



# Understanding the root cause of an outbreak

## *Campylobacter* Workbook

Identifying contributing  
factors and environmental antecedents



**Integrated Food Safety**  
Centers of Excellence



# Outbreak Information

## Outbreak Identification:

On May 22<sup>nd</sup>, the health department received a complaint of illness in a group of four who had eaten together at a restaurant on May 15<sup>th</sup>. All four cases became ill with diarrhea and fever one to four days after the meal date. This was the only meal that the cases ate together leading up to the illness. Upon receiving this complaint, environmental health was contacted, and an investigation was initiated.

## Epi Findings:

Three of the four cases in the complainant's party were interviewed. Their illnesses lasted between 3 and 5 days, and symptoms included diarrhea, fever, abdominal cramps, body ache, and chills. They had eaten multiple chicken skewer dishes at the restaurant, and campylobacter was the suspected agent. The health department had previously investigated outbreaks associated with chicken consumption at the same restaurant. The health department received an additional, independent complaint, made by another diner who mentioned a *Salmonella* diagnosis, but investigators were not able to connect with that individual to interview them.



## Resources

### CIFOR OUE Agent List:

Agent Name	Median Incubation Period	Primary Signs and Symptoms	Notable Exposures
<i>Campylobacter</i> spp.	2-5 days (1-10 days)	D (may be bloody), abdominal cramps, Fever, possible N & V, Guillain-Barre Syndrome	Undercooked or raw meat or poultry; raw milk/ milk-products
<i>Salmonella</i> spp. (non-typhi)	12-36 hours (6- 72 hours)	D (can be bloody) fever, abdominal pain, N, V	

IAFP Key A. Situations that likely contributed to outbreaks of foodborne diseases when meat or poultry are implicated as vehicles:

Key A. Situations that likely contributed to outbreaks of foodborne diseases when meat or poultry were implicated as vehicles

Meat or Poultry	Farm/Field							Processing							Retail Store/Food Service/Home																							
	Contamination Issues							Contamination Issues							Contamination																							
<div>✖ = Principal Factor to Consider</div> <div>✔ = Factor to Consider</div> <div>▲ = Potential Factor to Consider</div> <div>● = Source of contamination, but likely to be destroyed during later processing</div> <div>T = Toxin Survives Heat Processes</div>	Colonized/Infected/Toxicogenic Animals	Animal Feces/Manure	Feed	Sewage	Soil/Grass/Mud	Water	Worker	Inadequate/Improper Cooling	Cross Contamination	During Cooling	Environment	Improper Cleaning of Equipment	Manipulation /Spread	Worker	Improper Hot Holding	Inadequate Refrigeration	Prolonged Storage	Room/Outdoor Temperature Holding	Heat Process Failure	Improper Cooling	Improper pH Adjustment	Improper Water Activity (a <sub>w</sub> )	Inadequate Reheating	Organism/Toxin Survives Process	Cross Contamination	During Reconstitution	Improper Cleaning of Equipment	Worker/Person	Improper Hot Holding	Inadequate Refrigeration	Prolonged Storage	Room/Outdoor Temperature Holding	Heat Process Failure	Improper Cooling	Inadequate Reheating	Organism/Toxin Survives Process		
POULTRY																																						
Bacteria																																						
Retorted	<i>Clostridium botulinum</i>	●	●				●								✔																				✔			
Heated	<i>Campylobacter jejuni</i>	●	●												✖																							
	<i>Clostridium perfringens</i>	✖	✖	▲				✖							✔																				✖			
	<i>Listeria monocytogenes</i>	●	●	●			●								✖																				✖			
	<i>Salmonella</i>	●	●	●											✔																				✖			
Cured/ Smoked/ Dried	<i>Staphylococcus aureus</i>	●					●								▲																							
	<i>Staphylococcus aureus</i>	●													▲																				▲			



## Exercise 1

Use the outbreak information and resources to answer below questions for site visit.

What practices would investigators want to observe?

What records would investigators want to review?

What might be some questions investigators would ask manager and/or food worker?



# Outbreak Information

## Environmental Findings:

- Inspectors visited the restaurant on May 27<sup>th</sup> to conduct an environmental assessment: food preparation review of the suspected food items and collect a list of additional reservations for the time frame in question. **(THINK: Why did liver make them sick?)**
- During the environmental assessment chicken liver skewers were found to be habitually undercooked, with measured temperatures of 153°F. **(THINK: Why not cooked to higher temperature?)**
- When the chef was instructed to cook the livers to 165°F, the chef said he couldn't serve those skewers because they were overcooked and dry. **(THINK: Why does the chef prioritize food quality over food safety?)**
- All other chicken dishes were at or above 165°F.
- Additionally, the employees couldn't find a metal stem thermometer **(THINK: Why not?)**, and the chef did not know the minimum cooking temperature for chicken **(THINK: Why does the chef not know about cooking temperatures?)**.
- No other hazardous food safety practices (bare hand contact, cross-contamination, etc.) were observed.



## Exercise 2A

### Determine follow-up questions and think about contributing

Based on the *think* questions from the environmental findings, what are some follow-up questions you would ask manager and/or food worker?

Which category(ies) would the contributing factor(s) fall into?  
(Contamination? Proliferation? Survival?)

Which category(ies) would the environmental antecedents fall into? (People?  
Process? Equipment? Food? Economics?)





## Exercise 2B

Determine contributing factors and environmental antecedents.

What contributing factor(s) do you suspect?

What environmental antecedent(s) do you suspect? Choose the top 3.





## Resource

Short-term	Embargo/discard/destroy product
	Require physical facility or equipment change
	Change ingredient (remove or replace)
	Change process (correct or replace)
	On-the-job training
	Fines/penalties
	Closure
	Limit menu/restrict food

Long-term	Formal training/certification
	Policy change (written or documented)
	Risk control plans
	Increase inspections
	Change supplier
	Require consultant or 3 <sup>rd</sup> party audit
	Change product (remove or replace)



## Exercise 3

### **What control measures would you implement?**

Based on contributing factors and environmental antecedents you identified what might be some short-term and long-term corrective actions you would put in place to ensure this wouldn't happen again?

How could findings from this investigation be used to influence food safety at a community or national level?



Contributing Factor Video



Environmental  
Antecedent Resources