LFFM Year 2 Microbiology Surveillance Outcomes

The Laboratory Flexible Funding Model (LFFM) is a cooperative agreement intended to enhance the capacity and capabilities of state human and animal food testing laboratories in support of an integrated food safety system.

LFFM activities are organized into distinct project areas, called tracks, some of which involve surveillance of human and animal foods for microbiological and chemical hazards (e.g., testing enoki mushrooms for *L. monocytogenes*, or pet foods for *Salmonella*). The following information summarizes accomplishments for the Microbiology Human and Animal Food (M-HAF) Product Testing Tracks from 31 state laboratories between July 1, 2021, and June 30, 2022 (year two of the five-year LFFM cooperative agreement).

How many samples were collected and analyzed?

A total of 10,786 samples were collected with 13,199 analyses in the M-HAF Product Testing Tracks for LFFM Year 2. This represents 105% of the 10,300 samples planned for year two.

Testing Area	Total Number of Samples Collected and Analyzed
Human Food	7,728
Animal Food	3,058

Who collected the samples?

Samples are collected for a variety of reasons, including, but not limited to a state-proposed sample plan, emergency response and outbreak situations, or an FDA assignment. Most samples are collected and analyzed by state agencies, but samples may also be collected by other organizations (e.g., the FDA or a third party under contract) and submitted to participating laboratories for analysis.

Collecting Organization	Human Food	Animal Food
State Laboratory	1,855 (24%)	582 (19%)
State Regulatory Program	5,757 (74%)	2,476 (81%)
FDA	30 (0.4%)	--
Third Party (e.g., contract with IEH Laboratories)	86 (1%)	--

Collection Location (Facility Type)	Human Food	Animal Food
Retailer	6,998 (91%)	2,529 (83%)
Distributor, Manufacturer or Grower	730 (9%)	529 (17%)

What pathogens were the samples analyzed for?

Analytical results were reported for *Salmonella*, *Listeria monocytogenes*, *E. coli* O157:H7 and other STECs, *Cyclospora cayetanensis*, *Cronobacter sakazakii*, *Norovirus*, and prohibited materials (i.e., mammalian protein in foods for ruminant animals). Some samples were analyzed for more than one pathogen.

Pathogen of Interest	Total # Samples Analyzed	Total Confirmed Positive
Salmonella species	8,158	61
Listeria monocytogenes	3,219	33
Enterohemorrhagic *Escherichia coli (EHEC)*	948	0
Cyclospora cayetanensis	272	1

LFFM Year 2 Microbiology Surveillance Outcomes

Pathogen of Interest	Total # Samples Analyzed	Total Confirmed Positive
Prohibited materials[1]	428	1
Norovirus	40	8
Cronobacter sakazakii	128	4
Other organisms of interest (e.g., *S. aureus, B. cereus*)	6	1

Of the 98 confirmed positive *Salmonella*, *L. monocytogenes,* and *Cronobacter sakazakii* positive samples, isolates from all 98 samples were sequenced and submitted to the National Center for Biotechnology Information. LFFM's Whole Genome Sequencing track supports state laboratory participation in GenomeTrakr.

What human and animal food products were tested and what were the findings?

LFFM sampling is planned by food product (commodity), along with the pathogens (hazards) the food product will be analyzed for (referred to as "commodity-hazard pairs"). Commodity-hazard pairs may be proposed by FDA or the state; sampling plans are developed as a collaborative effort between FDA and state agencies. States may pivot planned sampling to address emerging and urgent needs such as outbreaks and other emergency response situations, and may add additional pathogens at their discretion. For example, multiple states tested powdered infant formula for *C. sakazakii* in response to the national recall (learn more about how LFFM supported the national response). Multiple laboratories may participate in any given commodity-hazard pair, and it is common for a single physical sample to be analyzed for more than one pathogen. The below tables are sorted by pathogen, followed by total number of samples analyzed, then percent detected.

Animal Food Commodity-Hazard Pairs

Commodity	Hazard	Total # Samples Analyzed	Total # of Samples Positive
Meat and Bone Meal	*Salmonella*	118	35 (29%)
Fish Meal	*Salmonella*	51	8 (16%)
Soybean Meal	*Salmonella*	175	9 (5%)
Poultry Food	*Salmonella*	553	6 (1%)
Dog Food	*Salmonella*	662	0 (0%)
Cat Food	*Salmonella*	591	0 (0%)
Dog and Cat Treats	*Salmonella*	477	0 (0%)
Dog Food	*E. coli O157:H7*	54	0 (0%)
Cat Food	*E. coli O157:H7*	51	0 (0%)
Dog and Cat Treats	*E. coli O157:H7*	43	0 (0%)
Poultry Food	*E. coli O157:H7*	20	0 (0%)
Poultry Food	*L. monocytogenes*	3	0 (0%)
Ruminant Food or Ingredients	Prohibited materials (mammalian protein)	428	1 (0%)

[1] Prohibited materials testing involves detection of prohibited mammalian protein in foods for ruminant animals, as addressed by 21 CFR Part 589.2000 and 589.2001. Some mammalian proteins, such as milk, are allowed to be fed to ruminants, and positive samples are typically followed-up by investigation into what triggered the initial result and whether the sample is truly violative.

LFFM Year 2 Microbiology Surveillance Outcomes

Human Food Commodity-Hazard Pairs

Commodity	Hazard	Total # Samples Analyzed	Total # of Samples Positive
Tahini products	*Salmonella*	254	3 (1%)
Cereals/granolas (packaged, ready-to-eat)	*Salmonella*	1,076	0 (0%)
Dips, salsas, mixes, spreads (ready-to-eat, multi-commodity, may include: hummus, vegetables, cheese, and/or seafood)	*Salmonella*	688	0 (0%)
Onion (raw, whole)	*Salmonella*	512	0 (0%)
Cashews	*Salmonella*	459	0 (0%)
Products containing Nut Butters	*Salmonella*	443	0 (0%)
Leafy greens (e.g., iceberg, spinach, microgreens, other leafy greens)	*Salmonella*	369	0 (0%)
Sprouted seeds/nuts and related products (ready-to-eat)	*Salmonell*a	313	0 (0%)
Hazelnuts (or other tree nuts)	*Salmonella*	292	0 (0%)
Tomatoes	*Salmonella*	270	0 (0%)
Stone fruit (peaches)	*Salmonella*	269	0 (0%)
Melon (cut, fresh)	*Salmonella*	233	0 (0%)
Milk (dried)	*Salmonella*	136	0 (0%)
Powdered Infant Formula	*Salmonella*	85	0 (0%)
Cheese (various types, ready-to-eat)	*Salmonella*	79	0 (0%)
Miscellaneous products in import status	*Salmonella*	28	0 (0%)
Apples	*Salmonella*	25	0 (0%)
Miscellaneous products in import status	*L. monocytogenes*	21	4 (19%)
Apples	*L. monocytogenes*	33	3 (10%)
Mushrooms (specialty, enoki, wood ear)	*L. monocytogenes*	263	17 (6%)
Stone fruit (peaches)	*L. monocytogenes*	325	9 (3%)
Dips, salsas, mixes, spreads (ready-to-eat, multi-commodity, may include: hummus, vegetables, cheese, and/or seafood)	*L. monocytogenes*	1,120	0 (0%)
Cheese (various types, ready-to-eat)	*L. monocytogenes*	525	0 (0%)
Cereals/granolas (packaged, ready-to-eat)	*L. monocytogenes*	306	0 (0%)
Leafy greens (e.g., iceberg, spinach, microgreens, other leafy greens)	*L. monocytogenes*	203	0 (0%)
Melon (cut, fresh)	*L. monocytogenes*	196	0 (0%)
Smoked fish	*L. monocytogenes*	143	0 (0%)
Cashews	*L. monocytogenes*	44	0 (0%)
Tahini products	*L. monocytogenes*	14	0 (0%)
Products containing Nut Butters	*L. monocytogenes*	13	0 (0%)
Hazelnuts (or other tree nuts)	*L. monocytogenes*	10	0 (0%)

LFFM Year 2 Microbiology Surveillance Outcomes

Commodity	Hazard	Total # Samples Analyzed	Total # of Samples Positive
Leafy greens (e.g., iceberg, spinach, microgreens, other leafy greens)	*E. coli O157:H7*	449	0 (0%)
Sprouted seeds/nuts and related products (ready-to-eat)	*E. coli O157:H7*	221	0 (0%)
Melon (cut, fresh)	*E. coli O157:H7*	78	0 (0%)
Cheese (various types, ready-to-eat)	*E. coli O157:H7*	26	0 (0%)
Dips, salsas, mixes, spreads (ready-to-eat, multi-commodity, may include: hummus, vegetables, cheese, and/or seafood)	*E. coli O157:H7*	6	0 (0%)
Leafy greens (e.g., iceberg, spinach, microgreens, other leafy greens)	*Cyclospora cayetanensis*	206	1 (0%)
Raspberries (fresh)	*Cyclospora cayetanensis*	66	0 (0%)
Cheese (ready-to-eat)	*Cronobacter sakazakii*	1	0 (0%)
Powdered Infant Formula[2]	*Cronobacter sakazakii*	127	4 (3%)
Molluscan Shellfish	*Norovirus*	39	8 (21%)
Mushrooms (specialty, enoki, wood ear)	*Norovirus*	1	0 (0%)
Cereal (packaged, ready-to-eat)	*B. cereus*	4	0 (0%)
Cheese (raw milk cheese)	*S. aureus*	2	1 (50%)

What public health interventions resulted from positive samples?

This table lists public recalls and consumer advisories that resulted from LFFM positive samples in year two. Follow-up investigation activities are conducted for all positive samples, regardless of whether a recall occurred. Not all positive samples are violative or result in a recall. Follow-up investigation activities include notifying the responsible firm, discussing preventive measures and corrective actions with the firm, document collection/traceback, collecting additional samples, adding firms to import alert, and/or conducting an investigation at the facility.

Type of Notice	Link	Commodity	Hazard
State partner consumer advisory	MDARD - MDARD Issues Consumer Advisory for Certain Enoki Mushrooms (michigan.gov)	Enoki mushroom	*L. monocytogenes*
Recall	Golden Medal Mushroom Inc. Recalls Enoki Mushrooms Because of Possible Health Risk | FDA	Enoki mushroom	*L. monocytogenes*
Recall	Jan Fruits Inc. Recalls Enoki Mushrooms Because of Possible Health Risk	Enoki mushroom	*L. monocytogenes*
Recall	Concord Farms Recalls Enoki Mushrooms Due to Possible Health Risk	Enoki mushroom	*L. monocytogenes*
Recall	WISETRADE CORPORATION RECALLS ENOKI MUSHROOMS BECAUSE OF POSSIBLE HEALTH RISK	Enoki mushroom	*L. monocytogenes*
Recall	Farm Fresh Produce LLC Recalls "TWA Agriculture Mixed Mushrooms" Because of Possible Health Risk	Enoki mushroom	*L. monocytogenes*

[2] Positive samples were opened containers collected from consumer homes. These samples were collected/analyzed after the recall was already in effect and the product tested was subject to the recall.

LFFM Year 2 Microbiology Surveillance Outcomes

Type of Notice	Link	Commodity	Hazard
Recall	Top Quality Produce, Inc. Recalls Enoki Mushroom Because Of Possible Health Risk	Enoki mushroom	*L. monocytogenes*
Recall	T Fresh Company of City of Industry, CA is Recalling its 7.5oz (200g) Yes! Enoki Mushrooms Due to Possible Health Risk	Enoki mushroom	*L. monocytogenes*
State partner consumer advisory	State Health Officials Warns Consumers Not to Eat Specific Brands of Imported Enoki and Mixed Mushrooms Because They May Cause Illness	Enoki mushroom	*L. monocytogenes*
Recall	Brookshire Grocery Company Recalls Yellow Flesh Peaches Because of Possible Health Risk | FDA	Peaches	*L. monocytogenes*
Recall	International Golden Foods, Inc (IGF) Recalls Tahini Because of Possible Health Risk | FDA	Tahini	*Salmonella*
Recall	Rushdi Foods Issues a Voluntary Recall on One Lot of their Mighty Sesame Organic Tahini 10.9 oz Squeeze Bottle | FDA	Tahini	*Salmonella*
State partner consumer advisory	MDA Issues Consumer Advisory for Ocean Mist Brand Romaine Hearts Cyclospora found during routine product testing	Romaine	*Cyclospora*