

## APPENDIX 1: Table of Foodborne Illnesses and Associated Clinical Characteristics

### Bacterial Agents: Table of Foodborne Illnesses and Associated Clinical Characteristics <sup>1</sup>

Agent	Usual Incubation Period (Range) <sup>2,3,4</sup>	Signs and Symptoms <sup>2,3,4</sup>	Duration <sup>2,3</sup>	Associated foods <sup>2</sup>	Period of Communicability <sup>2,3</sup>	CDC criteria for outbreak confirmation <sup>5</sup>
						SLD Test Kit  See SLD Biological Sciences Bureau directory of services for up to date information <a href="https://nmhealth.org/about/sld/">https://nmhealth.org/about/sld/</a>
<i>Bacillus cereus</i> (diarrheal form)	6-24 hours	Abdominal cramps, watery diarrhea, nausea.	24-48 hours	Meats, stews, gravies, vanilla sauce.	Not communicable (enterotoxin formed in vivo).	Isolation of organism from stool of two or more ill persons OR isolation of 10 <sup>5</sup> organisms/g from epidemiologically implicated food. Contact Environmental Micro section regarding food collection at (505) 383-9129.
						Enteric Transport Kit (ETM). Refrigerate not frozen, place in container. Stool in ETM must be received at SLD within 48 hours of collection.
<i>Bacillus cereus</i> (emetic form)	1-6 hours	Sudden onset of severe nausea and vomiting, diarrhea may be present.	24 hours	Improperly refrigerated cooked and fried rice, meats.	Not communicable (preformed enterotoxin).	Isolation of organism from stool of two or more ill persons and not from stool of control patients OR isolation of 10 <sup>5</sup> organisms/g from epidemiologically implicated food, provided specimen is properly handled.
						Enteric Transport Kit (Refrigerate not frozen, place in container without preservative, vomitus must be without preservative). Must be received at SLD within 24 hours of collection
Brucellosis ( <i>Brucella abortus</i> , <i>B. melitensis</i> , <i>B. suis</i> )	Several days to several months; usually >30 days	Fever, chills, sweating, weakness, headache, muscle and joint pain, diarrhea, bloody stool during acute phase.	Multiple weeks	Unpasteurized milk, unpasteurized cheese, contaminated meat.	Not known to be communicable from person-to-person.	Two or more ill persons and isolation of organism in culture of blood or bone marrow; greater than fourfold increase in standard agglutination titer (SAT) over several weeks, or single SAT 1:160 in person who has compatible clinical symptoms and history of exposure.
						Call SLD General Microbiology at (505) 383-9128 for blood culture options and SLD Virology/Serology at (505) 383-9124 for antibody titer serology. Blood for testing must be separated and serum frozen.

Agent	Usual Incubation Period (Range) <sup>2,3,4</sup>	Signs and Symptoms <sup>2,3,4</sup>	Duration <sup>2,3</sup>	Associated foods <sup>2</sup>	Period of Communicability <sup>2,3</sup>	CDC criteria for outbreak confirmation <sup>5</sup>
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<i>Campylobacter</i>	2-10 days; usually 2-5 days	Diarrhea, cramps, vomiting and fever; diarrhea may be bloody.	2-10 days	Raw and undercooked poultry, unpasteurized milk, contaminated water.	Excreted for 2-7 weeks; uncommon to have person-to-person spread.	Isolation of organism from clinical specimens from two or more ill persons OR isolation of organism from epidemiologically implicated food. Contact Env. Micro section regarding food collection at (505) 383-9129.  Enteric Transport Kit. Refrigerate, must be in preservative. Must be received at SLD within 48 hours of collection. This test is included in BioFire panel, PCR multiplex. Availability based on supply and funding. Please contact SLD Bureau Chief at (505) 383-9122.
<i>Clostridium botulinum</i> (Foodborne botulism)	2 hours to 8 days; usually 12-48 hours	Vomiting, diarrhea, blurred vision, diplopia, dysphagia, descending muscle weakness.	Days to months, can be complicated by respiratory failure and death.	Home-canned foods with low acid content, improperly canned commercial foods, home-canned or fermented fish, foil-wrapped baked potatoes.	Not communicable (preformed enterotoxin)	Detection of botulinum toxin in serum, stool, gastric contents, or implicated food; or isolation of organism from stool or intestine.  Stool, serological and food testing available only through CDC. Call SLD General Microbiology at (505) 383-9128 for specimen collection and shipping requirements.
<i>Clostridium botulinum</i> (infant botulism)	3-30 days	Infants <12 months: lethargy, weakness, poor feeding, constipation, poor gag and sucking reflex.	Variable	Raw honey, home-canned vegetables and fruits, corn syrup. (Majority of cases not associated with food)	Not communicable (preformed enterotoxin).	Detection of botulinum toxin in serum, stool, gastric contents, or implicated food OR isolation of organism from stool or intestine.  Food testing available only through CDC. Call SLD Environmental Microbiology at (505) 383-9129 for food collection and transport requirements.
<i>Clostridium perfringens</i>	6-24 hours	Watery diarrhea, nausea, abdominal cramps.	24-48 hours	Meats, poultry, gravy, dried or precooked foods.	Not communicable (enterotoxin formed in vivo)	Isolation of 10 <sup>6</sup> organisms/g from stool of two or more ill persons, provided specimen is properly handle; or demonstration of enterotoxin in the stool of two or more ill persons; or isolation of 10 <sup>5</sup> organisms/g from epidemiologically implicated food, provided specimen is properly handled. May require CDC referral.

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						For stool cultures, Enteric Transport Kit (with or without preservative, must be refrigerated) must be received at SLD within 48 hours of collection. Contact Env. Micro section regarding food collection at (505) 383-9129.
Enterohemorrhagic <i>E. coli</i> (EHEC) including <i>E. coli</i> O157:H7 and other Shiga toxin-producing <i>E. coli</i> (STEC)	1-10 days; usually 3-4 days	Diarrhea that is often bloody, severe abdominal pain; fever occurs in less than 1/3 of cases.	5-10 days	Ground beef, unpasteurized milk and juice, fresh produce, ingestion of contaminated water also contact in petting zoos (sheep, deer, calves).	For the duration of excretion of the pathogen; typically a week or less in adults, but 3 weeks in 1/3 of children	Isolation of <i>E. coli</i> O157:H7 or other Shiga-like toxin-producing <i>E. coli</i> from clinical specimen from two or more ill persons; or isolation of <i>E. coli</i> O157:H7 or other Shiga-like toxin-producing <i>E. coli</i> from epidemiologically implicated food.  Enteric Transport Kit (Stool in preservative, refrigerated). Must be received at SLD within 48 hours of collection. This test is included in BioFire panel, PCR multiplex. Availability based on supply and funding. Please contact SLD Bureau Chief at (505) 383-9122. Contact Env. Micro section regarding food collection at (505) 383-9129.
Enterotoxigenic <i>E. coli</i> (ETEC)	6-48 hours	Diarrhea, abdominal cramps, nausea; vomiting and fever less common.	3-7 days or longer	Contaminated fruits, vegetables and water.	For the duration of excretion of the pathogen, this may be prolonged. (Rare in the United States, more common in infants and travelers to resource limited countries)	Isolation of organism of same serotype, demonstrated to produce heat-stable (ST) and/or heat-labile (LT) enterotoxin, from stool of two or more ill persons.  This test is included in BioFire panel, PCR multiplex. Availability based on supply and funding. Please contact SLD Bureau Chief at (505) 383-9122.
<i>Listeria monocytogenes</i>	1-6 weeks	Fever, muscle aches and nausea or diarrhea. Pregnant	Variable	Unpasteurized milk, fresh soft cheeses, ready-to-eat deli		Isolation of organism of same serotype from stool of two or more ill persons exposed to food that is epidemiologically implicated or from which organism of same serotype has been isolated.

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		women may have mild flu-like illness and infection may lead to miscarriage. High risk patients may have meningitis or sepsis. Neonates may have pneumonia, sepsis or meningitis		meats, hot dogs, melons, fruit salads.	Infected persons can shed the organism for a week to several months.	Stool culture not useful. CSF or blood serum collected and cultured at SLD. Call General Microbiology at (505) 383-9128 for more detail. Contact Env. Micro section regarding food collection at (505) 383-9129.
<i>Salmonella</i> species (non-typhi)	6 hours to 10 days; usually 6-48 hours	Diarrhea, fever, abdominal pain, nausea, headache.	4-7 days	Eggs, poultry, meat, unpasteurized milk or juice, contaminated fresh produce.	Throughout course of infection; carrier state may occur with excretion months to >1 year.	Isolation of organism of same serotype from clinical specimens from two or more ill persons OR isolation of organism from epidemiologically implicated food.  Enteric Transport Kit. (Stool in preservative, refrigerated, must be received at SLD within 48 hours of collection) This test is included in BioFire panel, PCR multiplex. Availability based on supply and funding. Please contact SLD Bureau Chief at (505) 383-9122.
<i>Salmonella typhi</i>	3-60 days; usually 7-14 days	Gradual onset of fever, headache, malaise, anorexia, abdominal pain. May have rose-colored spots on trunk, hepato-splenomegaly.	4-7 days	Food or water contaminated by feces or urine of infected patients or chronic carriers.	As long as organism is in excreta (i.e., stool or urine); 2-5% of infected persons become permanent gallbladder carriers.	Isolation of organism from clinical specimens from two or more ill persons OR isolation of organism from epidemiologically implicated food.  Enteric Transport Kit (stool in preservative, refrigerated; must be received at SLD within 48 hours of collection)
<i>Shigella spp.</i>	12 hours to 6 days; usually 2-4 days	Diarrhea (sometimes bloody), often accompanied by fever	4-7 days	Food or water contaminated by feces of infected persons. (Majority of	During acute phase of illness, and usually less than 4 weeks.	Isolation of organism of same species or serotype from clinical specimens from two or more ill persons OR isolation of organism from epidemiologically implicated food.

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		and abdominal cramps.		cases are person-to-person spread).		Enteric Transport Kit (stool in preservative, refrigerated; must be received at SLD within 48 hours of collection). This test is included in BioFire panel, PCR multiplex. Availability based on supply and funding. Please contact SLD Bureau Chief at (505) 383-9122.
<i>Staphylococcus aureus</i>	30 minutes-8 hours; usually 2-4 hours	Vomiting, diarrhea.	24-48 hours	Unrefrigerated or improperly refrigerated foods.	Not communicable (preformed enterotoxin)	Isolation of organism of same phage type from stool or vomitus of two or more ill persons OR detection of enterotoxin in epidemiologically implicated food OR isolation of 10 <sup>5</sup> organisms/g from epidemiologically implicated food, provided specimen is properly handled.  Enteric Transport Kit (stool or emesis in preservative, refrigerated; must be received at SLD within 48 hours of collection). This test is included BioFire panel, PCR multiplex. Availability based on supply and funding. Please contact SLD Bureau Chief at (505) 383-9122.
<i>Vibrio cholerae</i> , O1 or O139	1-5 days	Profuse watery diarrhea and vomiting.	3-7 days	Fish, shellfish, water or food contaminated by infected persons.	Usually a few days after recovery, except carrier state.	Isolation of toxigenic organism from stool or vomitus of two or more ill persons; OR significant rise in vibriocidal, bacterial-agglutinating, or antitoxin antibodies in acute- and early convalescent-phase sera among persons not recently immunized; OR isolation of toxigenic organism from epidemiologically implicated food.
<i>Vibrio parahaemolyticus</i>	4-30 hours	Watery diarrhea, abdominal cramps, nausea, vomiting.	2-5 days	Undercooked or raw fish or shellfish.	Not normally communicable from person-to-person.	Isolation of <i>Vibrio</i> spp. from stool of two or more ill persons; OR isolation of <i>Vibrio</i> spp from epidemiologically implicated food, provided specimen is properly handled.  Enteric Transport Kit. (Stool in preservative, refrigerated; must be received at SLD within 48 hours of collection). <i>Vibrio</i> spp. screening test is included in BioFire panel, PCR multiplex. Availability based on supply and funding. Please contact SLD Bureau Chief at (505) 383-9122. Contact Env. Micro section regarding food collection at (505) 383-9129.

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<i>Yersinia enterocolitica</i> and <i>Yersinia pseudotuberculosis</i>	1-10 days; usually 4-6 days	Appendicitis-like symptoms (diarrhea and vomiting, fever, and abdominal pain) occur primarily in older children and young adults. May have a scarlatiniform rash with <i>Y. pseudotuberculosis</i> .	1-3 weeks	Undercooked pork, unpasteurized milk, tofu, contaminated water. Infection has occurred in infants whose caretakers handled pig intestines.	Secondary transmission appears rare. There is fecal shedding as long as symptoms exist. Untreated cases may excrete organism for 2-3 months. Prolonged asymptomatic carriage has been reported in children and adults.	Isolation of organism from clinical specimen from two or more ill persons; OR isolation of pathogenic strain of organism from epidemiologically implicated food.  Enteric Transport Kit. (Stool in ETM (Cary-Blair) preservative, refrigerated; must be received at SLD within 48 hours of collection.) <i>Yersinia enterocolitica</i> is included in BioFire panel, PCR multiplex. Availability is based on supply and funding. Please contact SLD Bureau Chief at (505) 383-9122.

Viral Agents: Table of Foodborne Illnesses and Associated Clinical Characteristics <sup>1</sup>

Agent	Usual Incubation Period (Range) <sup>2,3,4</sup>	Signs and Symptoms <sup>2,3,4</sup>	Duration <sup>2,3</sup>	Associated foods <sup>2</sup>	Period of Communicability <sup>2,3</sup>	CDC criteria for outbreak confirmation <sup>5</sup>
						SLD Test Kit
Norovirus (and other caliciviruses)	12-48 hours  (median: 33 hours)	Nausea, vomiting, abdominal cramps, watery diarrhea, may include myalgia and some headache. Diarrhea is more prevalent in adults and vomiting is more prevalent in children.	16-60 hours	Shellfish harvested from contaminated waters, fecally-contaminated foods, ready-to-eat foods contaminated by infected food handlers such as salads, cookies, ice, sandwiches, fruit and leafy vegetables.	Extremely contagious, precise time when infected person is no longer contagious is unknown. Shown to be shed in stool and vomitus; viral shedding averages 4 weeks after infection and peaks 2-5 days.	<p>Detection of viral RNA in at least two bulk stool or vomitus specimens by real-time or conventional reverse transcriptase-polymerase chain reaction (RT-PCR) OR visualization of viruses (NoV) with characteristic morphology by electron microscopy in at least two or more bulk stool or vomitus specimens OR two or more stools positive by commercial enzyme immunoassay (EIA).</p> <p>Stool (preferred) and/or vomitus collected in clean container (no preservative); refrigerated specimen must be tested within 14 days of collection. <b>Do not freeze</b> Frozen specimen is acceptable, but not preferred. Specimen collected in Cary-Blair transport media is also acceptable, but must not be frozen. Keep refrigerated. Testing requires pre-approval by ERD. Results reported only to ERD. Specimen in ETM (Cary-Blair transport less than 48 hrs may be tested by BioFire panel, PCR multiplex. Availability based on supply and funding. Please contact SLD Bureau Chief at (505) 383-9122.</p>
Rotavirus (Retroviridae family; Group A most common)	1-3 days	Vomiting, fever, watery diarrhea, may result in severe dehydration in young children.	4-6 days	Foods handled by infected person, or foods prepared in proximity to diapered, ill infants; contaminated water.	During acute phase and shed up to 8 days after symptoms resolve.	<p>Demonstration of organism in stool of two or more ill persons.</p> <p>Stool in ETM less than 48 hours from collection may be tested by BioFire panel, PCR multiplex. Availability based on supply and funding. Please contact SLD Bureau Chief at (505) 383-9122.</p>
Hepatitis A	15-50 days;  (median: 28 days)	Diarrhea, dark urine, jaundice, fever, headache, nausea, and abdominal pain.	Variable; 2 weeks to 3 months	Shellfish harvested from contaminated waters, fecally-contaminated foods, ready-to-eat foods contaminated by infected food handlers.	Maximum infectivity occurs during the 1-2 weeks before illness onset and diminishes by one week after onset of jaundice.	<p>Detection of immunoglobulin M antibody to hepatitis A virus (IgM anti-HAV) in serum from two or more persons who consumed epidemiologically implicated food.</p> <p>Serologic testing available at SLD. Contact Virology/Serology at (505) 383-9124. Blood sample with serum separated off. Refrigerated serum must be tested within 7 days of collection. If shipment takes longer, specimen must be frozen at -20°C (-4°F) and shipped on dry ice.</p>

Parasitic Agents: Table of Foodborne Illnesses and Associated Clinical Characteristics <sup>1</sup>

Agent	Usual Incubation Period (Range) <sup>2,3,4</sup>	Signs and Symptoms <sup>2,3,4</sup>	Duration <sup>2,3</sup>	Associated foods <sup>2</sup>	Period of Communicability <sup>2,3</sup>	CDC criteria for outbreak confirmation <sup>5</sup>
						SLD Test Kit
<i>Cryptosporidium</i>	2-28 days (median: 7 days)	Diarrhea (usually watery), stomach cramps, upset stomach, slight fever.	May be remitting and relapsing over weeks to months.	Drinking water, food contaminated by infected food handlers.	Usually two weeks after recovery, but shedding can continue for up to two months.	<p>Demonstration of oocysts in stool or in small-bowel biopsy of two or more ill persons; OR demonstration of organism in epidemiologically implicated food.</p> <p>May forward specimens to CDC. Contact General Micro at (505) 383-9128. Stool in enteric transport media (ETM, such as Cary-Blair) received within 48 hours of collection may be tested by BioFire panel, PCR multiplex. Availability based on supply and funding. Please contact SLD Bureau Chief at (505) 383-9122.</p>
<i>Cyclospora cayetanensis</i>	1-14 days (median: 7 days)	Diarrhea (usually watery), loss of appetite, weight loss, stomach cramps, nausea, vomiting, fatigue.	May be remitting and relapsing over weeks to months.	Fresh produce, berries, lettuce, herbs.	Unknown, person-to-person transmission has not been documented.	<p>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.</p> <p>May forward specimens to CDC. Contact General Micro at (505) 383-9128. Stool in enteric transport media (ETM, such as Cary-Blair) received within 48 hours of collection may be tested by BioFire panel, PCR multiplex. Availability based on supply and funding. Please contact SLD Bureau Chief at (505) 383-9122.</p>
<i>Giardia lamblia</i>	3-25 days (median: 7 days)	Diarrhea, stomach cramps, gas.	Days to weeks	Any food contaminated by infected food handler, drinking water.	As long as the organism is excreted in stool. Symptomatic giardiasis in adults usually lasts from 2 weeks to 2 months.	<p>Demonstration of the parasite in stool or small bowel biopsy specimen of two or more ill persons.</p> <p>Stool in enteric transport media (ETM, such as Cary-Blair) received within 48 hours of collection may be tested by BioFire panel, PCR multiplex. Availability based on supply and funding. Please contact SLD Bureau Chief at (505) 383-9122.</p>
<i>Trichinella spp.</i>	1-2 days for intestinal phase; 2-4 weeks for systemic phase	Fever, nausea, diarrhea, vomiting, weakness, myalgia, periorbital edema,	May last up to 8 weeks	Infected undercooked meat, especially pork	Unknown; person-to-person transmission has not been documented	<p>Two or more ill persons and positive serologic test or demonstration of larvae in muscle biopsy; OR demonstration of larvae in epidemiologically implicated meat.</p> <p>No testing done at SLD.</p>



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						SLD Test Kit
		high eosinophil count.				

Non-infectious Agents: Table of Foodborne Illnesses and Associated Clinical Characteristics <sup>1</sup>

Agent	Usual Incubation Period (Range) <sup>2,3,4</sup>	Signs and Symptoms <sup>2,3,4</sup>	Duration <sup>2,3</sup>	Associated foods <sup>2</sup>	Period of Communicability <sup>2,3</sup>	CDC criteria for outbreak confirmation <sup>5</sup>
						SLD Test Kit
Ciguatoxin	1-48 hours; usually 2-8 hours	Usually abdominal pain, nausea, vomiting, diarrhea, followed by neurologic symptoms including paresthesias.	Variable; days to months	Large reef fish (grouper, red snapper, amberjack, and barracuda).	Not communicable.	Demonstration of ciguatoxin in epidemiologically implicated fish OR clinical syndrome among persons who have eaten a type of fish previously associated with ciguatera fish poisoning (e.g., snapper, grouper, or barracuda).  No patient testing available. Collect suspect fish and contact Environmental Microbiology at (505) 383-9129.
Scombroid toxin (histamine)	1 min-3 hours; usually 1 hour	Flushing, rash, burning sensation of skin, mouth and throat, dizziness, urticaria, paresthesias.	3-6 hours	Mishandled fish (bluefin, tuna, skipjack, mackerel, marlin, escolar and mahi mahi).	Not communicable.	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 (e.g., mahi-mahi or fish of order Scomboidei).  No patient testing available. Collect suspect fish and contact Environmental Microbiology at (505) 383-9129.
Paralytic shellfish poisoning (also referred to as Neurotoxic)	30 minutes to 3 hours	Diarrhea, nausea, vomiting leading to parasthesias of mouth, lips,	Days	Scallops, mussels, clams, cockles.	Not communicable.	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.

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						SLD Test Kit
Shellfish Poisoning)		weakness, dysphagia, dysphonia, respiratory paralysis.				No patient testing available. Collect suspect food and contact Environmental Microbiology at (505) 383-9129.
Puffer fish (tetrodotoxin)	10 min-3 hours; usually 10-45 minutes	Parasthesias, vomiting, diarrhea, abdominal pain, ascending paralysis, respiratory failure.	Death, usually in 4-6 hours	Puffer fish	Not communicable.	Demonstration of tetrodotoxin in epidemiologically implicated fish; OR clinical syndrome among persons who have eaten puffer fish.
						No patient testing available. Collect suspect food and contact Environmental Microbiology at (505) 383-9129.
Heavy metals (antimony, cadmium, copper, iron, tin, zinc)	5 min to 8 hours; usually <1 hour	Vomiting, nausea, often metallic taste.	Usually self-limited	Acidic foods or beverages prepared stored or cooked in containers coated, lined or contaminated with metal.	Not communicable.	Demonstration of high concentration of metal in epidemiologically implicated food.
						No patient testing available. Collect suspect food or metal container and contact Environmental Microbiology at (505) 383-9129.
Mushroom toxins, shorter-acting (muscimol, muscarine, psilocybin, coprinus artrementaris, ibotenic acid)	2 hours	Vomiting, diarrhea, confusion, visual disturbance, salivation, diaphoresis, hallucinations, disulfiram-like reaction.	Self-limited	Wild mushrooms	Not communicable.	Clinical syndrome among persons who have eaten mushroom identified as toxic type; OR demonstration of toxin in epidemiologically implicated mushroom or food containing mushroom.
						No patient testing available. Collect suspect food and contact Environmental Microbiology at (505) 383-9129.

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						SLD Test Kit
Mushroom toxins, longer-acting (amanitin)	6-24 hours	Diarrhea, abdominal cramps, leading to hepatic and renal failure	Often fatal	Mushrooms	Not communicable.	<p>Clinical syndrome among persons who have eaten mushroom identified as toxic type OR demonstration of toxin in epidemiologically implicated mushroom or food containing mushrooms.</p> <p>No patient testing available. Collect suspect food and contact Environmental Microbiology at (505) 383-9129.</p>

- CDC. Diagnosis and management of foodborne illness: a primer for physicians and other healthcare providers. MMWR. 2004;53(RR4):1-33. Produced collaboratively by the American Medical Association; American Nurses Association - American Nurses Foundation; Centers for Disease Control and Prevention, Center for Food Safety and Applied Nutrition, Food and Drug Administration; Food Safety and Inspection Service, US Department of Agriculture. Available at <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5304a1.htm>. Accessed November 23, 2012.
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