. Outreach requisition or Form 219 - Isolation of toxigenic <i>V. cholerae</i> 01 or 0139 from implicated food, OR Isolation of <i>V. cholerae</i> 01 or 0139 from stool or vomitus of ill persons, OR significant rise (fourfold) in vibriocidal antitoxins. - Feces, rectal swabs - Enteric pathogens kit with Cary-Blair preservative. Must be refrigerated. Outreach requisition or Form 219 All Vibrio testing is currently sent from DLS to FDA lab for food testing. FDA needs to approve testing before samples can be sent.
<i>Vibrio cholerae</i> 01 and 0139	24-72 hours (12 hours-5 days)	Diarrhea, vomiting water	72 hours-7 days	Usually a few days after recovery except carrier state	Shellfish, water or foods contaminated by infected food handlers	- Isolation of toxigenic <i>V. cholerae</i> 01 or 0139 from implicated food, OR Isolation of <i>V. cholerae</i> 01 or 0139 from stool or vomitus of ill persons, OR significant rise (fourfold) in vibriocidal antitoxins. - Feces, rectal swabs - Enteric pathogens kit with Cary-Blair preservative. Must be refrigerated. Outreach requisition or Form 219 All Vibrio testing is currently sent from DLS to FDA lab for food testing. FDA needs to approve testing before samples can be sent.
Agent¹	Usual Incubation Period (Range)²	Symptom Profile	Duration of Illness³	Period of Communicability	Characteristic Foods⁴	Criteria for Confirmation: Type and amount of specimens and handling requirements for shipping to DLS⁵
<i>Vibrio cholerae</i> non-01 and non-0139	12-24 hours (12 hours-5 days)	Profuse watery diarrhea and vomiting, which can lead to severe dehydration and death within hours	72 hours-7 days; causes life threatening dehydration	Several days	Shellfish	- Isolation of <i>V. cholerae</i> non-01 or non-0139 from stool of ill person. Isolation of <i>V. cholerae</i> non-01 or non-0139 from implicated food is supportive evidence. - Feces, rectal swabs - Enteric pathogens kit with Cary-Blair preservative. Must be refrigerated. Outreach requisition or Form 219 - All Vibrio testing is currently sent from DLS to FDA lab for food testing. FDA needs to approve testing before samples can be sent.

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Agents typified by bloody diarrhea without fever, within 48 hours of consuming.					
<i>Escherichia coli</i> enterohemorrhagic (<i>E. coli</i> O157:H7 & others)	48 hours- 8 days (24 hours- 10 days)	Bloody diarrhea with cramps, vomiting, fever; hemolytic uremic syndrome (2-7% of cases)	5-10 days	1-4 weeks	Beef, venison, raw milk, water, produce
					- Demonstration of <i>E. coli</i> isolates from stools that are enterotoxigenic or enterohemorrhagic. - Feces, rectal swabs - Enteric pathogens kit with buffered glycerol saline. Must be refrigerated. Outreach requisition or Form 219 - STEC, O157 and certain non-O157 food testing available. Lab needs to be informed of the non-O157 varieties ASAP so kits can be obtained for testing.
Agent ¹	Usual Incubation Period (Range) ²	Symptom Profile	Duration of Illness ³	Period of Communicability	Characteristic Foods ⁴
Botulism					
<i>Clostridium botulinum</i>	12-48 hours (2 hours to 8 days)	Nausea, vomiting, diarrhea, with or just before onset of descending paralysis	Days to months	Not communicable (performed enterotoxin)	- Detection of <i>C. botulinum</i> toxin from implicated food, OR Detection of <i>C. botulinum</i> toxin from human sera, or feces, OR Isolation of <i>C. botulinum</i> from stool of persons with clinical syndrome, OR Consistent clinical syndrome in persons known to have eaten same food as persons with laboratory proven cases. 25 - 50 gm feces, 10 mL sera in red top tube⁷ - Sterile, leak-proof unbreakable container. Outreach requisition or Form 219
Agent ¹	Usual Incubation Period (Range) ²	Symptom Profile	Duration of Illness ³	Period of Communicability	Characteristic Foods ⁴
					Criteria for Confirmation: Type and amount of specimens and handling requirements for shipping to DLS ⁵

⁷ DLS staff must be contacted before any specimens for botulism will be tested.

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Cryptosporidiosis					
<i>Cryptosporidium parvum</i>	2-12 days (usually 7 days)	Profuse watery diarrhea, abdominal cramps, nausea, low-grade fever, anorexia, vomiting (Some infected individuals have no symptoms at all.)	1-2 weeks	Weeks to months	Fruits, produce, or water
- Demonstration of <i>C. parvum</i> oocysts from implicated food, OR - Demonstration of <i>C. parvum</i> oocysts from stool of ill persons, OR - Demonstration of <i>C. parvum</i> in intestinal fluid, or small bowel biopsy specimens, OR Demonstration of <i>C. parvum</i> antigen in stool by a specific immunodiagnostic test (e.g., enzyme-linked immunosorbent assay (ELISA). - Walnut-sized stool 10% formalin - Food testing not available at DLS.					
Free Living Ameba					
Free Living Ameba – <i>Acanthamoeba</i> spp., <i>Balamuthia mandrillaris</i> , <i>Naegleria fowleri</i> (referenced below in its own section), <i>Sappina</i> spp.	Weeks- several years	<i>Acanthamoeba</i> spp. - inflammation of lungs or sinuses, skin infections/lesions/abscesses, neurological impairment, ocular symptoms (eye pain, swelling, redness, excessive tearing, light sensitivity) <i>Balamuthia mandrillaris</i> - similar to <i>Acanthamoeba</i> spp.; plague like lesions on skin and face, headache, vomiting, lethargy, fever, seizures, paralysis, confusion	<i>Acanthamoeba</i> spp.- several weeks to months <i>Balamuthia</i> <i>mandrillaris</i> - usually fatal	Not communicable	<i>Acanthamoeba</i> spp. - Soil, fresh, brackish, and seawater, field grown vegetables, swimming pool, tap water <i>Balamuthia mandrillaris</i> - soil, dust
- Clinical testing is performed at CDC and requires pre-approval. - Food testing not available at DLS. <i>Acanthamoeba</i> spp- brain tissue is preferred specimen type (will also accept cerebrospinal fluid (CSF), corneal scraping, and skin tissue for certain subtypes); 0.2 tissue, 1 mL fluids, 5 mm corneal scraping; must be refrigerated or frozen. <i>Balamuthia mandrillaris</i>- brain tissue is preferred specimen type(will also accept cerebrospinal fluid, and skin tissue for certain subtypes); 0.2 g tissue, 1 mL fluids; must be refrigerated or frozen.					

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Naegleria fowleri						
Naegleria fowleri- primary amebic meningoencephalitis (PAM)	1-12 days (Average 5 days)	Stage 1: Severe frontal headache, fever, nausea, vomiting Stage 2: stiff neck, seizures, altered mental status, hallucinations, coma, death	1-18 days (almost always fatal)	Not communicable	Lakes, rivers, hot springs, warm water discharge from industrial and power plants, poorly maintained swimming pools, water heaters, soil, rarely tap water *has to enter the body nasally to infect people.*	- Clinical testing is performed at CDC and requires pre-approval. - CSF is preferred specimen type. Also accept fresh or frozen brain tissue. 0.2 mL (CSF); 1mL preferred. 0.1 g brain tissue; 0.2 g preferred. - Must be refrigerated or frozen. Food testing not available at DLS.
Agents most readily diagnosed from the history of eating a particular type of food.						
Heavy Metals (antimony, arsenic, cadmium, copper, iron, lead, mercury, tin, zinc)	5 minutes - 8 hours (usually <1 hour)	Vomiting with nausea, cramps, and diarrhea	Usually self-limited	Not communicable	Acidic foods and beverages prepared, stored or cooked in containers coated, lined or contaminated with offending metal	- Demonstration of high concentration of metal in epidemiologically implicated food - Collect suspect food or metal container
Poisonous mushrooms (muscimol, muscarine, psilocybin, coprinus artementarius, ibotenic acid)	<2 hours	Vomiting, diarrhea, confusion, visual disturbances, salivation, diaphoresis, hallucinations, disulfiram-like reaction	Usually self-limited	Not communicable	Wild mushrooms	- Clinical syndrome among persons who have eaten mushroom identified as toxic type, OR demonstration of toxin in epidemiologically implicated mushroom or food containing mushrooms - Collect mushrooms or food containing mushrooms Food testing not available at DLS
Shellfish poisoning (diarrhetic, neurotoxic, amnesic)	20 minutes - 2 hours	Cramps, diarrhea, headaches, vomiting, amnesia, seizures	Days	Not communicable	Mussels, oysters	- Detection of toxin in epidemiologically implicated food OR detection of large numbers of shellfish-poisoning associated species of dinoflagellates in water from which epidemiologically implicated mollusks are gathered - Collect any amount of epidemiologically implicated shellfish Food testing not available at DLS

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Ciguatera poisoning	1-6 hours; usually within 24 hours	Diarrhea, nausea, vomiting, paresthesias, reversal of temperature sensation	Days to weeks to months	Not communicable	Large ocean fish (groupers, amberjack, barracuda, snapper)	- Demonstration of ciguatera toxin in epidemiologically implicated fish, OR clinical syndrome among persons who have eaten a type of fish previously associated with ciguatera fish poisoning - Collect epidemiologically implicated fish Food testing not available at DLS.
Scombroid fish poisoning (histamine fish poisoning)	1 minute–3 hours; usually within 6 hours	Cramps, diarrhea, headache, nausea, flushing, urticaria	3-6 hours	Not communicable	Mishandled fish (mahi-mahi, tuna, mackerel, bluefish, salmon, bonito, skipjack)	- Demonstration of histamine in epidemiologically implicated fish, OR clinical syndrome among persons who have eaten a type of fish previously associated with histamine fish poisoning (fish of order Scombroidei) - Collect epidemiologically implicated fish Food testing not available at DLS.
Paralytic shellfish poisoning	30 minutes–3 hours	Paresthesias, feeling of floating, loss of balance, dry mouth, double vision, dysarthria, shortness of breath	Days	Not communicable	Clams, mussels, cockles	- Detection of toxin in epidemiologically implicated fish, OR detection of large numbers of shellfish-poisoning associated species of dinoflagellates in water from which epidemiologically implicated mollusks are gathered - Collect epidemiologically implicated fish Food testing not available at DLS.
Cronobacter sakazakii	6-8 hours	Infants (less than one year old)- fever, poor feeding, excessive crying, low energy, seizures; can lead to meningitis or sepsis People of all ages- wound infections, UTI, no symptoms; can lead to meningitis or sepsis		Unknown if communicable; mostly found in the environment	Powdered infant formula, powdered milk, herbal teas, starches	Food testing not available at DLS. Treated as a regular miscellaneous specimen. Specimen needs to be an isolate.

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