USDA Food Safety and Inspection Service
Annual Sampling Summary Report
Fiscal Year 2020

United States Department of Agriculture
Food Safety and Inspection Service

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Introduction

The U.S. Department of Agriculture's (USDA) 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 year, FSIS establishes sampling priorities and goals through its annual sampling plan. FSIS utilizes the Agency's Strategic Plan goals, outcomes, objectives, and measures – as well as specific items of focus in the agency's Annual Plan – to develop its Annual Sampling Plan. The Annual Sampling Plan identifies changes planned for the fiscal year to FSIS' various sampling programs and describes the agency's overall strategy for directing its sampling resources. In addition, the Annual Sampling Plan aligns goals and measures described in FSIS' Strategic and Annual Plan with sampling activities and results. This report, the FY 2020 Annual Sampling Summary Report, summarizes the activities and provides an overview of results for the products the agency inspected during fiscal year (FY) 2020 (October 1, 2019 – September 30, 2020).

FSIS routinely assesses 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. The results of these assessments are used in a variety of ways, including monitoring the effectiveness, where applicable, of Hazard Analysis and Critical Control Points (HACCP) plans, informing agency policy making, estimating public health impact, and advising strategic and performance planning.

Background

The agency historically used the Annual Sampling Plan to detail sampling results and related activities from the previous years, in addition to reporting the planned sampling allocations and activities for the current year. Effective FY 2019, FSIS began reporting only the prospective current year planned information in the annual sampling plan and developed this report to provide the retrospective information, including sampling results.

Each sampling project has a unique description name and alpha-numeric data system code; both are commonly used when discussing sampling projects and are both included in this report. FSIS analyzes sampling data and calculates either percent positive or prevalence. Percent positive is the percentage of samples of a specific FSIS-regulated product with a specific pathogen detected by sampling. Prevalence is the estimated proportion, nationally, of a specific FSIS-regulated product with a specific pathogen. More information on the definitions for percent positive, volume-weighted percent positive, and prevalence can be found on the FSIS website sampling results data dictionary.

Summary of Sampling

FSIS continued to focus on its mission of protecting public health and preventing foodborne illness in several different ways. FSIS continued to implement and expand on efforts begun in FY 2019 in response to the Strategic Assessment of Sampling Resources (SASR).

On October 28, 2019, FSIS proposed and requested public comment on an updated *Salmonella* performance standard for raw ground beef and a new *Salmonella* performance standard for beef manufacturing trimmings, a primary component of raw ground beef (80 FR 57688). FSIS proposed both

standards to ensure that establishments are consistently controlling or reducing *Salmonella*, a pathogen not ordinarily considered an adulterant in raw beef products. On August 6, 2019, FSIS announced new *Campylobacter* standards for comminuted poultry ([84 FR 38203](#)).

FSIS modernized laboratory technologies for identifying *Salmonella*. For samples collected after January 1, 2020, labs began to use whole genome sequencing (WGS)-derived serotyping to identify *Salmonella* strains in place of traditional methods.

In June 2020, FSIS requested comments on the proposal to expand its routine verification testing for six non-O157 Shiga toxin-producing *Escherichia coli* (STEC) to ground beef, bench trim, and other raw ground beef components to further protect public health ([84 FR 34397](#)). Currently, FSIS analyzes all ground beef, bench trim, and other raw ground beef components for *E. coli* O157:H7, but only tests its beef manufacturing trimmings samples for the six non-O157 STEC. FSIS is currently reviewing the public comments.

In September 2020, in conjunction with USDA's Office of Food Safety (OFS), FSIS released the [Roadmap to Reducing *Salmonella*: Driving Change through Science-Based Policy](#), which outlines programs and policies that are science-based, data-driven, and promote innovation to reduce *Salmonella* in meat, poultry, and egg products. The [USDA FSIS Virtual Public Meeting: *Salmonella* - State of the Science](#) meeting information and recordings are available for viewing.

In August 2020, FSIS convened the National Advisory Committee on Meat and Poultry Inspection (NACMPI) to discuss the steps FSIS should take to ensure better control of artisanal, shelf-stable ready-to-eat (RTE) fermented, salt-cured, or dried products that rely on multiple hurdles for lethality. In addition, NACMPI considered whether the Agency should continue not to test boxed beef primal and sub-primal products for Shiga toxin-producing *E. coli* (STEC), if they are intended for intact cuts ([85 FR 51674](#)). The [virtual NACMPI public meeting information](#) is available for viewing.

FSIS collaborated with U.S. Centers for Disease Control and Prevention (CDC) and the U.S. Food and Drug Administration (FDA) to meet the agency's goal to improve coordination of Federal food safety efforts and address cross-cutting priorities for food safety data. FSIS also developed a triage team procedure to be initiated when one or more *Listeria monocytogenes (Lm)* positive food, food contact, or environmental FSIS samples are closely related to a historical clinical isolate. The triage team's summary can inform the Public Health Risk Evaluation (PHRE) and any subsequent Food Safety Assessment (FSA) performed in response to the *Lm* positive.

Beef Products

FSIS collects samples from Federally inspected establishments and retail firms to verify that establishments' food safety systems are addressing the pathogen effectively and that products are not adulterated. Samples from establishments are scheduled monthly by randomly selecting establishments from the current population that produce eligible products. The frequency of sampling at any establishment is based on the volume of eligible products. 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**).

FSIS also collects raw beef follow-up samples that are scheduled in response to a positive finding from an initial routine verification sample positive at the establishment where FSIS found the positive. For

ground beef product or bench trim samples that are positive, FSIS also collects follow-up samples from suppliers, when suppliers provided source materials. (**Table 1**). Follow-up samples are a tool FSIS uses to verify whether the establishment has made effective corrective action in response to the initial positive detected through routine FSIS verification testing. Follow-up samples may also be collected at retail 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 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).

In FY 2020, there were a sufficient number of MT43 and MT60 samples to estimate the prevalence of STEC in raw ground beef and beef manufacturing trimmings, respectively. Unlike percent positive, prevalence calculations incorporate the production volume of each establishment. Though the number of positives or percent positive may remain at similar levels each year, a positive from a high-volume producer will increase the prevalence more than a positive from a low volume producer. The calculated *E. coli* O157:H7 prevalence in raw ground beef (MT43) in FY2019 was <0.01% and in FY 2020 was 0.14%; one large raw ground beef producer with a single positive MT43 sample was a major contributing factor to the FY 2020 prevalence value. The calculated *E. coli* O157:H7 prevalence in beef manufacturing trimmings (MT60) in FY 2019 was 0.05% and 0.14% in FY 2020. The calculated non-O157 STEC prevalence (MT60) in FY 2019 was 0.51% and 0.13% in FY 2020.

Salmonella analysis is performed on all raw beef samples. *Salmonella* prevalence in raw ground beef from FSIS-inspected establishments was 2.25% in FY 2019 and 2.89% in FY 2020, and *Salmonella* prevalence in beef manufactured trimmings was 1.44% in FY 2019 and 2.01% in FY 2020. The number of samples allocated each year to other raw beef sample projects does not allow FSIS to estimate prevalence; instead, those values are reported as percentage positive (**Table 2**).

Follow-up samples are assigned based on detection of STEC through routine testing. The elevated levels of STEC and *Salmonella* in follow-up samples, when compared to routine projects, is not unusual. The

results are used by FSIS to support compliance determinations and enforcement actions, when necessary (**Table 3**).

Table 2. FY 2020 Summary of FSIS' Beef Verification Sampling Programs

FY 2020 results for FSIS' five verification sampling codes for detecting *E. coli* O157:H7 and/or non-O157 STEC (including O23, O45, O103, O111, O121, and O145) and *Salmonella* in raw beef product samples.

Product Name and Project Code	Pathogen	Number of Establishments Sampled	Number of Samples Analyzed	Number Positive	Type of Calculation[1]	Prevalence or Percent Positive Calculation
Raw Ground Beef MT43	*E. coli* O157:H7	1,200	10,539	7	Prevalence	0.14%
	Salmonella spp.	1,200	10,540	166	Prevalence	2.89%
Beef Manufacturing Trim MT60	*E. coli* O157:H7	488	4,109	10	Prevalence	0.14%
	non-O157 STEC	481	4,028	23	Prevalence	0.13%
	Salmonella spp.	488	4,108	88	Prevalence	2.01%
Raw Ground Beef Components other than Trim MT64	*E. coli* O157:H7	135	1,294	2	Percent Positive	0.15%
	Salmonella spp.	135	1,294	95	Percent Positive	7.34%
Bench Trim MT65	*E. coli* O157:H7	470	1,386	0	Percent Positive	0.00%
	Salmonella spp.	470	1,386	14	Percent Positive	1.01%
Raw Ground Beef In-Commerce MT05	*E. coli* O157:H7	524[2]	524	0	Percent Positive	0.00%
	Salmonella spp.	524[2]	525	16	Percent Positive	3.05%

[1]Percent positive is 100*(the total number of positive samples divided by the total number of tested samples). Prevalence is a more complex, 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.
[2] MT05 ground beef samples are collected from retail firms, not Federal establishments.

Table 3. FY 2020 Summary of FSIS' Beef Follow-Up Sampling Programs

FY 2020 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	4	42	0	0.00%
	Salmonella spp.	4	42	1	2.38%
Trim and Components MT52	*E. coli* O157:H7	5	11	0	0.00%
	non-O157 STEC	5	10	0	0.00%
	Salmonella spp.	5	11	0	0.00%
Beef Manufacturing Trim MT53	*E. coli* O157:H7	54	745	1	0.13%
	non-O157 STEC	54	711	11	1.55%
	Salmonella spp.	54	745	24	3.22%
Follow-Up Testing to an *E. coli* Positive (Trim or Ground Beef) MT44T[2]	*E. coli* O157:H7	4	34	3	8.82%
	non-O157 STEC	4	27	0	0.00%
	Salmonella spp.	4	34	0	0.00%

[1]No MT06, raw ground beef retail follow-up, samples were collected in FY 2020.
[2]Traceback not at slaughter establishments and dependent on positive findings from other *E. coli* O157:H7 or on-O157 STEC sampling projects.

Pork Products

FSIS began exploratory sampling of raw pork products in May 2015 to test for pathogens of public health concern, as well as for indicator organisms (January 26, 2015, 80 FR 3940). In FY 2020, FSIS announced to inspection program personnel the expansion of raw pork sampling in FSIS Notice 41-19, *Raw Pork Sampling Program* (reissued in FY 2021 under FSIS Notice 65-20). This change expanded sampling across all eligible official establishments from the limited set of establishments in the FY 2019 exploratory phase and grouped non-intact and intact cuts into a single project based on the data collected in the exploratory projects. Beginning in November 2019, eligible establishments producing over 6,000 pounds of not ready-to-eat (NRTE) comminuted pork products (HC_PK_COM01) and establishments producing more than 50,000 pounds a day of raw pork cuts (HC_PK_CUT01) receive 5 sample tasks per month. Establishments below these thresholds that produce more than 1,000 pounds daily are sampled randomly throughout the year.

FSIS entered into a research collaboration with USDA's Agricultural Research Service (ARS) to continue diagnostics related to STEC in raw pork products sampled by FSIS. As announced in the October 4, 2019, *Constituent Update*, for all raw pork products collected after October 7, 2019, FSIS sent enrichments with ARS for further analysis of STEC recovery. Low numbers of samples collected in **Table 4** correlate with 6 days of sampling at the beginning of FY2020 from October 1 – 6 prior to implementing the change on October 7, 2019.

Table 4. FY 2020 Results for FSIS' Raw Pork Sampling Program

FY 2020 exploratory sampling results for detecting *E. coli* (O157:H7 and non-O157 STEC) and *Salmonella* in raw pork product samples are shown.

Product Name and Sampling Code	Pathogen	Number of Establishments Sampled	Number of Samples Analyzed	Number Positive	Percent Positive Calculation
Intact Cuts EXP_PK_ICT02[1]	*E. coli* O157:H7	6	12	0	0.00%
	non-O157 STEC	6	12	0	0.00%
	Salmonella spp.	76	232	8	3.45%
Non-intact Cuts[1] EXP_PK_NCT02	*E. coli* O157:H7	5	14	0	0.00%
	non-O157 STEC	5	14	0	0.00%
	Salmonella spp.	36	188	12	6.38%
Comminuted[1] EXP_PK_COM02	*E. coli* O157:H7	5	10	0	0.00%
	non-O157 STEC	5	10	0	0.00%
	Salmonella spp.	87	264	60	22.7%
Comminuted HC_PK_COM01[2]	*Salmonella* spp.	292	5,596	1,267	29.6%

Product Name and Sampling Code	Pathogen	Number of Establishments Sampled	Number of Samples Analyzed	Number Positive	Percent Positive Calculation
Intact and Non-Intact Cuts HC_PK_CUT01[2,3]	*Salmonella* spp.	87	1,826	205	6.75%

[1] At the end of October 2019, exploratory (EXP) sampling ended.
[2] Beginning in November 2019, eligible establishments producing over 6,000 pounds of not ready-to-eat (NRTE) comminuted pork products (HC_PK_COM01) and establishments producing more than 50,000 pounds a day of raw pork cuts (HC_PK_CUT01) receive 5 sample tasks per month. [3] Beginning in November 2019, all raw pork cuts, whether intact or non-intact, are collected under the same sampling code.

Siluriformes Products

FSIS began sampling raw fish of the order Siluriformes in May 2016 (FSIS Directive 14,010.1 from eligible establishments. In FY 2020, FSIS collected exploratory samples for *Salmonella* in raw Siluriformes fish products that will inform the next steps for food safety verification through routine sampling in the future.

Table 5. FY 2020 Siluriformes Sampling Results

FY 2020 exploratory sampling results for FSIS raw Siluriformes product sampling are shown.

Product Name and Sampling Code	Pathogen	Number of Establishments Sampled	Number of Samples Analyzed	Number Positive	Percent Positive Calculation
Raw Siluriformes EXP_FI_MIC01	*Salmonella*	75	599	23	3.8%

Poultry Products

FSIS samples Federally inspected establishments to verify whether eligible products meet applicable *Salmonella* performance standards[1]. Eligible products were scheduled for sampling 2 to 5 times per month throughout the year based on product volume. This allows FSIS to place each product into a category based on 24 to 60 sample results. All samples are tested for *Salmonella* and *Campylobacter* using enrichment methods (**Table 6**). Other products (quarter or half chicken carcasses, other chicken parts (hearts, livers, gizzards; FSIS Notice 42-20), and mechanically separated chicken and turkey) were also sampled but at lower numbers per establishment (**Table 6**). Notably, *Campylobacter* results in **Table 6** were derived from the enrichment method. The transition from direct plating to the more sensitive enrichment method was announced in the August 27, 2018 *Constituent Update*. FSIS announced new proposed *Campylobacter* standards for comminuted poultry (84 FR 38203) on August 6, 2019.

In FY 2020, FSIS concluded the exploratory sampling for livers, hearts, necks, and gizzards[2] and initiated an exploratory sampling program for fowl carcasses slaughtered under the New Poultry Inspection System (NPIS)[3].

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[1] Product eligibility described at https://www.fsis.usda.gov/sites/default/files/media_file/2020-08/10250.1-Salmonella_Scheduling_Algorithm_Functions.pdf.

[2] As announced in the August 7, 2020 *Constituent Update*.

[3] As announced in FSIS Notice 25-20.

Table 6. FY 2020 Sampling Result Summary for FSIS' Raw Poultry Sampling Programs

FY 2020 sampling results for detecting *Salmonella* and *Campylobacter* in raw poultry product samples are shown. Follow-up samples from previous positives are not included in the calculations.

Product Name and Sampling Code	Pathogen	Number of Establishments Sampled	Number of Samples Analyzed	Number Positive	Type of Calculation	Prevalence or Percent Positive Calculation
Chicken Whole Carcasses[1] HC_CH_CARC01	*Salmonella* spp.	205	9,686	456	Prevalence	3.52%
	Campylobacter spp.[4]	205	9,648	1,937	Percent Positive	18.42%
Chicken Quarter or Half Carcasses[1] EXP_CPT_QH01[2]	*Salmonella* spp.	51	63	6	Percent Positive	9.52%
	Campylobacter spp.[4]	50	62	28	Percent Positive	45.16%
Chicken Parts - Legs, Breasts, Wings[1] HC_CPT_LBW01	*Salmonella* spp.	479	13,909	1,160	Prevalence	7.62%
	Campylobacter spp.[4]	479	13,856	2,280	Percent Positive	17.17%
Other Raw Chicken [1,]Parts[1,5] EXP_CPT_OT01[2,6]	*Salmonella* spp.	75	145	90	Percent Positive	62.07%
	Campylobacter spp.	75	146	55	Percent Positive	37.67%
Comminuted Chicken HC_CH_COM01	*Salmonella* spp.	69	2,057	502	Prevalence	27.19%
	Campylobacter spp.[4]	69	2,043	94	Percent Positive	5.32%
Mechanically Separated Chicken[2] EXP_CH_MSK01	*Salmonella* spp.	25	82	66	Percent Positive	80.49%
	Campylobacter spp.[4]	25	82	61	Percent Positive	74.39%
Turkey Whole Carcasses[3] HC_TU_CARC01	*Salmonella* spp.	43	1,731	19	Prevalence	0.92%
	Campylobacter spp.[4]	43	1,727	50	Percent Positive	2.33%
Comminuted Turkey HC_TU_COM01	*Salmonella* spp.	44	1,413	229	Prevalence	17.02%
	Campylobacter spp.[4]	44	1,404	19	Percent Positive	1.28%
	Salmonella spp.	14	87	42	Percent Positive	48.28%

Product Name and Sampling Code	Pathogen					
Mechanically Separated Turkey[2] EXP_TU_MSK01	*Campylobacter* spp.[4]	14	87	29	Percent Positive	33.33%

[1] This sampling uses a product rinse.

[2] Exploratory sampling projects.

[3] This sampling project uses sponge sampling.

[4] *Campylobacter* results are of samples analyzed using the enrichment method. FSIS began analyzing raw poultry samples using the enrichment method on August 27, 2018.

[5] Only *Salmonella* results are reported for Raw Chicken - Other Parts.

[6] *Campylobacter* results from the EXP_CPT_OT01 sampling project are based on the direct plating method because the limited sample collection volume prevents the use of the enrichment method.

Table 7. FY 2020 Follow-Up Sampling Result Summary for FSIS' Raw Poultry Sampling Programs

FY 2020 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. 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 Sampling Code	Pathogen	Number of Establishments Sampled	Number of Samples Analyzed	Number Positive	Type of Calculation	Percent Positive Calculation
Chicken Whole Carcasses[1] F_CH_CARC01	*Salmonella* spp.	40	623	73	Percent Positive	11.72%
Chicken Parts - Legs, Breasts, Wings[1] F_CPT_LBW01	*Salmonella* spp.	95	1361	209	Percent Positive	15.36%
Comminuted Chicken F_CH_COM01	*Salmonella* spp.	13	143	42	Percent Positive	29.37%
Turkey Whole Carcasses[2] F_TU_CARC01	*Salmonella* spp.	1	1	0	Percent Positive	0.00%
Comminuted Turkey F_TU_COM01	*Salmonella* spp.	15	178	13	Percent Positive	7.30%

[1] This sampling uses a product rinse.

[2] This sampling uses sponge sampling.

Ready-to-Eat (RTE) Products

FSIS conducts microbiological testing of RTE meat, poultry, and egg products for *Lm* and *Salmonella*. *Lm* and *Salmonella* are adulterants in RTE products. Under various RTE sampling programs, FSIS collects RTE product samples and swab samples. More information can be found on the FSIS website: [RTE Meat and Poultry Products Microbiological Sampling Programs](#).

FSIS did not identify notable changes in the percent positive for *Lm* or *Salmonella* for RTE sampling programs (**Table 8**). There were fewer Routine *Listeria monocytogenes* (R*Lm*) samples collected due to restrictions put in place due to the CoViD-19 pandemic making it difficult to compare trends although the percent positive was still within typical rates.

In FY 2020, FSIS evaluated *Salmonella* and *Lm* percent positive in egg products (**Tables 9 and 10**).

Table 8: FY 2020 Ready-to-Eat Product Sampling Results

FY 2020 sampling results for all FSIS domestic RTE microbiological sampling programs are reported for *Listeria monocytogenes* (*Lm)* and *Salmonella* (if applicable).

Product Name and Sampling Code	Pathogen	Number of Establishments Sampled	Number of Samples Analyzed	Number Positive	Percent Positive Calculation
Post-Lethality Exposed (PLE) and non-PLE products selected randomly RTEPROD_RAND	*Listeria monocytogenes (Lm)*	2,162	6,609	8	0.12%
	Salmonella spp.	2,162	6,609	2	0.03%
PLE products selected by risk RTEPROD_RISK	*Listeria monocytogenes (Lm)*	1,674	7,517	17	0.23%
	Salmonella spp.	1,674	7,520	0	0.00%
Intensified Verification Testing (IVT/for-cause) product INTCONT	*Listeria monocytogenes (Lm)*	31	558	9	1.61%
	Salmonella spp.	3	15	0	0.00%
IVT non-food contact environmental INTENV	*Listeria monocytogenes (Lm)*	31	305	17	5.57%
	Salmonella spp.	3	23	0	0.00%

IVT product INTPROD	*Listeria monocytogenes (Lm)*	31	270	1	0.37%
	Salmonella spp.	3	15	0	0.00%
Routine risk-based *Lm* (R*Lm*/risk-based) food contact surfaces RLMCONT	*Listeria monocytogenes (Lm)*	124	1,634	6	0.37%
R*Lm* non-food contact environmental (composite of 5-swabs) RLMENVC[1]	*Listeria monocytogenes (Lm)*	124	164	11	6.71%
R*Lm* product (composite of five 25-gram products from same lot) RLMPRODC	*Listeria monocytogenes (Lm)*	125	165	0	0.00%

[1] Includes one RLMENVR noncomposited brine sample that was negative.

In FY 2020, FSIS updated egg products sampling (FSIS Notice 22-20, FSIS Directive 10,230.3). Previously, FSIS sampled egg products under seven different project codes. Plants received one sample task per month for each sample code for which the plant produced eligible product, regardless of the plant's production volume. For the revision, FSIS condensed the seven sample codes down to two. Inspectors at egg product plants now receive up to three sample tasks per month based on the plant's overall production volume.

Table 9. RTE Egg Products FY 2020 *Salmonella* Sampling Results

FY 2020 microbiological sampling of liquid and dried domestic pasteurized egg products tested for *Salmonella* are shown.

Sampling Code	Product	*Salmonella* (Oct - May)			*Salmonella* (Jun – Sep)			
		Positive	Total	Percent Positive Calculation	Code/Product	Positive	Total	Percent Positive Calculation
EM31	Egg Whites	0	224	0.00%	EGG_LQ_MIC01– Liquid / Frozen Egg Products	1	377	0.26%
EM32	Whole Egg or Yolks	0	293	0.00%				
EM33	Whole Eggs with Added Yolks or Whole Egg Blends	0	155	0.00%				
EM34	Whole Eggs or Yolks with > 2% Salt or Sugar Added	0	215	0.00%				
EM35	Dried Yellow Egg Products	0	105	0.00%	EGG_DY_MIC01– Dried Egg Products	0	97	0.00
EM36	Dried Egg Whites	0	76	0.00%				
EM37	Pan Dried Egg White	0	8	0.00%				

Table 10. RTE Egg Products FY 2020 Sampling *Listeria monocytogenes* Results

FY 2020 microbiological sampling of liquid and dried domestic pasteurized egg products tested for *Listeria monocytogenes* are shown.

Sampling code	Product	*Listeria monocytogenes* (Lm) (Oct - May)			*Listeria monocytogenes* (Lm) (Jun – Sep)			
		Positive	Total	Percent Positive Calculation	Sampling Code/Product	Positive	Total	Percent Positive Calculation
EM31	Egg Whites	0	224	0.00%	EGG_LQ_MIC01– Liquid / Frozen Egg Products	0	377	0.00%
EM32	Whole Egg or Yolks	0	293	0.00%				
EM33	Whole Eggs with Added Yolks or Whole Egg Blends	0	155	0.00%				

EM34	Whole Eggs or Yolks with > 2% Salt or Sugar Added	0	215	0.00%			
EM35	Dried Yellow Egg Products	0	105	0.00%	EGG_DY_MIC01– Dried Egg Products	0	97	0.00
EM36	Dried Egg Whites	0	76	0.00%			
EM37	Pan Dried Egg White	0	8	0.00%			

National Residue Program

The U.S. National Residue Program (NRP) sampling plan guides the collection of domestic and imported meat, poultry, and egg product samples. Information on the NRP can be found on the FSIS website: Residue Chemistry.

Domestic Scheduled Sampling Plan

The domestic sampling plan includes surveillance sampling, inspector-generated, and special project sampling in both Federal and state-inspected slaughter establishments. The NRP requires the cooperation and collaboration of other agencies (Food and Drug Administration (FDA) and Environmental Protection Agency (EPA)) for its successful design and implementation. Each year, representatives from FSIS, FDA, EPA, USDA Agricultural Research Service (ARS), USDA Agricultural Marketing Service (AMS), and the U.S. Centers for Disease Control and Prevention (CDC), convene for a meeting of the Surveillance Advisory Team to evaluate chemical compounds for inclusion in the NRP for the following fiscal year.

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 2020, 10 analytical methods were used by FSIS to detect approximately 250 different veterinary drugs, pesticides, and environmental contaminants. Of the 7,726 samples analyzed by FSIS (7,304 from U.S. Federal plants and 422 from U.S. State inspected plants), 31 samples contained violative chemical residues. In total, more than 1,000,000 chemical residues were evaluated in the 7,726 samples analyzed under the scheduled sampling plan.

In comparison to NRP Surveillance sampling from previous years (FY 2016 -- FY 2020), the number of samples collected has remained about the same. The violation rate (no. of violations/no. of samples collected) for Surveillance sampling was 0.27% in FY 2019 and 0.40% in FY 2020. In FY 2020, the detected residue violations consisted of the following residues: moxidectin (4), piperonyl butoxide (3), DDT and metabolites (3), atrazine (3), diclofenac (3), lasalocid (3), metolachlor (3), metronidazole (3), tilmicosin (2), and one instance each for bifenthrin, carbadox,

ciprofloxacin, enrofloxacin, imidacloprid, pentachlorobenzene, permethrin, and ractopamine. In some cases, sample violations were associated with multiple residues in a single sample.

Table 11: Summary of FY 2020 Surveillance Sampling Residue Results

FY 2020 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 Planned	Number of Samples Analyzed by Animal Class			
			Total Samples	Number of Non-Detect Samples	Number of Non-Violative Positives Samples	Number of Violative Samples
Bovine	Beef Cows	800	850	843	5	2
	Bob Veal	400	420	413	7	--
	Dairy Cows	800	863	858	4	1
	Formula-Fed Veal	75	64	63	--	1
	Heifers	400	509	483	24	2
	Non-Formula-Fed Veal	75	63	61	1	1
	Steers	400	477	455	22	--
Porcine	Feral Swine	75	57	56	--	1
	Market Swine	800	869	861	7	1
	Roaster Swine	300	312	311	--	1
	Sows	800	715	708	1	6
Poultry	Young Chickens	400	397	395	2	--
	Whole Chickens	400	219	218	1	--
	Young Turkeys	800	656	649	7	--
Other Species	Goats	300	298	294	--	4
	Lambs	100	127	123	4	--
	Mature Sheep	100	105	103	--	2
	Siluriformes (Catfish)	650	564	547	10	7
	Egg Products	400	161	158	1	2
Annual Total		**8,075**	**7,726**	**7,599**	**96**	**31**

Table 12: FY 2020 Residue Surveillance Sampling Summarized by Chemical Methods

FY 2020 residue surveillance collection summary is shown reflecting the number of samples (carcasses) analyzed per chemical method per animal class.

Animal Category	Samples Collected	Number of Samples Analyzed per Chemical Method								
		Aminoglycosides	Antifungal Dyes	Avermectins	βeta-Agonists	Carbadox	Metals	Multi-Residue Method	Nitrofurans	Pesticides
Beef Cows	850	850	--	91	430	--	118	850	--	433
Bob Veal	420	419	--	48	208	--	99	420	--	212
Dairy Cows	863	863	--	100	436	--	120	863	--	441
Formula-Fed Veal	64	64	--	6	24	--	1	64	--	24
Heifers	509	508	--	55	253	--	114	509	--	256
Non-Formula Fed Veal	63	63	--	7	27	--	--	63	--	28
Steers	477	476	--	55	232	--	110	477	--	233
Feral Swine	57	--	--	--	--	--	--	7	--	57
Market Swine	869	867	--	94	464	--	127	869	--	465
Roaster Swine	312	--	--	--	--	311	--	1	--	--
Sows	715	714	--	85	350	--	106	715	--	351
Young Chickens	397	396	--	--	--	--	90	396	169	191
Whole Chickens	219	219	--	--	--	--	--	219	213	219
Young Turkeys	656	654	--	--	--	--	132	656	315	320
Goats	298	298	--	40	--	--	--	298	--	145
Lambs	127	127	--	24	--	--	--	127	--	20
Mature Sheep	105	105	--	12	47	--	--	104	--	57
Siluriformes	564	--	299	--	--	--	283	563	218	263
Egg Products	161	--	--	--	103	--	--	126	--	161
Annual Total	**7,726**	**6,623**	**299**	**617**	**2,574**	**311**	**1,300**	**7,327**	**915**	**3,876**

Table 13. Summary FY 2020 Surveillance Sampling Residue Violations by Animal Class

List of FY 2020 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 (CFR Citation)
Beef Cow	Muscle	p,p'-DDE (4,4')	*	*	*	CPG Sec. 575.100
Beef Cow	Muscle	Diclofenac	*	*	*	Not Approved[1]
Dairy Cow	Muscle	Piperonyl Butoxide	0.162	PPM	0.100	40 CFR 180.127
Eggs	--	Lasalocid	*	*	*	21 CFR 556.347
Eggs	--	Lasalocid	*	*	*	21 CFR 556.347
Feral Swine	Muscle	DDT and Metabolites	*	*	*	CPG Sec. 575.100
Formula-fed Veal	Muscle	Enrofloxacin	0	*	*	21 CFR 556.226
		Ciprofloxacin	0	*	*	21 CFR 530.41
Goat	Muscle	Moxidectin	40.40	PPB	0.00	21 CFR 556.426
Goat	Muscle	Moxidectin	43.10	PPB	0.00	21 CFR 556.426
Goat	Muscle	Moxidectin	32.10	PPB	0.00	21 CFR 556.426
Goat	Muscle	Moxidectin	35.90	PPB	0.00	21 CFR 556.426
Heifer	Liver	Ractopamine	0.114	PPM	0.090	21 CFR 556.570
Heifer	Muscle	Diclofenac	*	*	*	Not Approved[1]
Market Swine	Muscle	DDT and Metabolites	*	*	*	CPG Sec. 575.100
Mature Sheep	Muscle	Diclofenac	*	*	*	Not Approved[1]
Mature Sheep	Muscle	Pentachlorobenzene	*	*	*	Not Approved[1]
Non-Formula-fed Veal	Liver	Tilmicosin	23.30	PPM	1.200	21 CFR 556.735
	Muscle	Tilmicosin	3.080	PPM	0.100	21 CFR 556.735
Roaster Swine	Liver	Carbadox	130.0	PPB	30	21 CFR 556.100
Siluriformes	Muscle	Imidacloprid	0.433	PPM	0.050	40 CFR 180.472
		Lasalocid	*	*	*	21 CFR 556.347
Siluriformes	Muscle	Atrazine and Metabolites	*	*	*	40 CFR 180.220
Siluriformes	Muscle	Atrazine and Metabolites	*	*	*	40 CFR 180.220
Siluriformes	Muscle	Metolachlor	*	*	0.00	40 CFR 180.368
	Muscle	Atrazine and Metabolites	*	*	*	40 CFR 180.220

Animal Category	Tissue	Compound	Concentration	Units	Tolerance Level Value	Authority (CFR Citation)
Siluriformes	Muscle	Metolachlor	*	*	0.00	40 CFR 180.368
Siluriformes	Muscle	Metolachlor	*	*	0.00	40 CFR 180.368
Siluriformes	Muscle	Bifenthrin	0.693	PPM	0.500	40 CFR 180.442
Sow	Muscle	Permethrin (Cis and Trans)	0.089	PPM	0.050	40 CFR 180.378
		Piperonyl Butoxide	0.169	PPM	0.100	40 CFR 180.127
Sow	Muscle	Piperonyl Butoxide	0.174	PPM	0.100	40 CFR 180.127
Sow	Muscle	Metronidazole	*	*	*	Not Approved[1]
Sow	Muscle	Metronidazole	*	*	*	Not Approved[1]
Sow	Muscle	Metronidazole	*	*	*	Not Approved[1]
Sow	Muscle	p,p'-DDE (4,4')	*	*	*	CPG Sec. 575.100

* Violative residue results were detected but not quantified.

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

PPB – parts per billion (µg/kg)

PPM – parts per million (mg/kg)

Inspector-Generated Sampling Plan

FSIS inspectors may generate non-scheduled samples when they suspect that animals presented for slaughter inspection may have violative levels of chemical residues. If an inspector suspects that there is misuse of drugs that cannot be detected by the KIS™ test, the samples are sent directly to the laboratory for appropriate analysis. These samples are reported under the Collector-Generated program.

In FY 2020, 166,306 Kidney Inhibition Swab (KIS™) tests were conducted on animals selected by FSIS (**Table 14**). In total, 2,783 samples were submitted to FSIS field laboratories for further analysis and, of these, 507 chemical residue violations were reported in 419 samples. Due to multiple analyses per sample submitted, multiple residue violations may be found in the same sample. The predominant violative residues in the inspector-generated samples were ceftiofur (152), penicillin (100), and neomycin (37), which account for 30%, 20%, and 7.3% of total violative residues, respectively.

Dairy cows (63%) and bob veal (18%) accounted for 81% of the 419 violations reported under the inspector-generated sampling plan.

- In FY 2020, desfuroylceftiofur (the primary metabolite of ceftiofur) and penicillin account for 49% and 26% of the violations reported in dairy cows, respectively.

- In FY 2020, of the 180 bob veal samples analyzed at FSIS labs, neomycin accounts for greater than 49% of the violations reported.

- In FY 2020, IPP performed a total of 23,297 in-plant KIS™ test in swine slaughter classes (market swine, sows, roaster swine, boar swine, and feral swine), resulting in only six violative samples (0.03%).

Table 14. Summary of FY 2020 Inspector-Generated Sampling (KIS™) Test and Confirmatory Tests

FY 2020 summary of in-plant screening tests performed using the KIS™ test, 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	10,284	10,002	276	**30**
	Bison	2	2	0	**0**
	Bob Veal	26,880	26,700	180	**76**
	Bulls	1,382	1,342	41	**10**
	Dairy Cows	87,899	86,128	1,779	**263**
	Heavy Calves	290	277	13	**4**
	Formula-fed Veal	238	231	7	**0**
	Heifers	4,490	4,385	112	**4**
	Non-Formula-fed Veal	224	210	14	**3**
	Steers	9,356	9,164	197	**15**
Porcine	Boar/Stag Swine	78	78	0	**0**
	Feral Swine	2	2	0	**0**
	Market Swine	18,227	18,122	99	**0**
	Roaster Swine	1,575	1,571	4	**0**
	Sows	3,415	3,383	36	**6**
Other Species	Goats	593	583	12	**8**
	Mature Sheep	404	399	2	**0**
	Lambs	967	957	11	**0**
Annual Total		**166,306**	**163,536**	**2,783**	**419**

Table 15. Summary of FY 2020 Inspector-Generated Sampling Residue Violation Results by Chemical Residue and Animal Class

FY 2020 summary of chemical residue violations reported within the inspector-generated sampling.

Chemical Residue	Animal Class											Total
	Beef Cow	Bob Veal	Bull/ Stag	Dairy Cow	Goat	Heavy Calf	Heifer	Lamb	Non-Formula-fed Veal	Sow	Steer	
Ampicillin	--	--	--	15	--	--	--	--	--	--	--	15
Ciprofloxacin	1	5	1	2	--	--	1	--	--	--	1	11
Desethylene Ciprofloxacin	--	4	--	--	--	--	--	--	--	--	--	4
Desfuroylceftiofur	6	7	1	129	--	--	1	--	1	2	5	152
Dihydrostreptomycin	--	--	--	1	--	--	--	--	--	--	--	1
Dimetridazole	--	--	--	1	--	--	--	--	--	--	--	1
Doramectin	2	--	2	--	--	--	--	--	--	--	--	4
Doxycycline	--	1	--	--	--	--	--	--	--	--	--	1
Enrofloxacin	--	4	--	--	--	--	--	--	--	--	--	4
Florfenicol	3	1	1	1	--	--	2	--	--	--	2	10
Florfenicol Amine	--	1	--	--	--	--	--	--	--	--	--	1
Flunixin	1	5	--	22	--	1	--	--	--	2	3	34
Gentamycin Sulfate	1	2	--	2	--	--	--	1	1	--	--	7
Ketoprofen	--	--	--	2	--	--	--	--	--	--	--	2
Lincomycin	1	--	--	--	--	--	--	--	--	--	--	1
Meloxicam	--	--	--	7	--	1	--	--	--	--	--	8
Neomycin	--	37	--	--	--	--	--	--	--	--	--	37
Oxytetracycline	1	--	--	3	8	--	--	--	--	--	--	12
Penicillin	12	6	3	70	2	1	1	--	--	2	3	100
Phenylbutazone	--	--	--	--	--	--	--	--	1	--	--	1
Sulfadimethoxine	1	4	1	30	--	--	--	--	--	--	--	36
Sulfadoxine	--	--	--	1	--	--	--	--	--	--	--	1
Sulfamethazine	6	1	3	11	--	--	--	--	--	--	2	23

Sulfamethoxazole	--	13	--	--	--	--	--	--	--	--	--	**13**
Sulfathiazole	--	10	--	--	--	--	--	--	--	--	--	**10**
Tetracycline	--	--	--	4	--	--	--	--	--	--	--	**4**
Tilmicosin	1	2	1	3	--	3	--	--	--	--	3	**13**
Tylosin	--	1	--	--	--	--	--	--	--	--	--	**1**
Annual Total	**36**	**104**	**13**	**304**	**10**	**6**	**5**	**1**	**3**	**6**	**19**	**507**

Table 16. Summary of FY 2020 Collected-Generated Sampling

FY 2020 summary of suspect carcass samples sent directly to any FSIS laboratory (collected-generated sampling) for appropriate analysis.

Animal Category	Animal Class	Number of Non-Detect Samples	Number of Non-Violative Positives Samples	Number of Violative Samples	Total Samples
Bovine	Beef Cow	18	3	1	22
	Bob Veal	2	--	2	4
	Bull/Stag	1	--	--	1
	Dairy Cow	39	3	5	47
	Heifer	4	5	1	10
	Steer	52	9	2	63
Porcine	Market Swine	27	2	--	29
	Roaster Swine	3	--	--	3
	Sow	1	--	--	1
Poultry	Young Turkey	1	--	--	1
Other Species	Goat	4	--	--	4
	Mature Sheep	1	--	--	1
	Lamb	8	1	1	10
Annual Total		**161**	**23**	**12**	**196**

Imports Sampling

Import Microbiological Sampling

FSIS conducts port-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. Sampling for imported product depends on the volume of shipments received by country and product.

Table 17. Summary of FY 2020 Microbiological Sampling of Imported Products

FY 2020 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.

Product Name and Sampling Code	Pathogen	Normal		Increased[1]		Intensified[2]		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	1,411	2	862	1	189	3	2,462
	non-O157 STEC	1,371	5	829	3	185	2	2,385
	Salmonella spp.	1,410	11	862	5	189	3	2,461
Imported Raw Ground or Comminuted Beef or Veal Product MT08	*E. coli* O157:H7	68	1	2	0	--	--	70
	Salmonella spp.	68	0	2	0	--	--	70
Micro Pathogen Sampling of RTE Products IMVRTE	*Listeria monocytogenes*	2,727	4	5	0	83	0	2,815
	Salmonella spp.	2,726	0	5	0	83	0	2,814
Imported Egg Products EGGIMP	*Listeria monocytogenes*	111	0	--	--	--	--	111
	Salmonella spp.	111	0	--	--	--	--	111
Imported Raw and NRTE Poultry Products IMP_Poultry	*Salmonella* spp.	766	150	--	--	--	--	766
	Campylobacter	765	72	--	--	--	--	765
Imported Raw Pork Product	*Salmonella* spp.	329	7	--	--	--	--	329

IMP_Pork									
Imported *Siluriformes* Microbiology Sampling IMPFISH_MI	*Salmonella* spp.	652	2	--	--	--	--	--	652

[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.

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. A total of 6,661 samples were analyzed under this program in FY 2020, of which, six samples were violative. Those violative samples originated from the following countries: Argentina (2), Canada (2), and Vietnam (2). The results are summarized in **Table 18**.

Table 18. Summary of FY 2020 Residue Sampling of Imported Products

FY 2020 import residue samples by inspection level and production type.

Sampling Code	Analytical Method	Normal			Increased[1]		Intensified[2]			Annual Total
		Number of Samples Analyzed	Non-Violative Positives Samples	Violative Samples	Number of Samples Analyzed	Non-Violative Positives Samples	Number of Samples Analyzed	Non-Violative Positives Samples	Violative Samples	
Imported Fish Products- Eastern Laboratory IMPFISH_CH_E	Antifungal Dyes, Metals, MRM	656	--	--	--	--	--	--	--	**656**
Imported Fish Products-	Nitrofurans, Pesticides	609	--	1	--	--	31	--	1	**640**

Western Laboratory IMPFISH_CH_W										
Imported - Metals IMPMETALS	Metals	357	--	--	597	--	--	--	--	**954**
Imported - Pesticide IMPPESTICIDE	Pesticides	807	1	2	574	3	--	--		**1,381**
Imported Egg Products - Chemistry IMPRESEGG	Pesticides	37	--	--	--	--	--	--	--	**37**
Imported Fresh Products - Residue Eastern Lab IMPRESFR_EL	Aminoglycosides, Avermectins, MRM	844	3	--	603	4	5	--	--	**1,452**
Imported Fresh Products - Residue Western Lab IMPRESFR_WL	Aminoglycosides, Beta Agonists, MRM, Nitrofurans	742	5	1	579	2	26	5	1	**1,347**
Imported Processed Products - Residue Eastern Lab IMPRESPR_EL	Avermectins	107	7	--	--	--	--	--	--	**107**
Imported Processed Products - Residue	Sulfonamides	87	--	--	--	--	--	--	--	**87**

Midwestern Lab IMPRESPR_MWL									
Annual Total	**4,246**	**16**	**4**	**2,353**	**9**	**62**	**5**	**2**	**6,661**

[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. During FY 2020, there were no violative samples at increased level of inspection.

[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.

Table 19. FY 2020 Import Residue Sampling Violations by Foreign Country/Animal Class

List of FY 2020 import residue sampling violations (foreign country, specific compound, concentration, tolerance, and regulatory citation) by animal class.

Foreign Country	Animal Class	Compound	Concentrations	Units	Tolerance Level Value	Authority (CFR Citations)
Argentina	**Beef**	Ethion	*	*	*	Not Approved[1]
Argentina	**Beef**	Ethion	*	*	*	Not Approved[1]
Canada	**Beef**	Abamectin	73.8	PPB	20.0	40 CFR 180.449
Canada	**Beef**	Doramectin	30.9	PPB	30.0	21 CFR 556.222
		Abamectin	49.2	PPB	20.0	40 CFR 180.449
Vietnam	***Siluriformes***	Fipronil	*	*	*	Not Approved[1]
Vietnam	***Siluriformes***	Fipronil	*	*	*	Not Approved[1]

* Violative residue results were detected but not quantified.

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

PPB – parts per billion (µg/kg)

Whole Genome Sequencing (WGS) Initiatives

FSIS engaged with Federal partners to establish, advance, and implement the application of whole genome sequencing (WGS) data for regulatory purposes. FSIS works to ensure that WGS-related projects: (1) align with the goals and objectives of the FSIS Strategic Plan and other policies and (2) disseminates information about the use of WGS data analyses to FSIS personnel and stakeholders.

FSIS laboratories performed WGS on all positive sample isolates for all pathogens from FSIS-regulated products. In FY 2020, this equated to ~14,000 bacterial isolate sequences uploaded to National Center for Biotechnology Information (NCBI). FSIS modernized *Salmonella* serotype determination and moved to using WGS data to routinely determine the serotype. FSIS laboratories additionally began inputting antimicrobial resistance genes, adaptability genes and *E. coli* virulence genes into the Data Warehouse in Quarter Four of FY 2020. The goal of this work is to provide the analyzed WGS data to Agency analysts for risk assessment purposes.

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. Until the first quarter of FY 2020, food animals' cecal content samples were taken from young chickens, young turkeys, dairy cattle, beef cattle, market hogs, and sows and analyzed for pathogens (*Salmonella* and *Campylobacter*) and indicator bacteria (*E. coli* and *Enterococcus*). In February 2020, FSIS implemented cecal content sampling for veal, lamb, sheep, and goats and these samples were analyzed for the same NARMS bacteria as the other cecal samples. In addition, lymph node sampling was included for dairy and beef cattle with a focus only on *Salmonella* analysis, and the new analysis of *E. coli* and *Enterococcus* was included into the Siluriformes fish sampling program. As shown in **Table 20**, in FY 2020, the NARMS program analyzed a total of 6,414 NARMS samples. From NARMS sampling in FY 2020, a total of 5,908 bacterial isolates were recovered. 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 20. Summary of FY 2019 NARMS Cecal Sampling Program

FY 2020 NARMS samples analyzed, isolates recovered, and further characterized.

Sampling Code	Samples Scheduled	Samples Analyzed	Total Isolates Retrieved	Isolates Characterized			
				Salmonella	Campylobacter	E. coli	Enterococcus
NARMS_YC Young Chicken	617	560	914	WGS - 233	WGS - 211	WGS - 91	WGS - 68
				AST - 236	AST - 222	AST - 227	AST - 219
NARMS_YT Young Turkey	337	349	580	WGS - 44	WGS - 149	WGS - 107	WGS - 59
				AST - 44	AST - 157	AST - 189	AST - 183
NARMS_DC Dairy Cow	848	769	851	WGS - 172	WGS - 195	WGS - 91	WGS - 54
				AST - 173	AST - 203	AST - 257	AST - 211
NARMS_BC Beef Cow	416	393	245	WGS - 31	WGS - 51	WGS - 39	WGS - 15
				AST - 31	AST - 55	AST - 88	AST - 68
NARMS_ST Steer	1076	1001	403	WGS - 103	WGS - 115	WGS - 40	WGS - 17
				AST - 107	AST - 120	AST - 89	AST - 82
NARMS_HF Heifer	470	410	336	WGS - 48	WGS - 109	WGS - 47	WGS - 26
				AST - 49	AST - 116	AST - 84	AST - 82
NARMS_MS Market Swine	727	681	824	WGS - 220	WGS - 156	WGS - 119	WGS - 63
				AST - 224	AST - 162	AST - 224	AST - 207
NARMS_SW Sow	330	304	641	WGS - 172	WGS - 69	WGS - 102	WGS - 62
				AST - 172	AST - 76	AST - 199	AST - 190
NARMS_BV Bob Veal	150	138	207	WGS - 44	WGS - 7	WGS - 38	WGS - 22
				AST - 44	AST - 7	AST - 78	AST - 76
NARMS_FFV Formula-Fed Veal	76	73	65	WGS - 3	WGS - 3	WGS - 20	WGS - 18
				AST - 3	AST - 3	AST - 30	AST - 29
NARMS_NFFV Non-Formula Fed Veal	72	56	59	WGS - 5	WGS - 11	WGS - 6	WGS - 8
				AST - 5	AST - 11	AST - 26	AST - 20
NARMS_GO Goat	92	75	84	WGS - 14	WGS - 15	WGS - 9	WGS - 5
				AST - 14	AST - 16	AST - 26	AST - 24
NARMS_LB Lamb	82	78	110	WGS - 18	WGS - 30	WGS - 8	WGS - 7
				AST - 18	AST - 30	AST - 33	AST - 28
NARMS_SH Sheep	71	62	81	WGS - 17	WGS - 17	WGS - 8	WGS - 7
				AST - 17	AST - 17	AST - 24	AST - 23
Siluriformes	N/A[1]	1264	471	WGS - 25	WGS – N/A	WGS - 38	WGS - 58
				AST - 25	AST – N/A	AST - 211	AST - 216
Cattle Lymph Nodes	230	201	37	WGS - 37	WGS – N/A	WGS – N/A	WGS – N/A
				AST - 37	AST – N/A	AST – N/A	AST – N/A

N/A – not applicable

[1]Siluriformes NARMS samples are sourced from the Siluriformes microbiology sampling project, EXP_FI_MIC01, and not scheduled independently.

Other Sampling

FSIS conducts other sampling programs and special projects, in addition to microbiological and chemical residue sampling, in response to investigations or other rapidly evolving events to protect consumers

and ensure food safety. 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;
- Sampling in support of other outbreak or natural disaster investigations;
- Animal species identification sampling to verify species named in labeling of meat, poultry, and egg products;
- Food chemistry sampling to identify economic fraud or other chemical hazards;
- Compliance testing to evaluate products in commerce that are suspected to be adulterated or misbranded;
- 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; and
- Abnormal container testing when inspection program personnel observe an abnormal container being used for thermally processed products.

These projects may also include routine sampling, such as:

- Label verification sampling to identify mislabeling, economic fraud, and adulteration of meat, poultry, and egg products.

Conclusion

In FY 2020, 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.