Chemical Residues and Contaminants

The Food Safety and Inspection Service (FSIS) uses a variety of analytical methods to detect, identify, and quantify chemical residues that may be present in meat (including *Siluriformes* fish), poultry, and egg products. The National Residue Program (NRP) supports FSIS's mission to protect public health by ensuring that FSIS-regulated products are safe, wholesome, and accurately labeled. FSIS partners with the Food and Drug Administration (FDA) and the Environmental Protection Agency (EPA) to ensure that food products

comply with U.S. requirements for veterinary drug residues, pesticide residues, and chemical contaminants. The FDA sets tolerances for veterinary drugs, which can be found in Title 21 of the Code of Federal Regulations (CFR). The EPA sets tolerances for pesticides, which can be found in Title 40 of the CFR. Contaminants include any chemical compounds in the NRP that are not veterinary drugs or pesticides. FSIS publishes its annual sampling data and annual sampling report </science-data/sampling-program>each year. For quarterly reports of residue data, please refer below.

Residue Testing: National Residue Program

NRP Background

National Residue Program

What is the U.S. National Residue Program?

The United States National Residue Program (NRP) for Meat*, Poultry, and Egg Products is an interagency program designed to identify, prioritize and analyze chemical residues and contaminants in meat, poultry, and egg products. The U.S. Department of Agriculture's (USDA) Food Safety and Inspection Service (FSIS) administers this program. FSIS publishes the NRP Residue Sampling Plan (historically published as the "Blue Book") each year to provide information on the process of sampling meat, poultry, and egg products and testing them for chemical compounds of public health concern.

The NRP is an important component of the FSIS mission to protect the health and welfare of the consumers by regulating domestic and imported meat, poultry, and egg products and to prevent the distribution into commerce of any such products that are adulterated or misbranded.

(*NOTE: The 2008 Farm Bill amended the Federal Meat Inspection Act (FMIA) to make all fish of the order Siluriformes amenable to the FMIA and, therefore, subject to FSIS inspection.)

How does the Program Work?

An essential aspect of food safety in meat, poultry, and egg products is the control of residues that may result from the use of animal drugs and pesticides, or from exposure to environmental contaminants.

The United States has a complex residue surveillance and control system, with rigorous processes for approval, sampling, testing, and enforcement. FSIS administers this regulatory program under the Federal Meat Inspection Act (FMIA) (21 U.S.C. 601 et seq.), the Poultry Products Inspection Act (PPIA) (21 U.S.C. 453 et seq.), and the Egg Products Inspection Act (EPIA) (21 U.S.C. 1031 et seq.). FSIS collects and tests samples of domestic and imported meat (including Siluriformes fish products), poultry, and egg products for residues. The NRP assists FSIS in meeting its mission to protect the public's health by ensuring that meat, poultry, and egg products are safe, wholesome, and accurately labeled.

The NRP is designed to provide a structured process for:

1. Identifying and evaluating chemical compounds intentionally and unintentionally used in food animals;
2. Testing for chemical compounds of concern;
3. Reporting test results; and
4. Determining the appropriate regulatory response to findings of chemical residues.

FSIS-Regulated Establishments

What Type of Sampling is Performed in FSIS-Regulated Establishments for the U.S. National Residue Program?

The NRP sampling plan guides the collection of domestic meat, poultry, and egg product samples and the import reinspection of meat, poultry, and egg products. The domestic sampling plan includes surveillance sampling, inspector-generated, and special project sampling in both federal and state-inspected slaughter facilities. The import reinspection sampling plan encompasses normal sampling, increased sampling, and intensified sampling. Details on FSIS residue sampling policy and procedures can be found in the following FSIS Directives:

- FSIS Directive 9900.6, for sampling imported meat, poultry, or egg product shipments presented for import reinspection at United States port-of-entry;
- FSIS Directive 10,800.1, for sampling in domestic slaughter establishments;
- FSIS Directive 14,010.1, for sampling fish of the Order Siluriformes from domestic establishments; and
- FSIS Directive 14,100.1, for sampling fish of the Order Siluriformes presented for import reinspection at United States port-of-entry.

Surveillance Sampling

Surveillance sampling is the scheduled sampling of specified slaughter subclasses [Animal Production Class Nomenclature (PDF Only)] at the time of slaughter, after a carcass has passed antemortem inspection. Carcasses are randomly selected within a given production class for sampling, with the goal of providing a nationally representative sample that can be used to determine baseline levels of chemical residues. The establishment must hold or control livestock carcasses selected for

testing pending the test results. For poultry carcasses, FSIS recommends that the establishment holds the specific poultry carcasses selected for residue testing pending the test results.

The animal production classes that are included in the FY2020 surveillance sampling plan can be found in the Domestic and Import Reinspection Sampling Plans table.

Inspector-Generated Sampling

FSIS inspectors conduct inspector-generated sampling when they suspect that animals may have violative levels of chemical residues. Currently, inspector-generated sampling targets individual suspect animals, suspect animal populations, and animals retained or condemned for specific pathologies.

The Public Health Veterinarian (PHV) selects a carcass for sampling based on the criteria outlined in FSIS Directive 10,800.1 (i.e., animal with disease signs and symptoms, producer history of violative levels of residues, or as a follow-up to results from random scheduled sampling). The PHV is to perform a KIS™ test on any carcass suspected of containing violative levels of chemical residues and on any carcass exhibiting signs of systemic conditions (e.g., septicemia, peritonitis, pyemia). When a PHV detects evidence of a disease that might have been treated with certain veterinary drugs or an injection site, the carcass is retained by FSIS. Tissue samples are collected from the carcass and tested for the presence of antibiotic drug residues using the Kidney Inhibition Swab test (KIS™ test), an in-plant screening test. If the KIS™ test is negative for antibiotic drug residues included in the screen, the carcass may continue to be retained for additional testing if other drug or chemical residues are suspected; otherwise, the carcass is released to the establishment. If the KIS™ test result is positive, the carcass is retained by FSIS pending the

confirmation results of FSIS laboratory testing. The PHV condemns carcasses and parts from animals found to contain violative levels of residues.

The state inspectors from state-inspected establishments that are “at least equal to” the federal requirements collect and submit samples of kidney, liver, and muscle directly to the FSIS laboratory from animals suspected of having violative residues.

Special Project (Exploratory) Sampling

When a necessary analytical project cannot be performed on samples that are already being collected as part of the surveillance or inspector-generated sampling, FSIS may collect special project samples. The duration of these sampling plans varies based on the situation.

Special project sampling may be specific to individual animals within a production class or may be conducted at a herd or flock level. An exploratory sampling program designed for livestock or flocks originating from the same farm or geographic region may be necessary to determine the level of exposure to one or more chemicals.

Whether an establishment must hold or control livestock carcasses subject to special project sampling depends on which chemical compounds are included in the testing and the regulatory decisions FSIS may take based on the test results.

In FY2020, special project sampling includes the production classes described in the Animal Production Class Nomenclature document.

Imported Products

What Type of Sampling and Testing is Performed on Imported Products for the U.S. National Residue Program?

Imported meat, poultry, and egg products are sampled through the point-of-entry Import Reinspection Sampling Plan, a chemical residue monitoring program conducted to verify the equivalence of inspection systems in exporting countries to U.S. standards. All imported products are subject to reinspection, and one or more Types of Inspection (TOI) are conducted on every lot of product before it enters the United States. The reinspection of imported products includes chemical residue testing. There are three levels of chemical residue reinspection:

- Normal sampling: random sampling from a lot;
- Increased sampling: above-normal sampling resulting from an Agency management decision; and
- Intensified sampling: additional samples taken when a previous sample for a TOI failed to meet U.S. requirements.

The structure of the import reinspection sampling program is based on criteria used to develop the domestic plan. The estimated annual amount of product imported into the United States is used to assign the number of samples. The importer of record must maintain control of the imported product that is subject to normal and increased import reinspection sampling pending the test results. For intensified import sampling, FSIS retains the product lot pending test results.

The testing of samples collected from imported product is similar to the domestic plan, with two important exceptions. Raw product testing from samples collected at the U.S. point-of-entry is rare, because many countries ship only processed products due to restrictions based on the presence of foreign animal diseases. When the importation of raw products is allowed, the raw product typically consists of muscle tissue only. FSIS requires exporting countries to identify the animal species in each product but does not require them to identify the production class. Imported meat and poultry testing is categorized by species (e.g., poultry

or porcine); egg products are distinguished as a separate category. For these reasons, the compounds selected for analysis in the import plan may not necessarily be the same as those in the U.S. domestic plan.

Chemicals Tested

Which Chemical Compounds are the Samples Tested for Under the U.S. National Residue Program?

The range of chemical compounds evaluated for inclusion in the NRP is comprehensive in scope. Testing includes approved and unapproved veterinary drugs, pesticides, and environmental contaminants known or suspected to be present in food animals in the United States or in countries exporting products to the United States. These three broad categories of chemical residues and contaminants are described below. FSIS partners with the Food and Drug Administration (FDA) and the Environmental Protection Agency (EPA) to decide which specific chemical compounds to test for within each category.

Veterinary Drugs

This category includes veterinary drugs that are regulated by the FDA under the Federal Food, Drug, and Cosmetic Act (FFDCA). FDA has established tolerance levels in meat, poultry, and egg products for many veterinary drugs, which can be found in Title 21 of the Code of Federal Regulations (CFR). The current list of veterinary drugs included in the NRP, as well as the numbers and types of meat, poultry, and egg product samples tested for veterinary drugs, can be found in the List of Chemical Residues by Category / Class document.

Pesticides

This category includes pesticide chemicals regulated by EPA, under the FFDCA and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). EPA has established tolerance levels for many registered pesticides, which can be found in Title 40 of the CFR. The current list of pesticides included in the NRP, as well as the numbers and types of meat, poultry, and egg product samples tested for pesticides, can be found in the Pesticide Prioritization Framework for the U.S. National Residue Prog ram document.

Contaminants

This category includes any chemical compound included in the NRP that is not a veterinary drug or a pesticide chemical. The current list of contaminants included in the NRP, as well as the numbers and types of meat, poultry, and egg product samples tested for contaminants, can be found in the List of Chemical Residues by Category / Class document.

Annual Plan Creation

How does FSIS Develop the U.S. National Residue Program Sampling Plan Each Year?

FSIS partners with the Food and Drug Administration (FDA) and the Environmental Protection Agency (EPA) as the primary Federal agencies that manage the NRP. This program requires the cooperation and collaboration of these and other agencies for its successful design and implementation.

Each year, representatives from FSIS, FDA, EPA, USDA's Agricultural Research Service (ARS), and the USDA's Agricultural Marketing Service (AMS), as well as the Department of Health and Human Services' (DHHS') Centers for Disease Control and Prevention (CDC), convene a meeting of the Surveillance Advisory Team (SAT) to evaluate chemical compounds

for inclusion in the NRP for the following fiscal year. The SAT consists of experts in veterinary medicine, toxicology, chemistry, and public health who provide professional advice, as well as information on veterinary drug and pesticide use in animal husbandry. The SAT meeting is used to determine which chemical compounds represent a public health concern and warrant inclusion in the NRP, either on a permanent or exploratory basis.

The sampling plan design begins with a list of residues that may occur in meat, poultry, and egg products and are of concern to human health. FSIS coordinates an annual meeting of the SAT members to identify and prioritize chemical compounds of public health concern. FSIS combines this information with historical data on violation rates for each chemical compound to develop the domestic sampling and import reinspection plans. These sampling plans guide the allocation of FSIS laboratory, supply, and inspection resources.

The SAT has provided a risk-based prioritization of pesticides, as described in the Pesticide Prioritization Framework for the U.S. National Residue Program document, which informs future decisions to add additional pesticides to its analytical method. FSIS is currently evaluating an approach to identify and prioritize veterinary drugs associated with FSIS-regulated products.

Additional factors considered when developing the domestic and import scheduled sampling plans include:

- The food animals likely to be affected by each chemical compound or compound class;
- The availability of analytical methods to identify the chemical compound or compound class and the FSIS laboratory capacity to conduct the analyses; and

- The existence of a regulatory tolerance.

Test Results

How are the Residue Test Results Used?

FSIS and its partners use the testing data collected through the NRP in a variety of ways.

Monitoring

For example, NRP results inform the agencies about veterinary drug and pesticide use in the food animal industry, compliance with regulations governing veterinary drug and pesticide use, and information on the presence of environmental contaminants that may affect the food supply. Residue testing data are used by the regulated establishment to make decisions about its food safety program, including its suppliers of live animals. In many cases, particularly for veterinary drugs and pesticides, the test results reported by FSIS laboratories are compared to a quantitative acceptable level (i.e., tolerance or action level) to verify that meat, poultry, and egg products tested are safe and wholesome and do not contain levels of a chemical compound that would render the product in question adulterated under the FMIA, PPIA, or EPIA.

Actions Taken on Violations

A violation occurs when an FSIS laboratory detects a chemical compound at a level that exceeds an established tolerance or action level for that compound, or if the specific type of chemical compound detected renders the product adulterated in the absence of an established tolerance. FSIS enters information about residue violations into the Residue Violator Tracking (RVT) system, an FSIS-FDA interagency database. FSIS provides establishment and the designated FSIS

inspection program personnel (IPP) with the analysis results and notifies the producer via certified letter. Under best practices, the establishment also notifies the producer that an animal from that business has been identified as having a residue violation.

In addition, FSIS shares the violation data with EPA and FDA, where the latter agency has on-farm jurisdiction. FDA and cooperating State agencies investigate producers linked to residue violations and, if conditions leading to residue violations are not corrected, can enforce legal action.

To notify the public and the industry of repeated residue violations by the same producer, FSIS posts a weekly Residue Repeat Violators List on its website that identifies producers with more than one violation on a rolling 12-month period. The list provides helpful information to the USDA AMS School Lunch Program processors and producers who are working to avoid illegal levels of residues, serves as a deterrent for violators, and enables FSIS and FDA to make better use of resources (list for processors and producers). Because FSIS updates are posted weekly, FDA may not have investigated each violation at the time of publication.

Strategic Planning

FSIS further uses data collected under the NRP to continuously reassess policies and programs to assure they are effective and protect public health. Even in the absence of a violation, testing data are routinely reviewed and analyzed for trends and individual results may trigger specific agency responses, including consultation between FSIS, FDA, and EPA, as well as follow-up actions if appropriate. For example, FSIS has conducted exploratory analyses in some production classes for chemicals like metals, dioxin, and, beginning in fiscal year 2020, per- and polyfluoroalkyl substances (PFAS).

Analytical Methods

What Analytical Methods are used for Testing under the U.S. National Residue Program?

FSIS uses a variety of analytical methods to detect, identify, and quantify chemical residues that may be present in meat, poultry, and egg products. When possible, FSIS uses multi-residue methods for the detection and confirmation of many chemical compounds in a single method. The veterinary drug method screens and confirms for over 100 analytes while the pesticide method screens and confirms over 100 pesticides.

The FSIS Chemistry Laboratory Guidebook (CLG) lists the analytical methods currently available to the agency and describes the analytical process and performance characteristics of each method. One such performance element is the Minimum Level of Applicability (MLA). FSIS defines an MLA as the lowest level at which a method has been successfully validated for a residue in each matrix (meat or poultry). It also refers to the lowest level at which a laboratory analyst is expected to maintain ongoing proficiency in the method. FSIS will generally not report or act on any analytical results below the applicable MLA.)

Related Media

NRP Acronyms </sites/default/files/media_file/2020-07/acronyms_nrp.pdf>

Animal Production Class Nomenclature </sites/default/files/media_file/2020-07/animal_production_classes.pdf>

List of Residues by Category/Class </sites/default/files/media_file/2020-07/chemical_residues_by_class-category_fy2020%2bnrp.pdf>

Statistical Table – U.S. National Residue Program
</sites/default/files/media_file/2020-07/statistical_table_nrp.pdf>

Pesticide Prioritization: Framework for the U.S. National Residue Program </sites/default/files/media_file/2020-07/pesticide-prioritization_nrp.pdf>

NRP Sampling Plans and Quarterly Reports

This quarterly report summarizes the chemical residue results for the United States National Residue Program for meat, poultry, and egg products. The results in this report cover the domestic (scheduled and inspector-generated) and import sampling programs. For the annual sampling plans and reports, please see: Sampling Program | Food Safety and Inspection Service (usda.gov) </science-data/sampling-program>.

Fiscal Year 2024

- Second Quarter, January – March 2024
  </sites/default/files/media_file/documents/fy24_quarterly_sampling_summary_report_residue_q2.pdf> | Dataset
  </sites/default/files/media_file/documents/dataset_qsr_tolerances_fy2024_q2.xlsx>
- First Quarter, October - December 2023
  </sites/default/files/media_file/documents/fy24-quarterly-sampling-summary-report_residue_q1.pdf> | Dataset
  </sites/default/files/media_file/documents/dataset_qsr_tolerances_fy2024_q1.xlsx>

Fiscal Year 2023

- Fourth Quarter, July – September 2023
  </sites/default/files/media_file/documents/fy23-quarterly-sampling-summary-report_residue_q4.pdf> | Dataset
  </sites/default/files/media_file/documents/dataset_qsr_residue_tolerances_fy23q4.xlsx>

- Third Quarter, April – June 2023 </sites/default/files/media_file/documents/fy23-quarterly-sampling-summary-report_residue_q3.pdf>| Dataset </sites/default/files/media_file/documents/dataset_qsr_residue_tolerances_fy23q3.xlsx>
- Second Quarter, January – March 2023 </sites/default/files/media_file/documents/dataset_qsr_residue_tolerances_summaryreport_fy23q2.pdf> | Dataset </sites/default/files/media_file/documents/dataset_qsr_residue_tolerances_fy23q2.xlsx>
- First Quarter, October - December 2022 <https://www.fsis.usda.gov/sites/default/files/media_file/documents/dataset_qsr_residue_tolerances_summaryreport_fy23q1.pdf> | Dataset </sites/default/files/media_file/documents/dataset_qsr_residue_tolerances_fy23q1.xlsx>

Fiscal Year 2022

- Fourth Quarter, July – September 2022 <https://www.fsis.usda.gov/sites/default/files/media_file/documents/dataset_qsr_residue_tolerances_summaryreport_fy22q4.pdf> | Dataset <https://www.fsis.usda.gov/sites/default/files/media_file/documents/dataset_qsr_residue_tolerances_fy22q4.xlsx>
- Third Quarter, April – June 2022 </sites/default/files/media_file/documents/fy2022_quarterly_sampling_summary_report_residue_q3.pdf> | Dataset <https://www.fsis.usda.gov/sites/default/files/media_file/documents/fy2022_q3_residue_results_tolerances.xls>
- Second Quarter, January – March 2022 <https://www.fsis.usda.gov/sites/default/files/media_file/2022-04/fy2022_quarterly_sampling_summary_report_residue_q2.pdf> | Dataset <https://www.fsis.usda.gov/sites/default/files/media_file/2022-04/fy2022_q2_residue_results_tolerances.xls>

- First Quarter, October – December 2021
  <https://www.fsis.usda.gov/sites/default/files/media_file/2022-01/firstquarteroctober%e2%80%93december2021.pdf> | Dataset <https://www.fsis.usda.gov/sites/default/files/media_file/2022-01/firstquarteroct-dec21dataset.xlsx>

Fiscal Year 2021

- Fourth Quarter, July – September 2021
  <https://www.fsis.usda.gov/sites/default/files/media_file/2022-01/fy2021_quarterly_sampling_summary_report_residue_q4.pdf> | Dataset <https://www.fsis.usda.gov/sites/default/files/media_file/2021-10/fy2021_q4_residue_results_tolerances.xls>
- Third Quarter, April – June 2021
  <https://www.fsis.usda.gov/sites/default/files/media_file/2021-08/fy2021_quarterly_sampling_summary_report_residue_q3.pdf> | Dataset <https://www.fsis.usda.gov/sites/default/files/media_file/2021-08/fy2021_q3_residue_results_tolerances.xls>
- Second Quarter, January – March 2021
  <https://www.fsis.usda.gov/sites/default/files/media_file/2021-05/fy2021_quarterly_sampling_summary_report_residue_q2_0.pdf> | Dataset <https://www.fsis.usda.gov/sites/default/files/media_file/2021-05/fy2021_q2_residue_results_tolerances.xls>
- First Quarter, October – December 2020
  <https://www.fsis.usda.gov/sites/default/files/media_file/2021-05/fy2021%20quarterly%20sampling%20summary%20report_residue_q1.pdf> | Dataset <https://www.fsis.usda.gov/sites/default/files/media_file/2021-03/fy_2021_q1_residue_results_tolerances.xls>

Fiscal Year 2016

- Second Quarter, January–March 2016 <https://www.fsis.usda.gov/sites/default/files/media_file/2021-02/residue-quarterly-report-q2-fy2016.pdf>
- First Quarter, October–December 2015 <https://www.fsis.usda.gov/sites/default/files/media_file/2021-02/residue-quarterly-report-q1-fy2016.pdf>

Fiscal Year 2015

- Fourth Quarter, July–September 2015 <https://www.fsis.usda.gov/sites/default/files/media_file/2021-02/residue-quarterly-report-q4-fy2015.pdf>
- Third Quarter, April–June 2015 <https://www.fsis.usda.gov/sites/default/files/media_file/2021-02/residue-quarterly-report-q3-fy2015.pdf>
- Second Quarter, January–March 2015 <https://www.fsis.usda.gov/sites/default/files/media_file/2021-02/residue-quarterly-report-q2-fy2015.pdf>
- First Quarter, October–December 2014 <https://www.fsis.usda.gov/sites/default/files/media_file/2021-02/residue-quarterly-report-q1-fy2015.pdf>

Historical Residue Sampling Plans and Results (Blue and Red Books, retired in 2020)

Until 2019, the “Blue Book” was published to explain the process used to plan the U.S. National Residue Program (NRP) for Meat, Poultry, and Egg products. The Blue book was retired in favor of the Annual Sampling Plan in FY2020.

- FY 2019 Blue Book </node/1983>

- FY 2018 Blue Book </node/1984>
- FY 2017 Blue Book </node/1985>

Until 2019, the “Red Book” was published to explain the FSIS’ chemical residue sampling plans and used to present the U.S. National Residue Program (NRP) for Meat, Poultry, and Egg testing results. The Red book was retired in favor of the Annual Sampling Report in FY2020.

In addition to the publication of the Red book results, FSIS posts the details of each positive non-violative, and positive violative residue result associated with the NRP sampling program in a spreadsheet format. This spreadsheet includes detailed information regarding samples collected and analyzed by FSIS under both the “scheduled” sampling and the “inspector-generated” sampling programs. The spreadsheet includes the following data fields: sample collection and reviewed date, the project code, the animal class, tissue type, chemical residue name, concentration values, sample results (whether positive non-violative or positive violative), chemical concentration values (if any) and the CFR reference for each chemical listed.

- FY 2019 Red Book|Dataset </node/1986>
- FY 2018 Red Book|Dataset </node/1987>
- FY 2017 Red Book|Dataset </node/1988>
- FY 2016 Red Book|Dataset </news-events/publications/residue-sampling-results-fiscal-year-2016-red-book>
- FY 2015 Red Book|Dataset </news-events/publications/residue-sampling-results-fiscal-year-2015-red-book>

Residue History of Producers, Repeat Violators

These lists, provided in PDF and Excel spreadsheet format, contain information to help establishments, Livestock Markets as well as inspection program personnel identify residue history of producers.

- View the Residue Repeat Violators List </news-events/publications/residue-repeat-violators-list>

Special Analyses

On May 28, 2014, FSIS issued FSIS Notice 24-14, Livestock Slaughter Establishment Residue Questionnaire, with instructions to Public Health Veterinarians (PHVs) to gather data about factors that may affect the performance of in-plant screening tests. The questionnaire began June 1 and ended June 30, 2014. The PHIS assigned questionnaire produced completed PHV responses from 796 establishments; however, multiple PHV responses were received from several establishments. In addition, several of the questions allowed multiple answers so this also resulted in answers that exceeded the 796. FSIS intends to use the responses to the questionnaire to assess what factors influence the ability of PHVs to implement residue sampling instructions as intended and to develop strategies to enhance the effectiveness of those instructions.

1. PHVs were asked to identify in which document the establishment addresses residues.

The majority of responses (432) indicate establishments address residues in their HACCP plan or in a prerequisite program (341). The third most common answer selected was that the establishment does not address residues (156). Some PHVs selected pre-slaughter controls at the

livestock production unit (79) or a Sanitation SOP (17). Only a few responses indicated that residues were addressed as a critical control point (9).

2. The PHVs were asked to select the statements that describe the establishment's residue control program (other than testing).

The response selected most frequently was that the establishment does not have a residue control program (354). For establishments with residue control programs, the responses were selected in this order: the establishments have residue control programs that are written (349), the residue control program is available for FSIS review (325), the establishment adheres to their program (285), the program creates and maintains records (223), the program identifies elements of FSIS' sampling as part of their program (222), the program requires residue-free certification from all suppliers (186), the residue control program has pre-slaughter controls (108), and the program has decreased the number of violative residues (48). The least selected answer was pre-testing of livestock from all suppliers (2).

3. The PHVs were asked to select the statements that describe this establishment's residue testing plan.

The vast majority responded that the establishment does not have a residue-testing plan (753). Of the establishments that have a residue-testing plan, the responses in decreasing frequency were: the residue testing plan is written (74), the residue testing plan is available for FSIS review (71), the plan creates and maintains records (58), the establishment adheres to its plan (56), the plan implements pre-slaughter testing at livestock production units (18), and the residue testing plan has decreased the number of violative residue results (7).

4. PHVs were asked to select the statements that describe residue testing at this establishment.

The majority responded that the establishment does not conduct its own residue testing (802). Of the responses at establishments that conduct their own residue testing, the top response was that the establishment performs residue screen assays only (20), followed by the establishment performs screening and submits the screen positives to an outside lab (19). The least selected response was that the establishment collects samples and submits them to an outside lab (15).

5. FSIS asked PHVs if there are livestock production units (producers) supplying animals to this establishment that have residue avoidance programs due to requirements in the establishment's residue control program.

The majority answered “no” (692) but around one-third of the responses were “yes.” (246).

6. FSIS asked if the establishment provides FSIS the livestock producer name and address for carcasses found to have violative levels of residues by the FSIS laboratory.

The majority of the responses were “yes” (465) with “not applicable” being the next most common response (370). A few responded “no” (14).

7. PHVs were asked to select and rank the top seven most significant reasons to not perform residue testing from greatest to least.

The top response was that there was no reason to not test (542). For the reasons that were selected to not test, starting with the most frequently selected: professional discretion (473), carcass condemned (337), and no specific instruction (305). 286 PHVs selected the time needed to enter

information into PHIS as a reason to not residue test. Staffing issues like rotation (277) and vacancies (262) were next, followed by a lack of supplies (253), “other” (240), and office space needed for testing equipment (207). Inspector training (179) was selected next, followed by perceived FDA inaction (176), frozen storage space (143), and establishment cooperation (123). The least selected includes KIS test block availability (113), lack of enforcement action (109), PHV training (85), and establishment repercussions (70).

8. The PHVs were asked to provide other barriers from Q.7.

Small establishment slaughtering healthy livestock was the reason for the majority of the answers (127). The second most frequent response was that there were no barriers; they do test (88). The other reasons for not testing include time (25), staffing shortage (14), shortage of KIS equipment or supplies (4), and vacant positions (4).

9. The PHVs were asked to list and rank the top 5 time-consuming inspection tasks out of a list of 18 possible choices.

The most frequently selected choice was HACCP duties (614), followed by post-mortem/on line inspection duties (588), humane handling (540), Sanitation SOP (497), and ante-mortem inspection (419). PHIS non residue entry was the next selected time-consuming task (402) and was followed by plant discussions (261), travel (252), email (247), pathology/dispositions (193), and then personnel issues (161). The least selected choices include residue in-plant testing (141), residue PHIS entry (107), residue-directed sampling (99), other generic E. coli (74), other records (72), and NR appeals (60).

10. The PHVs were asked to provide other time-consuming tasks from not identified in Q.9.

The reasons provided include other sampling (11), PHIS data entry (9), exports (4), AgLearn (2), and verifying sanitary dressing (1).

11. Veterinarians were asked to select from a list of decision criteria which factors they use to support a decision not to select a carcass for residue testing when the carcass demonstrates a condition that may warrant testing.

The most frequently selected responses were the establishment only slaughters healthy livestock (401) and the veterinarian had not previously found violative residues in livestock from the producer (297). The next most frequently selected responses were: IPP have the authority to test fewer carcasses if establishment history supports the decision (181) and the list of conditions that may warrant testing does not apply to the market class slaughtered (169). The selections identified least frequently were when the carcass is condemned (148), and the IPP have the authority to test fewer carcasses if producer history supports the decision (119).

12. FSIS veterinarians selected a set of responses that they find helpful when determining which carcasses to test for residues.

Generally, respondents prefer to strengthen inspector awareness of the pathological conditions that warrant testing for residues (406). Additionally, respondents favor more definitive carcass selection criteria (348). The rest of the responses, in order of emphasis from most to least, were: provide IPP guidance on how to assess their level of in-plant testing (333), require veterinarians, food inspectors and consumer safety inspectors to test a percent of carcasses for each market class (262), provide an explanation on how to prioritize performance of residue tasks (229), and strengthen FSIS veterinarians' awareness of pathological conditions warranting residue testing (228).

13. FSIS veterinarians were asked to share an approach or a strategy they use when implementing FSIS' residue program that they considered helpful to other FSIS veterinarians.

The top two responses were 1) perform the screen test based on the observations made from antemortem and postmortem inspection observations (59) and 2) work with the consumer safety inspectors to enhance the inspectors' awareness of FSIS' policy and pathological conditions that may warrant testing for residues (47). Additionally, veterinarians recommend the following steps be taken: follow the existing policy (20), post a list of pathologies warranting testing in the FSIS inspection office (19), post the residue violator list and refer inspectors to the list (6), ensure carcasses demonstrating conditions of acute disease are tested (5), and finally, a small percentage of veterinarians suggest testing all condemned carcasses (4).

14. FSIS asked whether field staff consider antemortem inspection findings when selecting carcasses for drug residue testing.
Most of the respondents selected "Always," indicating veterinarians considered antemortem findings and postmortem findings when selecting carcasses for in-plant residue testing (383). Many veterinarians reported they either "occasionally" (220) or "frequently" (186) consider antemortem observations when deciding if a carcass should be tested for residues. A small percentage of the responses showed that antemortem observations are not used when deciding to test a carcass (53).

15. Respondents identified the residue tasks performed by Food Inspectors or Consumer Safety Inspectors at the establishment.

The survey identified the process of selecting carcasses for testing and the performance of the many features of the testing program as separate elements, and the survey asked veterinarians to identify which parts of

the testing program were completed by inspectors. The parts most frequently selected were: tissue sample collection (641), security of samples (634), collection of all animal identification (581), carcass selection at postmortem for residue testing (565), setting up the residue test (KISTM Test)(562), security of animal identifications (554), entering the information into PHIS (529), and inspectors perform all aspects of the FSIS in-plant residue program (515). Additional tasks performed by inspectors included selecting animals for residue testing during ante-mortem inspection (399), and some inspectors enter test results in another record system, such as Microsoft Excel or Word (152).

16. Veterinarians were asked to report the total number of hours all FSIS personnel at the assigned establishment spend performing all aspects of FSIS' in-plant residue program.

Most respondents said they spend less than 1 hour per shift executing FSIS’ residue program (560), followed by 1 hour to less than 2 hours (173), 2 hours to less than 3 hours (52), 4 hours or more was next (31), followed by 3 hours to less than 4 hours (25).

17. FSIS asked veterinarians to identify what actions the establishment took to prevent the slaughter of livestock that have violative residues by selecting from a list of actions that establishments could implement.

The most frequent response was that the establishment did not have to address violative residues because FSIS never found a violative residue in livestock slaughtered at the establishment (489). Other responses identified include: buying directly from producers (282), provide supplier information to FSIS at the time of antemortem inspection (239), notify producers of all residue findings (221), establishments verified supplying producers are not on the Residue Repeat Violator List (179), and the

establishments stopped buying livestock from the repeat violator (121).

Additional actions taken included: establishments started their own in-plant residue control program (75), identifying drug residues as reasonably likely to occur in the establishment's hazard analysis (55), establishments improved their animal segregation practices (31), establishments reassessed the hazard analysis when there are changes in suppliers (24), and started live animal testing (7).

18. FSIS asked veterinarians to identify additional actions that establishments took to prevent the slaughter of livestock that have violative residues.

In order of predominance, the responses include: purchase from known suppliers with good reputations (29), require certificates or producer affidavits (27), slaughter only healthy animals (20), discontinued business with suppliers of residue positive livestock (9), all suppliers are notified of violations (8), the establishment provides educational information on residues (7), the establishment does not or rarely slaughters high risk production classes (6), the establishment monitors herd records (6), the establishment does not buy from sale barns (6), and the establishment provides FSIS with animal identification (3).

Veterinarians also reported the following actions were taken by establishments. A few establishments increase testing when violations are identified (3), make suppliers liable for violations (2), require suppliers to check the repeat violator list for names of owners of livestock shipped to the establishment (2), hold livestock prior to slaughter (2), use end-user specifications (1), performs its own ante-mortem and

postmortem check (1), post signs in the pen area indicating that the establishment will not accept livestock with drug residue (1), and maintains and updates list of known violators.

19. FSIS asked veterinarians to identify those actions, from a list of actions, which FSIS took in the establishment because of multiple residue violations.

The most common response was that no actions had been taken because the establishment has not had to address multiple violative residues (683). For those establishments that experienced multiple residue violations, veterinarians reported that FSIS took the following actions: increased testing of carcasses (71), documented discussions with establishment officials on memorandum of interviews (63), authored noncompliance records (50), linked noncompliance reports (15), and district offices issued either a Notice of Intended Enforcement (9) or Notice of Suspension without prior notification (2).

20. Veterinarians were asked to provide any additional comments they may have about FSIS taking action due to multiple residue violations.

Some respondents thought FSIS should increase residue testing on livestock from brokers that handled violative livestock and producers who sold livestock with violative residues (7). They also express concern regarding suppliers changing their names in order to evade the repeat violator list protocols (6). Some veterinarians responded that FDA should take on greater responsibility and take stronger action against violators (3).

21. Respondents provided additional comments about the establishment's residue control program or testing plan that were not addressed in the rest of the survey.

Several veterinarians reported that establishments relied solely on National Residue Program testing and FSIS' residue program (14). Several reported establishments address residue in HACCP plans and determined residues are a hazard not reasonably likely to occur (13). Respondents report establishment-based practices included: residue testing to support export requirements (2), marking swine to identify hogs to be used for producing export product and specific domestic distribution(1), and establishments are purchasing hogs from producers certified by National Pork Board's Quality Assurance Program (1).

Conclusion: The 2014 Residue Questionnaire results indicate a need for more specific instruction and training for PHVs on when to residue test. The responses from the PHVs indicate that there is some confusion with the current instruction, and, further, those instructions should be more slaughter class specific. Staffing shortages and interference from other inspection responsibilities continue to be a reason to not residue test. The results of this questionnaire were used to initiate the FSIS Slaughter Pilot project which FSIS intends to start in October.

Interagency Collaboration

Residue MOA

The Memorandum of Agreement (MOA) between the FSIS, the HHS, and the EPA promotes coordinated federal activity concerning drug residues, pesticide residues, and chemical contaminants in meat, poultry, and egg products. Through this MOA, the Signatory Agencies intend to establish a structure for interagency information exchange, mutual consultation on scientific and regulatory issues, and resolution of disagreements.

- Memoranda of Understanding <https://www.fsis.usda.gov/about-fsis/food-safety-agency-partners/memoranda-understanding-mou>

Drug and Pesticide Residues

FDA

The U.S. Food and Drug Administration (FDA) is responsible for programs and regulatory actions aimed at preventing illegal drug residues in human food products derived from treated animals. Illegal drug residues in edible products can constitute a hazard to the health of persons consuming such food.

Animal Products FDA Regulates <https://cacmap.fda.gov/animal-veterinary/resources-you/animal-products-fda-regulates>

Additional information on residue avoidance and withdrawal times can be found at:

Food Animal Residue Avoidance Databank <http://www.farad.org/>

EPA

The Environmental Protection Agency (EPA) sets tolerances, the maximum amount of a pesticide allowed to remain in or on a food, as part of the process of regulating pesticides. In some countries, tolerances are called maximum residue limits (MRLs).

EPA Regulation of Pesticide Residues on Food <https://www.epa.gov/pesticide-tolerances>

Analytical Methods

Screening Method (KIS™ Test)

Guidance document which provides instruction for conducting residue in-plant tests. Available in English, Arabic, Chinese, Spanish and Vietnamese.

- View the instructions </node/1990>

Laboratory Methods

FSIS uses a variety of analytical methods to detect, identify, and quantify chemical residues that may be present in meat, poultry, and egg products. When possible, FSIS uses multi-residue methods for the detection and confirmation of many chemical compounds in a single method. The veterinary drug method screens and confirms for over 100 analytes while the pesticide method screens and confirms over 100 pesticides.

The FSIS Chemistry Laboratory Guidebook (CLG) lists the analytical methods currently available to the agency and describes the analytical process and performance characteristics of each method. One such performance element is the Minimum Level of Applicability (MLA). FSIS defines an MLA as the lowest level at which a method has been successfully validated for a residue in each matrix (meat or poultry). It also refers to the lowest level at which a laboratory analyst is expected to maintain ongoing proficiency in the method. The MLAs for compounds in FSIS-regulated commodities can be found in the methods section of the CLG. FSIS will generally not report or act on any analytical results below the applicable MLA.

Chemistry Laboratory Guidebook </news-events/publications/chemistry-laboratory-guidebook>

Terms used in CLG defined </sites/default/files/media_file/2021-06/2020_05_website_definitions_chemistry_methods.pdf>

Environmental Contaminants and Special Topics

FSIS Melamine Testing Results in Retail Meat and Poultry

In 2008, FSIS collected retail samples of ready-to-eat meat and poultry products to test for the presence of melamine. This action was prompted by public health concerns regarding melamine contamination of imported milk-derived food ingredients in FDA-regulated products. None of the products tested by FSIS posed a public health concern.

- View the report </node/1980>

Investigation into the Detection of Semicarbazide (SEM), a Nitrofurazone Indicator, in Chicken

In 2018, FSIS published a report to evaluate whether semicarbazide (SEM) could be detected in fresh and frozen chicken samples collected at various points during production. Tissue-bound SEM has been used as a target for monitoring compliance with the restrictions on nitrofurazone use. Nitrofurazone is a nitrofuran antibiotic that is restricted from use in food-producing animals. Its metabolism results in tissue-bound metabolites, including semicarbazide (SEM).

- View the report </node/1981>

FSIS Dioxin Monitoring Surveys

- Dioxins and PCBs, U.S. Food and Drug Administration (FDA) <http://www.fda.gov/food/foodborneillnesscontaminants/chemicalcontaminants/ucm2006784.htm>
- Environmental Assessment: See Dioxin Resources, U.S. Environmental Protection Agency (EPA) <https://www.epa.gov/dioxin>
- Dioxins, National Institute of Environmental Health Sciences (NIEHS) <http://www.niehs.nih.gov/health/topics/agents/dioxins/>

The U.S. Department of Agriculture (USDA) Food Safety and Inspection Service (FSIS) conducts a survey approximately every 5 years to gather information on dioxins, furans, and dioxin-like polychlorinated biphenyls in U.S. meat (including Siluriformes fish and fish products) and poultry products. This survey is part of FSIS' effort to monitor dioxin in regulated products to provide insight on changes in human exposure to dioxin-like compounds through the diet.

Dioxin Survey Reports

View the 2005, 2009, 2013, and 2018 Reports </node/1979>

PFAS Sampling Results

FSIS implemented a testing method for per- and polyfluoroalkyl substances (PFAS), which are a class of persistent organic environmental contaminants that include perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS). The purpose of this activity is to gain a better understanding of PFAS concentrations in *Siluriformes* fish, chicken, and swine products. The testing method for PFAS compounds, titled "Screening, Determination, and Confirmation of PFAS by UPLC-MS-MS"

(CLG-PFAS2.00), will analyze for 16 of these compounds. The PFAS testing program is monitored and evaluated by FSIS in consultation with its NRP partner agencies, the FDA and EPA.

Data Results 2021 & 2022 </sites/default/files/media_file/documents/pfas-sampling-data-2021-2022.xlsx> (XLSX)

Metals Sampling Results

FSIS tests meat and poultry products for heavy metals, in order to gain a better understanding of metal concentrations in FSIS-regulated products. The testing method for metals contaminants, titled “Determination of Metals by ICP-MS and ICP-OES (Optimal Emission Spectrometry)” (CLG-TM3) analyzes for 18 of these compounds. Metals testing results are monitored and evaluated by FSIS.

Published Works

Dietary Estimates of Dioxins Consumed in USDA Regulated Meat and Poultry Products

In February 2012, EPA established a chronic oral reference dose (RfD) for noncancer effects for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD), which is used as a reference dioxin. In a study published in September 2013, FSIS estimated dietary exposures of its regulated products for comparison to the RfD.

- Dietary Estimates of Dioxins Consumed in U.S. Department of Agriculture–Regulated Meat and Poultry Products <http://jfoodprotection.org/doi/pdf/10.4315/0362-028x.jfp-13-046>. Kerry L. Dearfield, Sarah R. Edwards, Margaret M. O'Keefe, Naser M. Abdelmajid, Ashley J. Blanchard, David D. Labarre, and Patty A. Bennett (U.S. Department of Agriculture, Food Safety and Inspection Service). Journal of Food Protection, Vol. 76, No. 9, 2013, Pages 1597–1607. (Subscription required)
- Dietary Estimate Tables (Supplemental) to accompany the journal article.
  - Beef </sites/default/files/media_file/2020-07/dioxin_exposure_tables_beef.pdf>
  - Pork, Chicken and Turkey </sites/default/files/media_file/2020-07/dioxin_exposure_tables_supplemental.pdf>

Survey of Dioxins and PCBs in U.S. meat, poultry, and Siluriform fish from 2018-2019

In a collaboration study published in April 2022, FSIS and ARS provided a comparison of the trends from current and previous Dioxin Surveys.

- Survey of polychlorinated dibenzo-p-dioxins, polychlorinated dibenzofurans and non-ortho-polychlorinated biphenyls in U.S. meat, poultry, and siluriform fish from 2018-2019: toxic equivalency levels, temporal trends, and implications. <https://www.tandfonline.com/doi/full/10.1080/19440049.2021.2022769> Sara J. Lupton, Cristian Ochoa, Alexander Domesle, and Randolph Duverna. Food Additives & Contaminants: Part A, Vol. 39, No. 3, Pages 560-571.

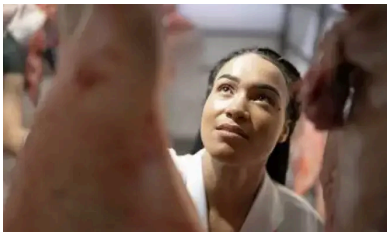
Related Resources

Journal Publications

FSIS research and findings are published in peer-reviewed journals.

Quarterly Enforcement Reports

Review the enforcement actions FSIS has taken to ensure that consumers have access to safe, wholesome and properly labeled products.



Humane Handling Enforcement

Contains official notifications of enforcement actions and restarts when the establishment has demonstrated regulatory compliance.

Learn More
</science-data/journal-publications>

Learn More
</inspection/regulatory-enforcement/quarterly-enforcement-reports>

Learn More
</inspection/regulatory-enforcement/humane-handling-enforcement>

Last Updated: May 03, 2024

Significant Guidance
</inspection/compliance-guidance/significant-guidance>

Vulnerability Disclosure Policy
<https://www.usda.gov/vulnerability-disclosure-policy>

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