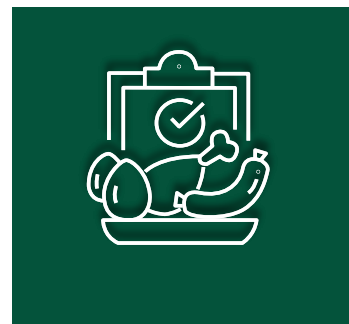




FSIS Foodborne Illness Outbreak Investigations, Fiscal Year 2021



Introduction

The United States Department of Agriculture's Food Safety and Inspection Service (FSIS), Office of Public Health Science, Applied Epidemiology Staff, coordinates the FSIS response to foodborne illness outbreaks that may involve FSIS-regulated products. This includes outbreaks that involve four foodborne pathogens that most frequently affect FSIS-regulated products: *Salmonella*, Shiga toxin-producing *Escherichia coli* (STEC), *Listeria monocytogenes* (*Lm*), and *Campylobacter*. FSIS may investigate illnesses associated with other less common foodborne pathogens (e.g., *Clostridium botulinum*) if they are associated with FSIS-regulated products.

In coordination with our public health partners (the Centers for Disease Control and Prevention (CDC) and state public health and agriculture departments), FSIS collects and evaluates epidemiologic, laboratory, and traceback information to determine if there is an association between an FSIS-regulated product and human illnesses. Epidemiologic information can include details like which foods ill people ate, where they purchased these foods, and where they live. Laboratory information can include comparing bacteria from FSIS-collected product samples and ill people to see if they are genetically similar or have similar characteristics. Traceback activities may include determining the location where the product was sold (e.g., grocery store, deli counter, or restaurant) or the source of a product (e.g., the federally inspected slaughter or processing facility). Depending on the evidence collected during an investigation, FSIS may have enough detailed exposure and product information to take one or more actions to prevent additional illnesses.

This report summarizes outbreaks that FSIS investigated from October 1, 2020 to September 30, 2021, Fiscal Year 2021 (FY 2021). This report also highlights key after-action reviews that were conducted and published in FY 2021. While the number of outbreaks FSIS investigates fluctuates annually, the COVID-19 pandemic likely decreased the number of reported foodborne illness outbreaks in FY 2021. Several factors likely played a part in this decrease, including healthcare-seeking behaviors, hygiene practices, and where consumers ate their meals. For the previous three fiscal years, the number of outbreaks investigated by FSIS are as follows: 16 in 2018, 16 in 2019, and 12 in 2020.

Fiscal Year 2021 in Review

During FY 2021, FSIS investigated nine outbreaks in coordination with local, state, and federal public health partners. These outbreaks involved approximately 200 illnesses and 60 hospitalizations. CDC notified FSIS about most of these outbreaks. Seven (77.7%) outbreaks involved illnesses in more than one state.

Of the nine outbreaks investigated by FSIS in FY 2021, *Salmonella* and STEC were each implicated in three outbreaks, with *Lm* implicated in two. The ninth investigation involved a suspected case of botulism, but neither the *botulinum* toxin nor the *Clostridium botulinum* microorganism was detected in the suspect product (Figure 1). The *Salmonella* outbreaks involved a total of four serotypes: Hadar, Enteritidis, Typhimurium, and Infantis, with both Typhimurium and Infantis in one outbreak. STEC outbreaks were caused by serogroups O157:H7 and O145. Beef was the most common food product linked to outbreaks in FY2021(Figure 2).

Figure 1: FY 2021 Outbreaks by Pathogen (N = 9)

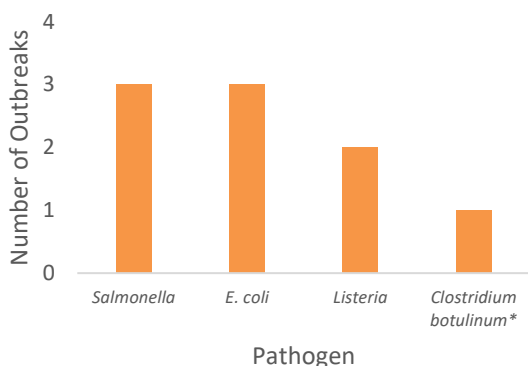
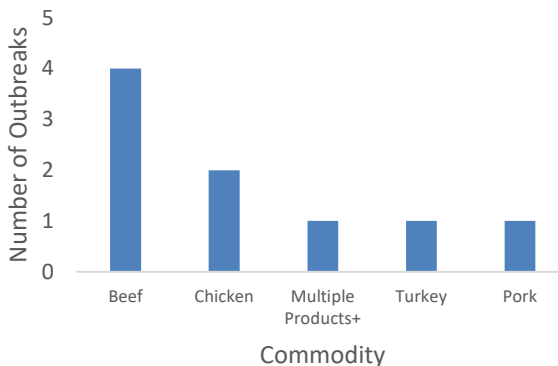


Figure 2: FY 2021 Outbreaks by Product of Interest (N = 9)



* Suspected case of botulism investigated.

+ Multiple FSIS-regulated products were investigated, and a single suspect food was not identified.

FSIS may ask an establishment to recall product from commerce to protect public health when it is found to be associated with an outbreak. A recall is a firm's removal of distributed meat or poultry products from commerce when there is a reason to believe that such products are adulterated or misbranded under the provisions of the [Federal Meat Inspection Act](#), the [Poultry Products Inspection Act](#), or [Egg Products Inspection Act](#). FSIS may issue a Public Health Alert (PHA) when the Agency determines that a meat, poultry, or egg product may be associated with human illness and no adulterated product remains in commerce or FSIS is unable to determine what specific regulated product is implicated by the illnesses and thus adulterated. In FY 2021, outbreak investigations led to three recalls of FSIS-regulated products and two PHAs.

Table 1 depicts characteristics about these outbreaks investigated in FY 2021.

Table 1. FY2021 Outbreak Characteristics

Pathogen	Serotype/ Serogroup	Commodity ^A	FSIS Isolates ^B	Non-FSIS Isolates ^C	Recall ^D	PHA ^E
Shiga toxin-producing <i>E. coli</i> (STEC)	O157:H7	Beef	No	No	No	No
	O157:H7	Beef	No	No	No	No
	O145	Beef	No	No	No	No
<i>Listeria monocytogenes</i> (Lm)		Chicken	Yes	No	Yes	No
		Multiple Products ⁺⁺	No	No	No	No
<i>Salmonella</i>	Hadar	Turkey	Yes	Yes	No	Yes
	Enteritidis	Chicken	Yes	Yes	Yes	Yes
	Typhimurium/ Infantis	Pork	No	No	Yes	No
<i>Clostridium botulinum</i> ⁺		Beef	No	No	No	No

- A) Product investigated by FSIS as possible, likely, or confirmed cause of illnesses during investigation.
- B) Isolates recovered from FSIS testing (product, cecal, or environmental) found to be related by whole genome sequencing to clinical isolates and are included in the outbreak.
- C) Isolates recovered from non-FSIS testing (product, live animal, or environmental) found to be related by whole genome sequencing to clinical isolates and are included in the outbreak.
- D) Based on available evidence, FSIS-regulated product was determined to be the cause of human illnesses and an FSIS-regulated establishment recalled product from commerce.
- E) Based on available evidence, FSIS-regulated product poses a public health risk; however, the product is no longer available for sale in commerce or FSIS is unable to determine which specific product is adulterated or misbranded.
- +) Investigation of a suspected case of botulism; however, the ill person tested negative for botulinum toxin.
- ++) Multiple FSIS-regulated products were investigated, and a single suspect food was not identified.

Learning from Outbreaks

Assessment of outbreaks associated with FSIS-regulated products is crucial to FSIS’ mission to prevent foodborne illness and to protect public health. FSIS routinely conducts after-action reviews (AAR) at the conclusion of foodborne outbreak investigations to identify lessons learned that can help improve response and prevent future illnesses. Applying and sharing outbreak lessons learned may lead to improved food safety policies and can strengthen collaborative investigations with public health partners. FSIS conducted AARs for [several FY 2021 outbreak investigations](#) to identify best practices and areas for improvement. Below are highlights from AARs that were conducted during FY 2021.

FSIS conducted an AAR for an FY 2021 outbreak of [Salmonella Enteritidis associated with raw, frozen, breaded, stuffed chicken products](#). During this outbreak, investigators noted that

consumers used a variety of cooking methods included on the manufacturer's cooking instructions label (oven) and also methods that were not included on the manufacturer's label (such as air fryers and microwaves).

- Establishments that produce raw, frozen, breaded, stuffed chicken products are encouraged to review [FSIS Labeling Policy Guidance Uncooked, Breaded, Boneless Poultry Products](#).
- FSIS brought concerns about these products to the National Advisory Committee on Meat and Poultry Inspection (NACMPI) to request advice on reducing illness. NACMPI made recommendations below for agency consideration:
 - FSIS review of labels and cooking instructions.
 - FSIS review of establishment food safety programs.
 - FSIS conduct exploratory sampling for *Salmonella* in producing establishments.

FSIS conducted an AAR for an FY 2021 outbreak of [Listeria monocytogenes associated with ready-to-eat chicken](#).

- Whole genome sequencing of isolates generated by FSIS routine sampling provided investigators with key data, highlighting the importance of these analyses to generate hypotheses related to possible food sources and inform outbreak investigations.
- Establishments that produce post-lethality exposed (i.e., products that are exposed to the environment after the lethality step such as cooking that destroys bacteria present in the raw product is complete) ready-to-eat products are encouraged to review [FSIS compliance guideline for controlling Lm](#).
- Rapid coordination and communication allowed for data sharing between FSIS, CDC, state public health partners, and industry, and facilitated the rapid response to this outbreak. FSIS was able to obtain exposure information quickly and rapidly collect and conduct traceback activities of the product for a complicated outbreak.

To see additional FSIS AAR reports and examples of how FSIS has applied outbreak lessons learned toward illness prevention, visit [Foodborne Outbreak Investigation Outcomes - Response and Prevention](#).

Contact and Questions

For more information, contact [askFSIS](#).