Food Safety and Inspection Service
U.S. DEPARTMENT OF AGRICULTURE

FSIS Foodborne Illness Outbreak Investigations, Fiscal Year 2022

Introduction

The U.S. 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 potentially associated with FSIS-regulated products.

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 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. These actions may include requesting that a company remove product from commerce and FSIS issuing a press release announcing that a firm is recalling meat, poultry, or egg products linked to human illnesses or FSIS notifying the public of potential food safety concerns through the issuance of a Public Health Alert (PHA).

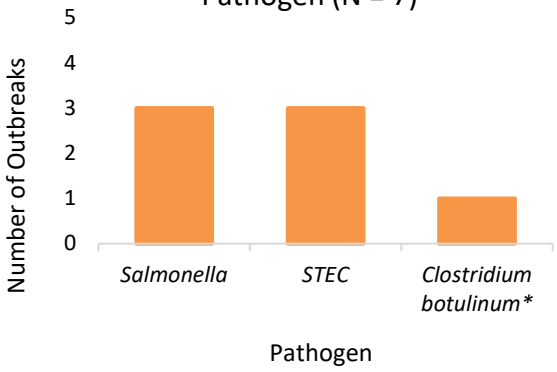
This report summarizes outbreaks that FSIS investigated from October 1, 2021, to September 30, 2022, Fiscal Year 2022 (FY 2022). This report also highlights key lessons learned from outbreak investigations in FY 2022.

Fiscal Year 2022 in Review

During FY 2022, FSIS investigated seven outbreaks in coordination with local, state, and federal public health partners. These outbreaks involved approximately 120 illnesses and 30 hospitalizations. The Centers for Disease Control and Prevention (CDC) notified FSIS of six (86%) of these outbreaks. FSIS became aware of the seventh outbreak by notification from a state public health agency. Five (71.4%) outbreaks involved illnesses in more than one state.

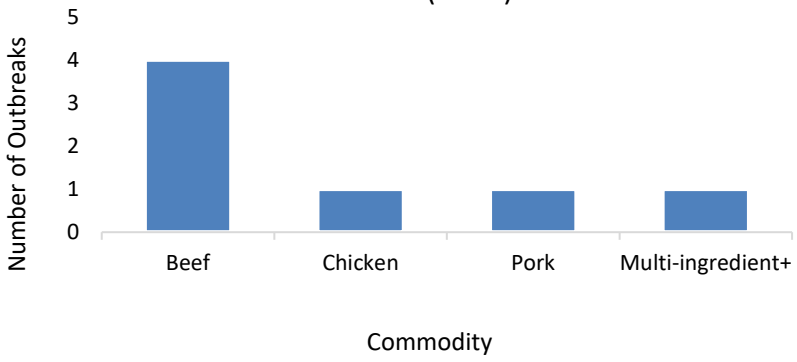
Of the seven outbreaks investigated by FSIS in FY 2022, *Salmonella* and STEC each caused three outbreaks. The seventh investigation involved a botulism illness where FSIS investigated commercially canned soup as a potential source (Figure 1). Given botulism's potential to cause outbreaks and the severity of illness, FSIS investigates reports of one or more botulism illnesses that may be associated with FSIS-regulated products and includes those investigations in the Agency's annual outbreak report. Of the non-botulism pathogens causing investigations, the three *Salmonella* outbreaks investigated involved serotypes Enteritidis, Muenchen, and I 4,[5], 12: i-. The three STEC outbreaks were all caused by the serogroup O157:H7. Beef was the most common food product of interest (Figure 2).

Figure 1. FY 2022 Outbreaks by Pathogen (N = 7)



** FSIS investigated a case of botulism and a commercially canned soup was a suspected source*

Figure 2. FY 2022 Outbreaks by Product of Interest (N = 7)



+ Product investigated was canned soup that contained multiple ingredients, including chicken, rice, and vegetables

FSIS may ask an establishment to voluntarily recall product from commerce to protect public health when the product is found to be associated with an outbreak. A recall is a firm's removal of distributed meat, poultry, or egg 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 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. FSIS

may also issue a PHA when the Agency is unable to determine what specific regulated product is implicated by the illnesses and thus adulterated. In FY 2022, outbreak investigations led to one recall of FSIS-regulated products and two PHAs.

Table 1 depicts characteristics about these outbreaks investigated in FY 2022, including information on the serotype/serogroup, product of interest, whether FSIS or non-FSIS samples were genetically related to human illnesses, and if the available outbreak information resulted in a recall of FSIS-regulated products from commerce or a PHA to prevent additional illnesses.

Table 1. FY 2022 Outbreak Characteristics

Pathogen	Serotype/ Serogroup	Commodity[A]	FSIS Isolates[B]	Non FSIS Isolates[C]	Recall[D]	PHA[E]
STEC	O157:H7	Beef	No	No	No	Yes
	O157:H7	Beef	No	No	No	No
	O157:H7	Beef	No	No	No	No
Salmonella	Enteritidis	Chicken	Yes	Yes	No	No
	Muenchen	Beef	Yes	Yes	No[+]	No
	I 4,[5],12:i-	Pork	Yes	No	Yes	Yes
Clostridium botulinum[++]		Multi-ingredient product[+++]	No	Yes[++]	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 or another testing method 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 and FSIS issued a PHA to notify the public.
+) Recall of a non-FSIS regulated pet food product occurred during the outbreak investigation as a result of a sample that tested positive, however the isolate did not match the outbreak strain and the recalled product was not linked to human illness.
++) Investigation of a case of botulism; botulinum toxin was detected in the patient's blood and an empty soup can recovered from the kitchen trash can.
+++) The product investigated was canned soup that contained multiple ingredients, including chicken, rice, and vegetables.

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 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 and published AAR Reports for several FY 2022 outbreak investigations to identify best practices and areas for improvement. Below are highlights from some of the AARs conducted during FY 2022.

FSIS investigated a *Salmonella* outbreak linked to Italian-style meats. The AAR report summarizes findings and lessons learned from two outbreaks linked to ready-to-eat, Italian-style meat products that were produced using multiple interventions (e.g., fermentation and drying) to control *Salmonella* and other bacteria that can make people sick. FSIS conducted assessments at the establishments where the products associated with these outbreaks were produced and identified factors that may have contributed to the outbreaks, including the use of a reduced salt formulation and lack of validated scientific support to achieve a 5-log reduction in *Salmonella*. A 5-log reduction in *Salmonella* means that the process will result in a 99.999% reduction of *Salmonella* that may be present in the raw meat, spices, and other ingredients used to make salami. FSIS has determined this level of reduction in shelf-stable products like salami will result in a safe product at the end of the process. FSIS is working with research partners to fill data gaps and better identify support for the safety of these products.

FSIS investigated a *Clostridium botulinum* illness potentially associated with commercially canned soup. Botulinum toxin type A was identified in both the patient and an empty soup can collected from the kitchen trash can in the patient's home. FSIS' investigation of the establishment where the soup was produced, including laboratory results of similar cans tested, did not confirm that the soup was the source of the illness. This appears to have been an isolated incident and underscores the importance of public awareness regarding hazards associated with eating food from damaged or dented cans. This investigation highlights the importance of a quick response and good collaboration between state and federal public health partners involving an uncommon bacterium (*C. botulinum*). Continuing to foster relationships with public health partners will enable FSIS to continue to quickly respond to potential outbreaks in the future.

To learn more about outbreaks and to see examples of how FSIS has applied outbreak lessons learned toward illness prevention, visit the FSIS Outbreaks webpage.