USDA Food Safety and Inspection Service
Annual Sampling Summary Report
Fiscal Year 2022

U.S. Department of Agriculture Food
Safety and Inspection Service

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Introduction

The U.S. Department of Agriculture's Food Safety and Inspection Service (FSIS) inspects meat, poultry, and egg products to ensure that the food produced is safe, wholesome, and properly labeled. Verification activities serve to protect the public from foodborne hazards. A key FSIS inspection verification activity is the sampling of product for microbiological contaminants or chemical residues.

Each new fiscal year (FY), FSIS develops its Annual Sampling Plan in alignment with the Agency's Strategic Plan goals, outcomes, objectives and measures, as well as the Agency's Annual Plan. The Annual Sampling Plan identifies changes planned to FSIS sampling programs and describes the Agency's overall strategy for directing its sampling resources. This report, the FY 2022 Annual Sampling Summary Report, summarizes the activities and provides an overview of results for the products the Agency sampled during FY 2022 (October 1, 2021 – September 30, 2022).

FSIS routinely evaluates sampling data, posts these data (including establishment-specific datasets) to the FSIS website, and shares data through quarterly letters directly with regulated establishments. These data include FSIS pathogen verification data, FSIS National Residue Program data, and import data. These data are used in a variety of ways, including monitoring the effectiveness of Hazard Analysis and Critical Control Points plans, informing Agency policymaking, estimating public health impact, and advising strategic and performance planning.

Summary of Sampling

Each sampling project has a unique description name and alphanumeric data system code; both are commonly used when discussing sampling projects and are included in this report. For microbiological analyses, FSIS analyzes sampling data and calculates either percent positive or prevalence. "Percent positive" is defined as the percentage of samples of a specific FSIS-regulated product where a specific pathogen is detected. "Prevalence" is defined as the estimated proportion, nationally, of a specific FSIS-regulated product with a specific pathogen. In FY 2022, microbiological sampling results include *Salmonella* isolates, the top three serotypes, associated with given FSIS-regulated products. Additionally, sanitary indicator organisms (Aerobic and Enterobacteriaceae) are summarized for applicable commodities in this report. More information on sampling definitions can be found on the FSIS website sampling results data dictionary.

This report separates sampling results into various sections: domestic microbiological sampling, domestic chemical residue sampling as conducted through the National Residue Program, import sampling, and all other sampling. FSIS continues to focus on its mission to protect public health and prevent foodborne illness in several different ways. Each section in the report below identifies any new sampling activities designed to further food safety and policy changes.

1. Domestic Microbiological Sampling

Raw Beef Products

FSIS collects raw beef samples from Federally inspected establishments and retail firms to verify that products are not adulterated and that establishments have systems in place to address pathogens. FSIS schedules sample collection monthly by randomly selecting establishments from the current population that produces eligible products. The frequency of sampling at any establishment is based on the volume of eligible products (FSIS Directive 10,010.1). FSIS analyzes raw beef products from establishments for

Escherichia coli (*E. coli*) O157:H7, non-O157 Shiga toxin-producing *E. coli* (STEC), and *Salmonella* and samples from retail for *E. coli* O157:H7 and *Salmonella* (**Table 1**).

Follow-up samples are a tool FSIS uses to verify whether the establishment has taken effective corrective action in response to the initial STEC positive detected through routine FSIS verification testing. FSIS collects raw beef follow-up samples in response to a STEC-positive finding from routine sampling. FSIS analyzes ground beef follow-up samples for *E. coli* O157:H7 and *Salmonella.* FSIS analyzes beef trim follow-up samples for *E. coli* O157:H7, non-O157 STEC, and *Salmonella.* For ground beef product or bench trim samples that are positive for STEC, FSIS also collects follow-up samples from suppliers when suppliers provide source materials (**Table 4**). Follow-up samples may also be collected at retail and tested for *E. coli* O157:H7 and *Salmonella* in response to a positive result.

For more information on source materials sampled, the sample project summary, sample method, and product sampled see the FSIS Directive 10,010.1 Informational Dashboard and select the appropriate sample code for more information.

Table 1. FSIS' Raw Beef Verification Sampling

FSIS has five verification sampling codes and corresponding follow-up sampling codes

Raw Beef Sampling Verification Code	Sample Project Description	Corresponding Follow-Up Sampling Code
MT43	Raw ground beef	MT53 or MT44[1]
MT60	Beef manufacturing trimmings produced from cattle slaughtered onsite	MT53
MT64	Raw ground beef components other than trim, produced from cattle slaughtered onsite	MT53
MT65	Bench trim produced from cattle not slaughtered onsite	MT52 or MT53
MT05	Raw ground beef in commerce	MT06

[1]FSIS also conducts MT44T follow-up sampling for positive samples not from FSIS verification sampling (e.g., traceback related to outbreaks).

Table 2. FY 2022 Summary of FSIS' Raw Beef Verification Sampling Programs

FY 2022 results for FSIS' five verification sampling codes for detecting *E. coli* O157:H7 and/or non-O157 STECs (including O23, O45, O103, O111, O121, and O145) and *Salmonella* (including the top 3 serotypes for each sampling project) in raw beef product samples.

Product Name and Project Code	Pathogen	Number of Establishments Sampled	Number of Samples Analyzed	Number Positive	Top 3 *Salmonella* serotypes per sampling project[1]	Type of Calculation[2]	Prevalence or Percent Positive Calculation
Raw Ground Beef MT43	*E. coli* O157:H7	1,243	10,737	5	N/A	Prevalence	0.01%
	Salmonella spp.	1,243	10,738	186	Montevideo (26) 14.0% Infantis (20) 10.8% Anatum (16) 8.6%	Prevalence	2.76%
Beef Manufacturing Trim MT60	*E. coli* O157:H7	545	3,713	3	N/A	Prevalence	0.001%
	non-O157 STEC	542	3,667	22	N/A	Prevalence	0.34%
	Salmonella spp.	545	3,714	82	Montevideo (16) 19.5% Anatum (10) 12.2% Dublin (6) 7.3%	Prevalence	1.94%
Raw Ground Beef Components other than Trim MT64	*E. coli* O157:H7	128	1,352	6	N/A	Percent Positive	0.44%
	Salmonella spp.	128	1,352	54	Anatum (11) 20.4% Montevideo (8) 14.8% Muenster (5) 9.3%	Percent Positive	3.99%
Bench Trim MT65	*E. coli* O157:H7	487	1,459	1	N/A	Percent Positive	0.07%
	Salmonella spp.	487	1,459	3	Anatum (1) 33.3% Brandenburg (1) 33.3% Cerro (1) 33.3%	Percent Positive	0.21%
Raw Ground Beef In-Commerce MT05[3]	*E. coli* O157:H7	524	525	0	N/A	Percent Positive	0%
	Salmonella spp.	524	525	11	Infantis (2) 18.2% Enteritidis (1) 9.1% Mbandaka (1) 9.1%	Percent Positive	2.1%

1 Percent of each serotype = (Number of isolates of the serotype/total number of *Salmonella* from the sampling project). The numerator is within parentheses.
2 Percent positive is 100*(the total number of positive samples divided by the total number of tested samples). Prevalence is a calculated percentage that takes into account establishment production volumes and the volume of contaminated product. See the sampling results data dictionary on the FSIS website for a detailed description of prevalence.
3 MT05 ground beef samples are collected from retail firms, not Federal establishments.

Table 3. FY 2022 Summary of FSIS' Beef Sanitary Indicator Organisms

FY 2022 results for FSIS' beef sanitary indicator organisms (Aerobic plate count MPN/ml) in raw beef product samples.

Product Name and Project Code	Number of Establishments Sampled	Number of Samples Analyzed	Number of Samples Detected	Mean Plate Count[1] (MPN/mL)	Percent Detection[2]
Sampling of Beef Manufacturing Trimmings MT60	422	1,536	695	3.7×10^4	45.2%
Cloth Sampling of Beef Manufacturing Trimmings MT60_CLOTH	422	1,531	1,200	1.4×10^5	78.4%
Beef Slaughter Waiver Sampling - Post-intervention/Pre-chill MT_PRECH	5	279	110	2.5×10^3	39.4%
Beef Slaughter Waiver Sampling - Pre-evisceration/Post-hide removal MT_PSTHR	5	279	267	4.1×10^4	95.7%

1 Mean of the results of every sample (greater than 10 MPN/ml) in countable range with +/- std).
2 Percent detection (% of samples greater than 10 MPN/ml detected over number of positive samples divided by the total number of tested samples).

Table 4. FY 2022 Summary of FSIS' Beef Follow-Up Sampling Programs

FY 2022 follow-up testing results in raw beef product samples in response to samples positive for either *E. coli* O157:H7 or non-O157 STEC in the verification sampling projects are shown.

Product Name and Project Code[1]	Pathogen	Number of Establishments Sampled	Number of Samples Analyzed	Number Positive	Percent Positive Calculation
Raw Ground Beef MT44	*E. coli* O157:H7	2	31	0	0.0%
	Salmonella spp.	2	31	0	0.0%
Trim and Components MT52	*E. coli* O157:H7	4	41	0	0.0%
	non-O157 STEC	4	41	0	0.0%
	Salmonella spp.	4	41	4	9.76%
MT44T	*E. coli* O157:H7	6	54	1	1.85%
	non-O157 STEC	6	54	0	0.0%
	Salmonella spp.	6	54	1	1.85%
Beef Manufacturing Trim MT53	*E. coli* O157:H7	36	534	0	0.0%
	non-O157 STEC	34	472	2	0.42%
	Salmonella spp.	36	534	14	2.62%

[1]No MT06 samples were collected in FY 2022.

Raw Pork Products

FSIS tests raw pork products samples for *Salmonella* and aerobic count indicator organisms. FSIS began sampling raw pork products in May 2015 (80 FR 3940) to test for pathogens of public health concern. In 2019, FSIS focused sample collection on eligible establishments producing greater than 6,000 pounds of comminuted product and eligible establishments producing greater than 50,000 pounds per day of pork cuts, both intact and non-intact (**Table 5**).

Table 5. FSIS' Raw Pork Sampling

FSIS has two raw pork sampling codes. FSIS does not conduct follow-up sampling for pork products.

Raw Pork Sampling Code	Sample Project Description	Establishment Volume
HC_PK_CUT01	Intact and Non-Intact Pork Cuts	1,001 – 50,000 lbs/day
HC_PK_CUT01	Intact and Non-Intact Pork Cuts	>50,000 lbs/day
HC_PK_COM01	Comminuted Pork	1,0001 – 6,000 lbs/day
HC_PK_COM01	Comminuted Pork	>6,000 lbs/day

Table 6. FY 2022 Results for FSIS' Raw Pork Sampling Program

FY 2022 results for exploratory sampling in raw pork products to detect *Salmonella* are shown below. This is considered exploratory sampling because FSIS is evaluating the results to inform future policy or procedures. FSIS does not take action in response to exploratory sampling results.

Product Name and Project Code	Pathogen	Number of Establishments Sampled	Number of Samples Analyzed	Number Positive	Top 3 *Salmonella* serotypes per sampling project[1]	Percent Positive Calculation
Comminuted Pork HC_PK_COM01	*Salmonella* spp.	302	6,356	1,218	Anatum (178) 14.6% Infantis (103) 8.5% I 4,[5],12:i:- (97) 7.9%	19.16%
Intact and Non-Intact Pork Cuts HC_PK_CUT01	*Salmonella* spp.	101	2,354	184	I 4,[5],12:i:- (25) 13.6% Infantis (20) 10.9% Derby (16) 8.7%	7.82%

[1] Percent of each serotype = (Number of isolates of the serotype/total number of *Salmonella* from the sampling project). The numerator is within parentheses.

Table 7. FY 2022 Summary of FSIS' Raw Pork Sanitary Indicator Organisms

FY 2022 results for FSIS' pork sanitary indicator organisms (Aerobic plate count MPN/g) in raw pork product samples.

Product Name and Project Code	Number of Establishments Sampled	Number of Samples Analyzed	Number of Samples Detected	Mean Plate Count[1] (MPN/g)	Percent Detection[2]
Comminuted Pork HC_PK_COM01	302	6,313	6,303	8.0×10^4	99.8%
Intact and Non-Intact Pork Cuts HC_PK_CUT01	101	2,347	2,346	3.5×10^4	99.9%

1 Mean of the results of every sample (greater than 10 MPN/g) in countable range with +/- std).
2 Percent detection (% of samples greater than 10 MPN/g detected over number of positive samples divided by the total number of tested samples).

Raw Siluriformes Products

FSIS began sampling raw fish of the order Siluriformes in May 2016 (FSIS Directive 14,010.1) for *Salmonell*a. In April 2022, FSIS published a report, Data Summary of Siluriformes Fish Testing: A Five-Year Review, FY 2016-2020, which describes the decline in *Salmonella* and chemical residues in Siluriformes fish during 5 years (2016-2022). Based on consumer cooking practices, lack of recent outbreaks attributed to Siluriformes fish, and low percent positives detected, FSIS announced the suspension (July 13, 2022) of its current FSIS *Salmonella* sampling program for Siluriformes fish and fish products.

Table 8. FY 2022 Siluriformes Sampling Results

FY 2022 results for FSIS exploratory raw Siluriformes product sampling are shown. This program is exploratory because FSIS does not take any action in response to these results and is evaluating them to inform future policy or procedures. Samples are collected monthly from eligible establishments.

Product Name and Project Code	Pathogen	Number of Establishments Sampled	Number of Samples Analyzed[1]	Number Positive	Top 3 *Salmonella* serotypes per sampling project[2]	Percent Positive Calculation
Raw Siluriformes EXP_FI_MIC01	*Salmonella* spp.	71	464	10	Typhimurium (4) 40.0% Newport (2) 20.0% Braenderup (1) 10.0%	2.16%

[1] The sampling program was suspended in July 2022, so the number of samples only represents 7 months of production
[2] Percent of each serotype = (Number of isolates of the serotype/total number of *Salmonella* from the sampling project). The numerator is within parentheses.

Raw Poultry Products

FSIS samples Federally inspected establishments to verify whether eligible products meet applicable *Salmonella* performance standards (81 FR 7285).[1] Eligible products were scheduled for sampling 1 to 5 times per month throughout the year (based on volume of product produced at establishments), thereby allowing FSIS to define a category[2] for each product, based on 10 to 60 sample results. All samples are tested for *Salmonella* and *Campylobacter* (**Table 9**). Other products (quarter or half chicken carcasses and mechanically separated chicken and turkey) were also sampled but at lower numbers per establishment (**Table 9**). These other products are under exploratory sampling and not under performance standards. In April and August 2022, FSIS revised the Young Chicken Carcass Exploratory Sampling Program (FSIS Notice 21-22 which was replaced by FSIS Notice 44-22). The notices added a new hot rehang sampling point to collect information on aerobic counts, *Salmonella* presence and enumeration for comparison with the existing post-chill sampling location.

[1] Product eligibility described at FSIS Establishment Eligibility Criteria for the Salmonella Verification Sampling Program and FSIS Scheduling Algorithm for the Salmonella Verification Sampling Program for Raw Meat and Poultry (usda.gov)

[2] Salmonella Verification Testing Program Monthly Posting | Food Safety and Inspection Service (usda.gov)

Table 9. FY 2022 Sampling Result Summary for FSIS' Raw Poultry Sampling Programs

FY 2022 sampling results for *Salmonella* and *Campylobacter* in raw poultry product samples are shown. Results do not include follow-up sample data.

Product Name and Project Code	Pathogen	Number of Establishments Sampled	Number of Samples Analyzed	Number Positive	Top 3 *Salmonella* serotypes per sampling project[1]	Type of Calculation	Prevalence or Percent Positive Calculation
Chicken Whole Carcasses HC_CH_CARC01	*Salmonella* spp.	206	9,652	400	Kentucky (188) 47.0% Infantis (68) 17.0% Enteritidis (43) 10.8%	Prevalence	4.14%
	Campylobacter spp.	206	9,644	1,867	N/A	Prevalence	19.36%
Chicken Quarter or Half Carcasses EXP_CPT_QH01[1]	*Salmonella* spp.	57	82	5	Infantis (2) 40.0% Kentucky (1) 20.0% Typhimurium (1) 20.0%	Percent Positive	6.10%
	Campylobacter spp.	57	82	28	N/A	Percent Positive	34.15%
Chicken Parts - Legs, Breasts, Wings HC_CPT_LBW01	*Salmonella* spp.	482	14,389	1,096	Infantis (338) 30.8% Kentucky (268) 24.5% Enteritidis (205) 18.7%	Prevalence	7.62%
	Campylobacter spp.	482	14,380	2,306	N/A	Prevalence	16.04%
Comminuted Chicken HC_CH_COM01	*Salmonella* spp.	66	1,765	427	Infantis (173) 40.5% Enteritidis (69) 16.2% Kentucky (66) 15.5%	Prevalence	24.2%
	Campylobacter spp.	66	1,749	100	N/A	Prevalence	5.72%
Mechanically Separated Chicken[2] EXP_CH_MSK01	*Salmonella* spp.	27	116	94	Infantis (41) 43.6% Kentucky (31) 33.0% Schwarzengrund (5) 5.32%	Percent Positive	81.03%
	Campylobacter spp.	27	116	84	N/A	Percent Positive	72.41%
Turkey Whole Carcasses HC_TU_CARC01	*Salmonella* spp.	43	1,624	6	I 4,[5],12:i:- (2) 33.3% Reading (2) 33.3% Amsterdam (1) 16.7%	Prevalence	0.37%
	Campylobacter spp.	43	1,623	13	N/A	Prevalence	0.80%

Product Name and Project Code	Pathogen	Number of Establishments Sampled	Number of Samples Analyzed	Number Positive	Top 3 *Salmonella* serotypes per sampling project[1]	Type of Calculation	Prevalence or Percent Positive Calculation
Comminuted Turkey HC_TU_COM01	*Salmonella* spp.	44	1,263	186	Hadar (23) 12.4% Schwarzengrund (21) 11.3% Reading (19) 10.2%	Prevalence	14.73%
	Campylobacter spp.	44	1,258	11	N/A	Prevalence	0.87%
Mechanically Separated Turkey[2] EXP_TU_MSK01	*Salmonella* spp.	12	96	37	Schwarzengrund (7) 18.9% Senftenberg (7) 18.9% Infantis (6) 16.2%	Percent Positive	38.54%
	Campylobacter spp.	12	96	26	N/A	Percent Positive	27.08%
Heavy Fowl Carcasses HC_HF_CARC01	Salmonella spp.	3	176	7	Enteritidis (4) 57.1% Hadar (1) 14.3% Kentucky (1) 14.3%	Percent Positive	3.98%
	Campylobacter spp.	3	176	50	N/A	Percent Positive	28.41%
Exploratory Young Chicken Carcass Rehang Sampling[2] EX_CHCAR_RH1	Salmonella spp.	203	3,896	2,376	Kentucky (991) 41.7% Infantis (776) 32.3% Typhimurium (207) 8.7%	Percent Positive	60.99%
	Campylobacter spp.	1	1	0	N/A	Percent Positive	0.00%

1 Percent of each serotype = (Number of isolates of the serotype/total number of *Salmonella* from the sampling project). The numerator is within parentheses.

2 Exploratory sampling projects.

Table 10. FY 2022 Summary of FSIS' Raw Poultry Sanitary Indicator Organisms

FY 2022 results for FSIS' poultry sanitary indicator organisms (Aerobic plate count MPN/ml) in raw poultry product samples.

Product Name and Project Code	Indicator	Number of Establishments Sampled	Number of Samples Analyzed	Number of Samples Detected	Mean Plate Count[1] (MPN/mL)	Percent Detection[2]
Chicken Whole Carcasses HC_CH_CARC01	Aerobic plate count	203	3,888	3,884	1.1×10^5	99.9%
	Enterobacteriaceae	203	3,891	3,845	1.1×10^4	98.8%
Exploratory Young Chicken Carcass Rehang Sampling EX_CHCAR_RH1	Aerobic plate count	204	3,976	2,795	7.7×10^3	70.3%
	Enterobacteriaceae	204	3,970	666	2.7×10^3	16.8%

1 Mean of the results of every sample (greater than 10 MPN/ml) in countable range with +/- std).

2 Percent detection (% of samples greater than 10 MPN/ml detected over number of positive samples divided by the total number of tested samples).

Table 11. FY 2022 Follow-Up Sampling Result Summary for FSIS' Raw Poultry Sampling Programs

FY 2022 follow-up sampling results for detecting *Salmonella* in raw poultry product samples are shown below. Follow-up sampling is assigned when an establishment does not meet a *Salmonella* performance standard (i.e., is in Category 3). FSIS *Salmonella* follow-up sampling results provide a snapshot of a specific establishment's performance based on intensified sample collection after the establishment implemented corrective actions, which can assist FSIS personnel during a Public Health Risk Evaluation or Food Safety Assessment. For this reason, the aggregated set of data reflects FSIS' efforts to collect follow-up samples but does not provide overall information about individual establishment performance

Product Name and Project Code	Pathogen	Number of Establishments Sampled	Number of Samples Analyzed	Number Positive	Top 3 *Salmonella* serotypes per sampling project[1]	Type of Calculation	Percent Positive Calculation
Chicken Whole Carcasses F_CH_CARC01	*Salmonella* spp.	28	397	38	Kentucky (21) 55.3% Infantis (7) 18.4% Typhimurium (5) 13.2%	Percent Positive	9.57%
Chicken Parts - Legs, Breasts, Wings F_CPT_LBW01	*Salmonella* spp.	73	1093	160	Infantis (55) 34.4% Kentucky (33) 20.6% Enteritidis (24) 15.0%	Percent Positive	14.64%
Comminuted Chicken F_CH_COM01	*Salmonella* spp.	14	137	70	Infantis (21) 30.0% Kentucky (15) 21.4% Enteritidis (12) 17.1%	Percent Positive	51.09%
Comminuted Turkey F_TU_COM01	*Salmonella* spp.	9	112	14	Anatum (3) 21.4% Senftenberg (3) 21.4% I 4,[5],12:i:- (2) 14.3%	Percent Positive	12.5%

1 Percent of each serotype = (Number of isolates of the serotype/total number of *Salmonella* from the sampling project). The numerator is within parentheses.

Ready-to-Eat (RTE) Products

FSIS conducts microbiological testing of all RTE meat, poultry, and egg products for *Lm* and *Salmonella*, which are adulterants in these products. FSIS collects RTE product samples and environmental swab samples under various RTE sampling programs; see RTE Meat and Poultry Products Microbiological Sampling Programs.

Table 12. FY 2022 Ready-to-Eat Product Sampling Results

FY 2022 sampling results for FSIS RTE microbiological sampling programs are reported for *Listeria monocytogenes* (*Lm)* and *Salmonella*, if applicable.

Product Name and Project Code	Pathogen	Number of Establishments Sampled	Number of Samples Analyzed	Number Positive	Top 3 *Salmonella* serotypes per sampling project[1]	Percent Positive Calculation
Post-lethality exposed (PLE) and non-PLE products selected randomly RTEPROD_RAND	*Listeria monocytogenes (Lm)*	2,182	7,037	33	N/A	0.47%
	Salmonella spp.	2,182	7,036	4	Infantis (1) 25.0% Muenchen (1) 25.0% Senftenberg (1) 25.0%	0.06%
PLE products selected by risk RTEPROD_RISK	*Listeria monocytogenes (Lm)*	1,650	7,733	24	N/A	0.31%
	Salmonella spp.	1,650	7,733	5	Infantis (2) 40.0% Muenchen (1) 20.0% Newport (1) 20.0%	0.06%
Intensified Verification Testing (IVT/for-cause) food contact surface samples INTCONT	*Listeria monocytogenes (Lm)*	48	740	10	N/A	1.34%
	Salmonella spp.	8	26	0	N/A	0.00%
IVT non-food contact environmental INTENV	*Listeria monocytogenes (Lm)*	48	375	33	N/A	8.8%
	Salmonella spp.	8	120	1	Muenchen (1) 100.0%	0. 83%

Product Name and Project Code	Pathogen	Number of Establishments Sampled	Number of Samples Analyzed	Number Positive	Top 3 *Salmonella* serotypes per sampling project[1]	Percent Positive Calculation
IVT product INTPROD	*Listeria monocytogenes (Lm)*	47	345	2	N/A	0.58%
	Salmonella spp.	8	75	0	N/A	0.00%
Routine risk-based *Lm* (R*Lm*/risk-based) food contact surfaces RLMCONT	*Listeria monocytogenes (Lm)*	227	2,963	4	N/A	0.13%
R*Lm* non-food contact environmental (composite of 5-swabs) RLMENVC[2]	*Listeria monocytogenes (Lm)*	224	294	32	N/A	10.88%
R*Lm* product (composite of five 25-gram products from same lot) RLMPRODC	*Listeria monocytogenes (Lm)*	227	298	2	N/A	0.67%

1 Percent of each serotype = (Number of isolates of the serotype/total number of *Salmonella* from the sampling project). The numerator is within parentheses.

2 Includes two RLMENVR noncomposited brine samples that were negative.

Table 13. RTE Egg Products FY 2022 Sampling Results

FY 2022 microbiological sampling of liquid and dried pasteurized egg products tested for *Lm* and *Salmonella* are shown.

Product Name and Project Code	Pathogen	Number of Establishments Sampled	Number of Samples Analyzed	Number Positive	Percent Positive Calculation
Egg Product Sampling - Dried Egg Products EGG_DY_MIC01	*Listeria monocytogenes (Lm)*	22	308	0	0.0%
	Salmonella spp.	22	308	0	0.0%
Egg Product Sampling - Liquid / Frozen Egg Products EGG_LQ_MIC01	*Listeria monocytogenes (Lm)*	47	1,204	0	0.0%
	Salmonella spp.	47	1,204	2	0.17%

2. Domestic Chemical Residue Sampling

National Residue Program

The U.S. National Residue Program (NRP) guides the sampling of domestic and imported meat, poultry, and egg product samples for chemical residue testing: see Residue Chemistry. Information about sampling of imported product is below. The NRP includes surveillance sampling, inspector-generated sampling, and special project sampling in both Federal and State-inspected slaughter establishments.

a. Surveillance Sampling Plan

Surveillance sampling is the scheduled sampling of specified slaughter subclasses at the time of slaughter, after a carcass has passed antemortem inspection. In FY 2022, 9 analytical methods were used to screen for approximately 250 different veterinary drugs, pesticides, and environmental contaminants. In FY 2022, detected residue violations () consisted of the following residues: diclofenac (6), metolachlor (4), carbadox (4), flunixin (2), moxidectin (2), salbutamol (4), and one instance each for ceftiofur, florfenicol, gamithromycin, ketoprofen, lasalocid, meloxicam, nitrofurazone, piperonyl butoxide, ractopamine, and sulfadimethoxine. In some cases, sample violations were associated with multiple residues in a single sample and multiple tissue types from a single animal.

Table 14. Summary of FY 2022 NRP Surveillance Sampling Residue Results

FY 2022 summary of surveillance sampling results from FSIS inspector-collected muscle, kidney, and liver tissue from carcasses and parts is shown.

Animal Category	Animal Category	Number of Samples Analyzed by Animal Class			
		Total Samples	Number of Non-Detect Samples	Number of Non-Violative Positive Samples	Number of Violative Samples
Bovine	Beef Cows	839	826	11	2
	Bob Veal	336	330	3	3
	Dairy Cows	820	811	3	6
	Formula-Fed Veal	63	63	--	--
	Heifers	434	432	1	1
	Non-Formula-Fed Veal	46	45	1	--
	Steers	417	414	1	2
Porcine	Feral Swine	52	52	--	--
	Market Swine	834	830	4	--
	Roaster Swine	268	264	--	4
	Sows	745	738	5	2
Poultry	Young Chickens	409	408	1	--
	Whole Chickens	366	362	4	--
	Young Turkeys	843	839	4	--
Other Species	Goats	292	287	3	2
	Lambs	90	89	1	--
	Mature Sheep	86	83	2	1
	Siluriformes (Catfish)	590	572	11	7
	Egg Products	156	155	1	--
	Annual Total	**7,530**	**7,445**	**55**	**30**

Table 15. FY 2022 Number Collected NRP Surveillance Sampling Residues by Chemical Method

FY 2022 number collected surveillance sampling residue sampling summary is shown reflecting the number of samples (carcasses) analyzed per chemical method per animal class.

Animal Category	Animal Class	Number of Samples Analyzed per Chemical Method								
		Aminoglycosides	Antifungal Dyes	Carbadox	Metals	MRM[1]	Nitrofurans	Pesticides	PFAS[2]	Speciation
Bovine	Beef Cows	839	--	--	152	839	--	554	--	--
	Bob Veal	336	--	--	116	336	--	216	--	--
	Dairy Cows	820	--	--	138	820	--	524	--	--
	Formula-Fed Veal	63	--	--	3	63	--	13	--	--
	Heifers	434	--	--	129	434	--	268	--	--
	Non- Formula Fed Veal	46	--	--	1	46	--	7	--	--
	Steers	417	--	--	143	417	--	243	--	--
Porcine	Feral Swine	--	--	--	--	--	--	52	43	--
	Market Swine	834	--	--	161	834	--	555	164	--
	Roaster Swine	--	--	268	--	--	--	--	--	--
	Sows	745	--	--	145	745	--	475	162	--
Poultry	Young Chickens	409	--	--	121	409	72	227	162	--
	Whole Chickens	366	--	--	--	363	362	366	2	--
	Young Turkeys	843	--	--	194	841	195	460	--	--
Other Species	Goats	292	--	--	--	292	--	76	--	--
	Lambs	90	--	--	--	89	--	41	--	--
	Mature Sheep	86	--	--	--	86	--	43	--	--
	Siluriformes (Catfish)	--	282	--	282	544	263	399	122	327
	Egg Products	--	--	--	--	151	--	152	--	--
Annual Total		**6,620**	**282**	**268**	**1,585**	**7,309**	**892**	**4,671**	**655**	**327**

[1] MRM: multiresidue method

[2] PFAS: polyfluoroalkyl substances

Table 16. Summary FY 2022 Surveillance Sampling Residue Violations by Animal Class

List of FY 2022 surveillance sampling residue violations, including specific compound, concentration, tolerance, and regulatory citation by animal class is shown.

Animal Category	Tissue	Compound	Concentration	Units	Tolerance Level Value	Authority[1] (CFR Citation)
Beef Cow	Liver	Salbutamol	*	*	*	Not Approved[1]
	Muscle	Salbutamol	*	*	*	Not Approved[1]
Beef Cow	Liver	Sulfadimethoxine	0.795	PPM	0.100	21 CFR 556.640
	Muscle	Sulfadimethoxine	0.688	PPM	0.100	21 CFR 556.640
Dairy Cow	Muscle	Salbutamol	*	*	*	Not Approved[1]
Bob Veal	Kidney	Gamithromycin	*	*	*	Not Approved[1]
Bob Veal	Kidney	Flunixin	*	*	*	21 CFR 552.970
Bob Veal	Muscle	Ketoprofen	*	*	*	Not Approved[1]
Dairy Cow	Muscle	Piperonyl Butoxide	0.116	PPM	0.100	40 CFR 180.127
Dairy Cow	Kidney	Desfuroylceftiofur	2.75	PPM	0.400	21 CFR 556.113
Dairy Cow	Liver	Florfenicol	4.37	PPM	3.7	21 CFR 556.283
	Muscle	Florfenicol	0.400	PPM	0.300	21 CFR 556.283
Dairy Cow	Liver	Flunixin	0.331	PPM	.125	21 CFR 556.286
Dairy Cow	Muscle	Salbutamol	*	*	*	Not Approved[1]
Dairy Cow	Muscle	Meloxicam	*	*	*	Not Approved[1]
Goat	Muscle	Moxidectin	*	*	*	21 CFR 556.426
Goat	Muscle	Moxidectin	*	*	*	21 CFR 556.426
Heifer	Liver	Ractopamine	0.176	PPM	0.090	21 CFR 556.570
Mature Sheep	Muscle	Diclofenac	*	*	*	Not Approved[1]
Roaster Swine	Liver	Carbadox	199	PPB	30.0	21 CFR 556.100
Roaster Swine	Liver	Carbadox	52.5	PPB	30.0	21 CFR 556.100
Roaster Swine	Liver	Carbadox	43.6	PPB	30.0	21 CFR 556.100
Roaster Swine	Liver	Carbadox	71.8	PPB	30.0	21 CFR 556.100
Siluriformes	Muscle	Lasalocid	*	*	*	Not Approved[1]
Siluriformes	Muscle	Metolachlor	*	*	*	Not Approved[1]

Animal Category	Tissue	Compound	Concentration	Units	Tolerance Level Value	Authority[1] (CFR Citation)
Siluriformes	Muscle	Diclofenac	*	*	*	Not Approved[1]
Siluriformes	Muscle	Metolachlor	*	*	*	Not Approved[1]
Siluriformes	Muscle	Nitrofurazone	*	*	*	Not Approved[1]
Siluriformes	Muscle	Metolachlor	*	*	*	Not Approved[1]
Siluriformes	Muscle	Metolachlor	*	*	*	Not Approved[1]
Sow	Kidney	Diclofenac	*	*	*	Not Approved[1]
Sow	Muscle	Diclofenac	*	*	*	Not Approved[1]
Steer	Muscle	Diclofenac	*	*	*	Not Approved[1]
Steer	Muscle	Diclofenac	*	*	*	Not Approved[1]

***** Violative residue results were detected but not quantified

[1] Reference to either Title 21 (veterinary drugs) or Title 40 (pesticides) of the Code of Federal Regulations (CFR). In cases, were there residue detected is not approved for the animal class, the violations is listed as "Not Approved"PPB – parts per billion (µg/kg)

PPM – parts per million (mg/kg)

CFR – Code of Federal Regulations

b. Inspector-Generated Sampling Plan

FSIS inspectors collect samples for residue testing when they suspect that animals presented for slaughter may have violative levels of chemical residues. If an inspector suspects that there is misuse of drugs that cannot be detected by the Kidney Inhibition Swab (KIS™) test, the samples are sent directly to the laboratory for analysis. These samples are reported under the inspector-generated program (FSIS Directive 10,800.1).

In FY 2022, 139,026 Kidney Inhibition Swab (KIS™) tests were conducted on animals selected by FSIS (Table 17). Of these, 2,071 samples were submitted to FSIS field laboratories for further analysis, and 376 chemical residue violations were reported from 315 samples (multiple residue violations may be found in the same sample).

- Inspectors performed 117,132 in-plant KIS™ test in bovine slaughter classes (beef cows, bob veal, bulls, dairy cows, formula-fed and non-formula-fed veal, and steers), resulting in 308 violative samples (0.26%).

- Dairy cows and bob veal accounts for 80% of the in-plant KIS™ test and 76% of the violations reported under the inspector-generated sampling plan.

- Desfuroylceftiofur (the primary metabolite of ceftiofur) and penicillin accounted for 44% and 17% of the violations reported in 189 dairy cows, respectively.

- Of the 53 bob veal violations, 26% of the violations were associated with neomycin.

- Inspectors performed 20,144 in-plant KIS™ test in swine slaughter classes (market swine, sows, roaster swine, boar swine, and feral swine), resulting in seven violative samples (0.03%).

- The predominant violative residues in the inspector-generated samples were ceftiofur (n=113), penicillin (45), and flunixin (41), which account for 30%, 12%, and 11% of total violative residues, respectively.

Table 17. Summary of FY 2022 Inspector-Generated Sampling (KIS™) Test and Confirmatory Tests

FY 2022 summary of KIS™ tests, number of in-plant screens with negative results, number of carcasses sent to FSIS laboratory for confirmation, and the number of carcasses (i.e., samples) with violations for each animal class.

Animal Category	Animal Class	KIS™ Test			
		Total Number of In-plant Carcasses	Number of In-plant Negative Carcasses	Number of Samples Analyzed in FSIS Labs	Number of Samples with Confirmed Lab Violations
Bovine	Beef Cows	10,123	9,900	223	31
	Bob Veal	14,509	14,394	115	53
	Bulls	1,547	1,481	66	9
	Dairy Cows	80,201	78,981	1,220	189
	Formula-fed Veal	158	158	--	--
	Heavy Calves	159	158	1	1
	Heifers	3,380	3,292	88	7
	Non-Formula-fed Veal	133	124	9	5
	Steers	6,922	6,725	197	13
Porcine	Boar/Stag Swine	97	95	2	--
	Feral Swine	12,356	12,272	84	1
	Market Swine	1,340	1,326	14	1
	Roaster Swine	6,254	6,223	31	3
	Sows	97	95	2	--
Other Species	Goats	432	428	4	2
	Lambs	996	986	10	--
	Mature Sheep	322	317	5	--
Annual Total		**139,026**	**136,955**	**2,071**	**315**

Table 18. Summary of FY 2022 Inspector-Generated Sampling Residue Violation Results by Chemical Residue and Animal Class

FY 2022 summary of chemical residue violations reported within the inspector-generated sampling.

Chemical Residue	Animal Class												
	Beef Cows	Bob Veal	Bull/ Stag	Dairy Cows	Goats	Heavy Calves	Heifers	Non-Formula-fed Veal	Market Swine	Roaster Swine	Sows	Steers	Total
Ampicillin	--	1	--	--	--	--	--	--	--	--	--	--	1
Ciprofloxacin	--	6	--	4	--	--	1	--	--	--	--	1	12
Desethylene Ciprofloxacin	--	5	--	--	--	--	--	--	--	--	--	--	5
Desfuroylceftiofur	9	9	3	84	--	--	3	--	--	--	--	5	113
Diclofenac	--	1	--	--	--	--	--	--	--	--	--	--	1
Dihydrostreptomycin	--	--	--	4	--	--	--	--	--	--	--	--	4
Doramectin	4	--	--	--	--	--	1	--	--	--	--	--	5
Enrofloxacin	--	5	--	--	--	--	--	--	--	--	--	--	5
Florfenicol	3	1	3	3	--	--	1	1	--	--	--	1	13
Florfenicol Amine	--	1	--	--	--	--	--		--	--	--	--	1
Flunixin	4	10	1	22	--	--	--	1	--	--	--	3	41
Gentamycin Sulfate	--	--	1	2	--	--	1	--	--	--	--	--	4
Ketoprofen	1	1	--	--	--	--	--	--	--	--	--	--	2
Lincomycin	--	--	--	1	--	--	--	--	--	--	--	--	1
Meloxicam	2	1	--	7	--	--	--	--	--	--	--	1	11
Neomycin	--	14	--	5	--	--	--	3	--	--	--	--	22
Norfloxacin	--	--	--	--	--	--	--	1	--	--	--	--	1
Oxyphenylbutazone	1	--	--	--	--	--	--		1	--	--	--	2
Oxytetracycline	--	--	--	2	2	--	--	--	--	--	--	--	4
Penicillin	3	3	1	32	--	1	--	--	--	1	2	2	45
Phenylbutazone	1	--	--	--	--	--	--	--	1	--	--	--	2
Spectinomycin	--	2	--	--	1	--	--	--	--	--	--	--	3
Sulfadiazine	--	7	--	--	--	--	--	--	--	--	--	--	7

Chemical Residue	Animal Class												
	Beef Cows	Bob Veal	Bull/ Stag	Dairy Cows	Goats	Heavy Calves	Heifers	Non-Formula-fed Veal	Market Swine	Roaster Swine	Sows	Steers	Total
Sulfadimethoxine	--	--	--	21	--	--	--	--	--	--	--	--	21
Sulfadoxine	--	--	--	1	--	--	--	--	--	--	1	--	2
Sulfamethazine	--	--	1	8	--	--	2	--	--	--	1	3	15
Sulfamethoxazole	--	7	--	--	--	--	--	--	--	--	--	--	7
Sulfathiazole	--	7	--	--	--	--	--	--	--	--	--	--	7
Tetracycline	--	--	--	1	--	--	--	--	--	--	--	--	1
Tildipirosin	--	1	--	--	--	--	--	--	--	--	--	--	1
Tilmicosin	9	2	2	1	--	--	--	1	--	--	--	2	17
Annual Total	**37**	**84**	**12**	**198**	**3**	**1**	**9**	**7**	**2**	**1**	**4**	**18**	**376**

Table 19. Summary of FY 2022 Inspector-Generated Sampling

FY 2022 summary of suspect animal samples sent directly to any FSIS laboratory (inspector-generated sampling) for analysis.

Animal Category	Animal Class	Total Samples	Number of Non-Detect Samples	Number of Non-Violative Positives Samples	Number of Violative Samples
Bovine	Beef Cows	13	11	2	0
	Bob Veal	5	2	2	1
	Bull/Stag	5	4	1	0
	Dairy Cows	23	20	2	1
	Formula-fed Veal	1	1	0	0
	Heifers	18	16	1	1
	Steers	263	246	12	5
Porcine	Market Swine	166	161	2	3
	Roaster Swine	1	1	0	0
Other Species	Goats	9	9	0	0
	Lamb	51	49	1	1
	Mature Sheep	5	5	0	0
Annual Total		**560**	**525**	**23**	**12**

3. Import Sampling

a. Import Microbiological Sampling

FSIS conducts point-of-entry reinspection of imported meat, poultry, and egg products. This activity is a reinspection of products that have already been inspected and passed by an equivalent foreign inspection system. Thus, imported product reinspection is a means of verifying the equivalence of a foreign country's inspection system on an ongoing basis.

Table 20. Summary of FY 2022 Microbiology Sampling of Imported Products

FY 2022 microbiological sampling results for imported products by inspection level. The values shown here summarize results over all countries and do not reflect the percent positive for individual countries. Additionally, no direct comparisons should be made to domestic sampling because sampling for imported product varies based on the volume of shipments received by country and product.

Product Name and Project Code	Pathogen	Normal		Increased[1]		Intensified[2]		Annual Total
		Number of Samples Analyzed	Number Positive	Number of Samples Analyzed	Number Positive	Number of Samples Analyzed	Number Positive	
Imported Raw Beef Manufactured Trimmings or Components for use in Ground Beef or Beef Products MT51	*E. coli* O157:H7	1,050	--	4	--	46	1	1,100
	non-O157 STEC	992	2	4	--	46	--	1,042
	Salmonella spp.	1,050	4	4	--	46	--	1,100
Imported Raw Ground or Comminuted Beef or Veal Product MT08	*E. coli* O157:H7	62	--	--	--	--	--	62
	Salmonella spp.	62	--	--	--	--	--	62
Micro Pathogen Sampling of RTE Products IMVRTE	*Listeria monocytogenes*	3,231	5	7	--	39	1	3,277
	Salmonella spp.	3,231	0	7	--	39	--	3,277
Imported Egg Products EGGIMP	*Listeria monocytogenes*	112	--	--	--	--	--	112
	Salmonella spp.	112	--	--	--	--	--	112
Imported Raw and NRTE Poultry Products IMP_Poultry	*Salmonella* spp.	777	107	--	--	--	--	777
	Campylobacter	775	83	--	--	--	--	775
Imported Raw Pork Product IMP_Pork	*Salmonella* spp.	411	8	--	--	--	--	411
Imported *Siluriformes* Microbiology Sampling IMPFISH_MI[3]	*Salmonella* spp.	589	1	--	--	--	--	589

[1]Increased is a level of reinspection above the normal level that is directed by a FSIS management decision. Under increased reinspection, FSIS may hold, on a case-by-case basis, lots of imported meat, poultry, or egg products pending receipt of a laboratory analysis. If FSIS does not place the product on hold, the importer of record is still required to hold product tested for adulterants by FSIS and is not to allow such product to enter commerce unless and until negative results are received.
[2]Intensified is a level of reinspection that is implemented automatically by the Public Health Information System (PHIS) when a Type of Inspection PHIS task is reported as "Fail." Under intensified reinspection, FSIS holds the sampled lot at the official import inspection establishment pending receipt of laboratory analysis. The sampled lot is not allowed to move off-site to be held.
[3]IMPFISH_MI is no longer active per FSIS Notice 32-22: FSIS *Salmonella* Sampling of Raw Siluriformes

b. Import Residue Sampling

Imported meat, poultry, and egg products are sampled through the point-of-entry Import Reinspection Sampling Plan, a chemical residue monitoring program that is conducted to verify whether foreign inspection systems in exporting countries are equivalent to U.S. standards. The results are summarized in Table 21.

Table 21. Summary of FY 2022 Residue Sampling of Imported Products

Project Code[1]	Analyte	Normal			Increased[2]				
		Number of Samples Analyzed	Non-Violative Positives Samples	Violative Samples	Number of Samples Analyzed	Number of Samples Analyzed	Non-Violative Positives Samples	Violative Samples	
Imported Siluriformes Fish Products-Eastern Laboratory IMPFISH_CH_E[4]	Antifungal Dyes, Metals, MRM	579	--	--	--	--	--	--	**579**
Imported Siluriformes Fish Products-Western Laboratory IMPFISH_CH_W	Nitrofurans, Pesticides	568	--	--	--	4	--	--	**572**
Imported - Metals IMPMETALS	Metals	294	--	--	1	--	--	--	**295**
Nitrofurans IMPNITROFUR[5]	Nitrofurans	81	--	1	--	--	--	--	**81**

Project Code[1]	Analyte				Increased[2]	Intensified[3]			Annual Total
		Number of Samples Analyzed	Non-Violative Positives Samples	Violative Samples	Number of Samples Analyzed	Number of Samples Analyzed	Non-Violative Positives Samples	Violative Samples	
Imported - Pesticide IMPPESTICIDE	Pesticides	579	2	1	--	17	--	--	**596**
Imported Egg Products - Chemistry IMPRESEGG	Pesticides	37	--	--	--	--	--	--	**37**
Imported Fresh Products IMPRESFRESH	Aminoglycosides, MRM	935	4	--	--	--	--	--	**935**
Imported Processed Products - Residue Eastern Lab IMPRESPR_EL	Avermectins	64	--	--	1	--	--	--	**65**
Imported Processed Products - Residue Midwestern Lab IMPRESPR_MWL	Sulfonamides	75	--	--	--	--	--	--	**75**
	Annual Total	**3,212**	**6**	**2**	**2**	**21**	**0**	**0**	**3,235**

[1]Project code descriptions can be found in the FY 2022 Sampling Plan (https://www.fsis.usda.gov/sites/default/files/media_file/2021-12/FSIS-Annual-Sampling-Plan-FY2022.pdf).
[2]Increased is a level of reinspection above the normal level that is directed by a FSIS management decision. Under increased reinspection, FSIS may hold, on a case-by-case basis, lots of imported meat, poultry, or egg products pending receipt of a laboratory analysis. If FSIS does not place the product on hold, the importer of record is still required to hold product tested for adulterants by FSIS and is not to allow such product to enter commerce unless and until negative results are received. During FY 2022, there were no violative samples and no non-violative samples at increased level of inspection.
[3]Intensified is a level of reinspection that is implemented automatically by the Public Health Information System (PHIS) when a Type of Inspection PHIS task is reported as "Fail." Under intensified reinspection, FSIS holds the sampled lot at the official import inspection establishment pending receipt of laboratory analysis. The sampled lot is not allowed to move off-site to be held.
[4]As of October 1, 2022, IMPFISH_CH replaces IMPFISH_CH_E and IMPFISH_CH_W sampling projects.
[5]IMPNITROFUR is discontinued per FSIS Notice 64-22: Suspension of Young Chicken Carcass Sampling and Raw Poultry Products Testing for Nitrofuran Residues.
MRM: multiresidue method

Table 22. FY 2022 Import Residue Sampling Violations by Foreign Country/Animal Class

List of FY 2022 import residue sampling violations (foreign country, specific compound, concentration, tolerance, and regulatory citation) by animal class. FSIS detected semicarbazide, a nitrofurazone indicator, in 1 lot of imported products. FSIS engaged with the applicable foreign government and did not uncover evidence of nitrofurazone use: Investigation into the Detection of Semicarbazide (SEM), a Nitrofurazone Indicator, in Chicken.

Foreign Country	Animal Class	Compound	Concentrations	Units	Tolerance Level Value	Authority (CFR Citations)
Canada	Chicken	Nitrofurazone	*	*	*	Not Approved[1]
Costa Rica	Beef	Ethion	*	*	*	Not Approved[1]

***** Violative residue results were detected but not quantified.

[1]Not Approved: the residue detected is not approved in the United States for the animal class.

PPB – parts per billion (µg/kg)

CFR – Code of Federal Regulations

DDT - dichlorodiphenyltrichloroethane

4. Whole Genome Sequencing (WGS) Initiatives

WGS-related projects align with the goals and objectives of the FSIS Strategic Plan and other policies. FSIS engages with Federal partners to establish, advance, and apply whole genome sequencing (WGS) data to ensure and strengthen regulatory functions. FSIS laboratories perform WGS on all positive sample isolates for all pathogens from FSIS-regulated products. In FY 2022, this equated to 16,193 bacterial isolate sequences uploaded to the National Center for Biotechnology Information (NCBI). To enhance transparency and use of the data, FSIS updated its publicly available establishment-specific datasets to include the FSIS number and date-stamped allele codes (FSIS Constituent Update, May 20,2022). The FSIS Number provides a way to link FSIS sequence metadata to already publicly available sequence data on NCBI and the allele codes provide a discrete reportable result to compare FSIS isolates to each other.

5. National Antimicrobial Resistance Monitoring System (NARMS)

The National Antimicrobial Resistance Monitoring System (NARMS) is an interagency collaborative partnership with State and local public health departments, the U.S. Food and Drug Administration (FDA), the Centers for Disease Control and Prevention (CDC), and the U.S. Department of Agriculture (USDA). This national public health surveillance system tracks changes in antimicrobial susceptibility of select foodborne enteric bacteria found in ill people (CDC), retail meats (FDA), and food animals (USDA FSIS). The NARMS program at FSIS historically focused on two sampling points: samples collected from intestinal (cecal) content; and carcass, food commodity or product samples. Antimicrobial Susceptibility Tests (AST) are routinely conducted on all NARMS isolates, and WGS is conducted on a selected number of isolates. AST information provides the phenotypic resistance information, which is determined using epidemiological cut-off values or clinical breakpoints to interpret data. WGS information provides the genotypic resistance information, which is the presence of acquired genes and mutations known to enable a bacterium to grow in the presence of higher antimicrobial concentrations. These data may be accessed at the FDA NARMS Integrated Data Dashboards.

Table 23. Summary of FY 2022 NARMS Sampling Program

FY 2022 NARMS samples analyzed, isolates recovered, and further characterized.

Sampling Code	Samples Scheduled	Samples Analyzed	Total Isolates Retrieved	Isolates Characterized			
				Salmonella	*Campylobacter*	*E. coli*	*Enterococcus*
Cecal Sampling							
NARMS_YC Young Chicken	690	708	977	AST: 331	AST: 210	AST: 219	AST: 217
				WGS: 325	WGS: 210	WGS: 108	WGS: 63
NARMS_YT Young Turkey	435	429	648	AST: 41	AST: 179	AST: 222	AST: 205
				WGS: 41	WGS: 179	WGS: 166	WGS: 77
NARMS_DC Dairy Cow	980	881	769	AST: 246	AST: 225	AST: 125	AST: 172
				WGS: 244	WGS: 225	WGS: 79	WGS: 102
NARMS_BC Beef Cows	456	453	263	AST: 49	AST: 50	AST: 86	AST: 75
				WGS: 50	WGS: 52	WGS: 39	WGS: 21

NARMS_ST Steer	1,368	1,393	447	AST: 133	AST: 159	AST: 85	AST: 70
				WGS: 132	WGS: 159	WGS: 37	WGS: 6
NARMS_HF Heifer	456	422	338	AST: 52	AST: 116	AST: 94	AST: 75
				WGS: 52	WGS: 117	WGS: 47	WGS: 11
NARMS_MS Market Swine	860	839	872	AST: 232	AST: 185	AST: 235	AST: 219
				WGS: 232	WGS: 186	WGS: 147	WGS: 81
NARMS_SW Sow	410	392	744	AST: 257	AST: 83	AST: 228	AST: 174
				WGS: 255	WGS: 83	WGS: 142	WGS: 72
NARMS_BV Bob Veal	258	158	172	AST: 56	AST: 13	AST: 69	AST: 34
				WGS: 53	WGS: 13	WGS: 56	WGS: 11
NARMS_FFV Formula-Fed Veal	100	130	111	AST: 0	AST: 20	AST: 57	AST: 34
				WGS: 0	WGS: 20	WGS: 50	WGS: 15
NARMS_NFFV Non-Formula-Fed Veal	120	189	176	AST: 23	AST: 45	AST: 77	AST: 31
				WGS: 23	WGS: 45	WGS: 55	WGS: 7
NARMS_GO Goat	180	162	112	AST: 18	AST: 18	AST: 39	AST: 18
				WGS: 18	WGS: 18	WGS: 18	WGS: 7
NARMS_LB Lamb	180	173	121	AST: 33	AST: 21	AST: 36	AST: 31
				WGS: 33	WGS: 21	WGS: 19	WGS: 2
NARMS_SH Sheep	180	158	147	AST: 57	AST: 23	AST: 35	AST: 31
				WGS: 58	WGS: 23	WGS: 17	WGS: 2
Non-Cecal Sampling							
Siluriformes[1]	N/A	116	214	AST: 10	AST: N/A	AST: 63	AST: 106
				WGS: 10	WGS: N/A	WGS: 16	WGS: 16

N/A – not applicable

[1]Siluriformes NARMS samples are sourced from the Siluriformes microbiology sampling project, EXP_FI_MIC01, and not scheduled independently. See Table 5 for more information.

6. Other Sampling

FSIS conducts other sampling programs and special projects in response to investigations or other rapidly evolving events to protect consumers and ensure food safety, on an as-needed basis (Table 24). Flexibility within FSIS laboratories provides the Agency with the ability to adapt and rapidly respond to emerging issues. These projects may include for-cause and inspector-generated sampling, such as:

- advanced meat recovery (AMR) sampling to verify that industry is preventing beef spinal cord material from entering the food supply and being misrepresented as meat;
- animal species identification sampling to verify species claims of meat, poultry, and egg products;
- food chemistry sampling to identify economic fraud or other chemical residues;
- compliance testing to evaluate products in commerce that are suspected to be adulterated or misbranded;
- abnormal container testing when inspection program personnel observe an abnormal container being used for thermally processed products;
- sampling in support of foodborne disease outbreaks or natural disaster investigations; and

- pathology testing to identify diseases, parasites, and related conditions in response to in-plant public health veterinarian findings from meat and poultry carcasses and parts.

These projects also include routine sampling to verify that labels are accurate.

Table 24. Summary of FY 2022 Other Sampling

Project Name and Project Code	Samples Collected
Advanced Meat Recovery Product AMR01	75
Follow-up Sampling to Advanced Meat Recovery Positive FAMR01	9
Investigative Sampling COMPLIAN	82
Label Verification of Antibiotic Free EXP_LV_ABX	231
Label Verification of Hormone Free EXP_LV_HORM	2
Label Verification of Sodium and Fat Content EXP_LV_NUTR	94
Label Verification of Soy Free EXP_LV_SOY	3
Abnormal Container ABNCONT	13
Import – Abnormal Container IMPABNCONT	6
Import – APM Product – Beef IMPAMRBEEF	2
Import – Species Identification IMPSPECIESID	243
Foodborne Illness and Outbreak Sampling OUTBREAK	823
Pathology – Collector Generated PATHOLOGY	3,160

Conclusion

In FY 2022, FSIS conducted meat, poultry, and egg products sampling verification to ensure that the food produced is safe, wholesome, and properly labeled to protect the public from foodborne hazards. As a science-based agency, FSIS uses data to inform decision making and drive continuous improvement of processes. FSIS evaluates these sampling data and shares the data, including analyses, on the FSIS website. Data sharing and transparency are critical steps to ensure public awareness of the food safety measures implemented.