UNITED STATES
National Residue Program for Meat, Poultry, and Egg Products

FY 2016 RESIDUE SAMPLE RESULTS[1]

United States Department of Agriculture
Food Safety and Inspection Service
Office of Public Health Science

May 2017

[1] Cover October 2015 through September 2016

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Preface

The “2016 Food Safety and Inspection Service (FSIS) National Residue Program Data” publication (the ‘Red Book’) explains FSIS’ chemical residue sampling plans and presents National Residue Program (NRP) testing results by fiscal year. [For those reading this electronically, this document has been commonly known as the “Red Book” because the covers of the printed versions are red.] In addition, the following appendices are included for the convenience of the reader: Appendix I, NRP Positive Non-Violative and Positive Violative Residue Samples Results; Appendix II, Statistical Table; Appendix III, FY2016 List of Chemical Residues by Class/Method ;Appendix IV, Summary of Scheduled Sampling Data from 2013 to 2016, Appendix V, Summary of Import Re-inspection Sampling Data from 2013 to 2016 and Appendix VI, Inspector Generated Sampling Data from 2013 to 2016 (includes KIS™ test)

Acknowledgements

We would like to extend our gratitude to the thousands of FSIS field inspection personnel who collected and submitted the residue samples and to all the laboratory staff who prepared the residue samples for analysis, analyzed the residue samples and documented the results from the analysis of the residue samples. We would like to acknowledge the Office of Data Intergration and Food Protection (ODIFP) members for providing the data.

Contacts and Comments

Personnel from the Science Staff (SciS), within the Office of Public Health Science (OPHS) at the United States Department of Agriculture’s (USDA) Food Safety and Inspection Service (FSIS) coordinated this effort and are responsible for the publication of this material. Questions about the U.S. NRP should be directed to:

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Executive Summary

The United States National Residue Program (NRP) is comprised of the following programs:

- Domestic Sampling Plan
  - Scheduled
  - Inspector-Generated
- Import Reinspection Sampling Plan

During FY 2016, (October 2015 to September 2016), FSIS reported **922** residue violations **29** stemmed from the Domestic Scheduled Sampling Program and **893** from the Inspector-generated Sampling Program) in **758** samples (**26** under the Domestic Scheduled Sampling Program and **732** under the Inspector-generated Sampling Program). Additionally, FSIS reported **22** residue violations in **2,676** samples under the Import Reinspection Sampling.

By comparison, in FY2015, there were **1,041** residue violations (**17** from the domestic scheduled sampling program and **1,024** from the Inspector-generated sampling program) in **808** samples. Note: Multiple violative (exceeding an acceptable or tolerable level set by FDA and/or EPA) residue may be detected in a single sample.

Domestic Scheduled Sampling

In FY 2016, under the Domestic Scheduled Sampling program, FSIS Inspection Program Personnel (IPP) collected **7,067** residue samples (This includes **6,535** samples from U.S. Federal establishments and **532** from U.S. State plants), from which **29** violative residues were reported from **26** samples, which is less than 1 % of the 6,445 samples collected under the Domestic Scheduled Sampling program. In FY 2015, FSIS IPP collected **6,445** residue samples, from which **17** violative residues were reported from **12** samples (less than 1%).

During FY 2016, four carbadox, two DDT/metabolites , one doramectin, , one ivermectin, two melengestrol acetate, seven moxidectin, one pentachlorobenzene, one permethrin, one piperonyl butoxide, two sulfadimethoxine and seven sulfamethazine violations were reported in the Domestic Scheduled Sampling Program.

In some cases, chemical residues were detected in samples at levels below the set tolerance levels non-violative levels). In FY 2016, **24** samples (less than 1% of **7,067** samples collected) were considered non-violative. By comparison, in FY 2015 the number of non-violative samples was similar, at **23** non-violative positives (less than 1%).

Inspector-generated Sampling

In FY 2016, under the Inspector-generated sampling program, FSIS IPP screened **182,184** samples using the Kidney Inhibition Swab (KIS™) test. Subsequently, **3,649** KIS™ test screened positive samples were submitted to FSIS field laboratories for further analysis. For FY 2016, **883** KIS™ test residue violations analytes were confirmed in **724** KIS™ test samples (Note: multiple residue violations may be found in same samples.

For comparison, in FY2015, FSIS IPP submitted **4,022** (from **184,010** KIS™ test) samples for laboratory confirmation. Of the **4,022** KIS™ submitted **1,017** KIS™ residure violatons were confirmed in **792** samples.

Under the Inspector-generated Sampling Program, samples from show animals, state testing program and collected-generated were sent directly to FSIS labs, for residue Analysis. For FY 2016, under these sampling programs **Ten** additional reside violative analystes were identified in **eight** samples submitted under this unique sampling.

Examination of the FY 2016 Inspector-generated Sampling Program showed that the predominant violative residues were Ceftiofur (**223**), Penicillin (**216**) and Sulfadimethoxine (**76**), which accounts for 25, 24 and 9% of total violative residues, respectively. In FY 2015, the top violative residues were Ceftiofur, Penicillin, and Sulfamethazine.

In FY 2016, **728** samples with non-violative positives were observed in the Inspector-generated Sampling Program, which was down, when compared to the **873** reported in FY 2015.

Import Reinspection Sampling

Of the **2,676** import samples analyzed, under the FY 2016 Import Reinspection Sampling Program, **22** samples had residues exceeding an acceptable or tolerable level set by FDA and/or EPA. These were from samples originating from Nicaragua (**2**) and Uruguay (**20**). In comparison to FY2015, where **seven** samples with violative residues were detected (**2,922** import samples) originating from Brazil (**1**), Canada (**1**), and Nicaragua (**5**).

FSIS continually strives to improve its methods for reporting of NRP data. These reports and previous years' residue sample results are publicly available on the FSIS website at:

http://www.fsis.usda.gov/wps/portal/fsis/topics/data-collection-and-reports/chemistry/residue-chemistry

Acronyms

CSI- Consumer Safety Inspector

COLLGEN – Collector-Generated Samples sent directly to the laboratory

DW – FSIS Data Warehouse

EPA- Environmental Protection Agency

FDA- Food and Drug Administration

FSIS – Food Safety and Inspection Service

HACCP – Hazard Critical Control Point

IPP – Inspection Program Personnel

KIS™ Test – Kidney Inhibition Swab Test

MRM – Multi Residue methods

ND – Non-detect

NRP- National Residue Program

OPHS – Office of Public Health Science

PHIS – Public Health Information System

PHV – Public Health Veterinarian

PPB – parts per billion

PPM – parts per million

SAT – Surveillance Advisory Team

STATE – State or Government Agency Testing

SHOW – Show Animals

U.S NRP – U.S**.** National Residue Program

"8888": A numerical entry that indicate instances when chemical residues results were detected, but were not quantitated.

Introduction

The U.S. National Residue Program (NRP) for Meat, Poultry, and Egg Products, administered by the U.S. Department of Agriculture's (USDA), Food Safety and Inspection Service (FSIS), is an interagency program designed to identify, rank, and analyze for chemical contaminants in meat, poultry, and egg products. FSIS publishes the NRP Residue Sampling Plans (traditionally known as the Blue Book) each year to provide information on the process of sampling meat, poultry, and egg products for chemical contaminants of public health concern.

Background

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.). The NRP is an important component of FSIS mission to protect the health and welfare of the consumers by regulating the meat, poultry, and egg products produced in federally inspected establishments and to prevent the distribution in commerce of any such products that are adulterated or misbranded.

The NRP requires the cooperation and collaboration of several agencies for its successful design and implementation. FSIS, along with the Food and Drug Administration (FDA) and the Environmental Protection Agency (EPA) are the primary Federal agencies managing this program. The FDA, under the Federal Food, Drug, and Cosmetic Act (FFDCA), establishes tolerances for veterinary drugs and action levels for food additives and environmental contaminants. The EPA, under the FFDCA, the Federal insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Toxic Substances Control Act (TSCA) establishes tolerances for registered pesticides. Title 21 Code of Federal Regulations (CFR) includes tolerance levels established by FDA; and Title 40 CFR includes tolerance levels established by EPA.

The Surveillance Advisory Team (SAT) meets annually to evaluate chemical compounds for inclusion in the NRP scheduled sampling plans. The SAT includes representatives from FSIS, FDA, EPA, USDA's Agricultural Research Service (ARS), and the USDA's Agricultural Marketing Service (AMS), as well as HHS' Centers for Disease Control and Prevention (CDC). 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. SAT discussions are used to decide which compounds represent a public health concern and warrant inclusion in the NRP scheduled sampling plans. In addition, the SAT may propose, based on professional judgment and reliable field information, the initiation of exploratory assessments for directed sampling on a production class or region of the country. These agencies work together to create the annual sampling plan, based on the following: prior NRP findings of chemical residues in meat, poultry, and egg products; FDA veterinary drug inventories completed during on-farm visits and investigation information; and pesticides and environmental contaminants of current importance to EPA.

Chemical compounds analyzed in the program include approved and unapproved veterinary drugs, pesticides, and environmental compounds. The NRP is designed to: (1) provide a structured process for identifying and evaluating chemical compounds used in food animals; (2) analyze chemical compounds of concern; (3) collect, analyze, and report results; and (4) identify the need for regulatory follow-up subsequent to the identification of violative levels of chemical residues.

Actions taken on violations

FSIS has administered the NRP by collecting and analyzing meat, poultry, and egg product samples for specific chemical compounds at FSIS laboratories since 1967 for meat and poultry, and beginning in 1995 for egg products. A violation occurs when an FSIS laboratory detects a chemical compound level in excess of an established tolerance or action level as well as if the residue detected has no approved tolerance. Once the laboratory analysis is complete, FSIS enters the detailed residue violation information into the Residue Violation Information System (RVIS), an FSIS/FDA interagency database. FSIS provides establishment and the designated FSIS Inspection Program Personnel (IPP) with the analysis results and also notifies the producer via certified letter. Under best practices, the establishment also should notify 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 Web site that identifies producers with more than one violation on a rolling 12-month period. In addition, the list provides helpful information to the AMS-School Lunch Program purchase clearance 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.

FSIS Laboratory Analytical Methods

In January 1997, FSIS implemented the Hazard Analysis and Critical Control Point (HACCP) inspection system in all federally inspected establishments. The HACCP regulation (HACCP GPO CFR) requires FSIS-inspected slaughter and processing establishments to identify all food safety hazards (including drug residues, chemical contaminants, and pesticides) that are reasonably likely to occur before, during, and after the food animal or product enters the slaughter establishment. The regulation also requires establishments to identify preventive measures to control these hazards. FSIS takes regulatory action against establishments that do not have an effective chemical residue control program in place. Minimizing food safety hazards from farm-to-fork protects consumers from the public health risks associated with chemical contaminants in food.

With greater public concern about the risks of chemical contaminants, focus has increased on strengthening the identification, prioritization, and testing for chemical hazards in meat, poultry, and egg products in the United States. The sampling plan for residues in FSIS-regulated products includes strengthening the focus of public health-based sampling. This approach includes broader screens for veterinary drugs, pesticides, and heavy metals, as well as conducting more analyses per sample.

FSIS uses analytical methods to detect, identify, and quantify residues that may be present in meat, poultry, and processed egg products. The Agency utilizes these methods for monitoring and for surveillance activities to determine product adulteration and for evaluations of human health risk. The Agency uses available methodologies to take appropriate regulatory action against adulterated products in a manner consistent with the reliability of the analytical data. The FSIS Analytical Chemistry Laboratory Guidebook lists the analytical methods used by the agency.

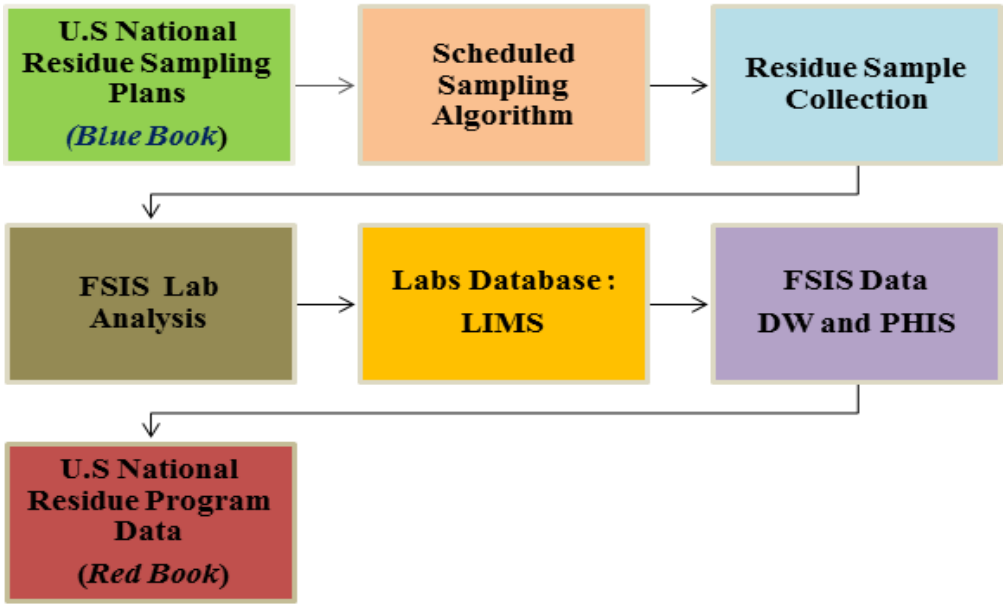

Figure 1. National Residue Program: The figure illustrates the intricate steps of the NRP. The NRP begins with interagency planning (Blue Book) of sampling program, which is followed by collection and analysis of samples reported (Red Book).

Overview of the Sampling Plans

The United States Government Fiscal Year (FY) runs from October 1 through September 30. To match this, since 2012, FSIS switched from implementing the NRP on a Calendar Year (CY) to a FY basis. This change allows the program to run concurrently with the Federal budget cycle.

The NRP consists of three separate, but interrelated, chemical residue testing programs: scheduled sampling (Tier 1), targeted sampling at the production or compound class level (Tier 2), and targeted sampling at the herd/flock or compound class level (Tier 3). This basic structure has been in existence since 1967. These testing programs provide data for FSIS to detect chemical residues of public health concern and have been modified annually in response to emerging chemical residue concerns and improved testing methodologies.

The 2016 NRP Residue Sampling Plan focuses on chemical residues in domestic meat, poultry, and egg products and the import reinspection of meat, poultry, and egg products. The domestic sampling plan includes scheduled sampling and inspector-generated sampling. The import reinspection sampling plan encompasses normal sampling, increased sampling, and intensified sampling. Directive 10,800.1, Rev 1 provides further detail on those sampling procedures.

Domestic Sampling Plan

1. Tier 1

The Tier 1 sampling plan is the scheduled sampling of specified slaughter subclasses at the time of slaughter, after they have passed antemortem inspection. Carcasses are randomly selected for sampling. The number of samples scheduled each year is based on the probability of detecting at least one violation (Appendix II). Data collected from Tier 1 sampling serves as a baseline level for chemical residue exposure. Sampling tasks are assigned each month through the Public Health Information System (PHIS). The sampling task provides information to the Inspection Program Personnel (IPP) on when to collect the sample (collection window) and which production class to sample. The establishment holds or controls livestock carcasses selected for testing pending the results of analysis. For directed testing of poultry, the IPP recommends to the establishment that the establishment holds the specific poultry carcasses selected for residue testing pending the analysis results.

Tier 1 sampling results also can be used to identify producers or other entities marketing animals with violative levels of residues. Thus, the Tier 1 sampling plan not only gathers information, but also assists in deterring practices that lead to violative residues.

In 2016, the Tier 1 sampling plan consisted of random samples collected from each of the following production classes: beef cows, bob veal, dairy cows, steers/ heifers, market hogs, sows, young chickens, and young turkeys. These production classes represent 95 percent of domestic meat and poultry consumption.

2. Tier 2

a. Inspector-Generated Sampling

FSIS inspection program personnel (IPP) 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 populations of animals, and animals condemned for specific pathologies listed in FSIS Directive 10,800.1, Rev 1. When Public Health Veterinarians (PHVs) detect evidence of a disease that may have been treated or suspect the administration of a drug, they retain the carcass and analyze samples from those carcasses using an in-plant method to screen for the presence of chemical residues. If the in-plant test is negative for antimicrobial residues included in the screen, the carcass is released to the establishment. If there are screen positive results, the carcass is held pending the results of laboratory testing. The PHV condemns carcasses of animals found to contain violative levels of residues in the muscle or if an unapproved drug is detected in any tissue.

In 2016, IPP completed in-plant residue screens using the Kidney Inhibition Swab test (KIS™ test). The screen positive samples are submitted to the FSIS Midwestern Laboratory and analyzed by the laboratory to identify, quantify and confirm the contaminants.

i. Sampling of Individual Suspect Animals

Under the direction of the PHV, IPP are to conduct a KIS™ test on any carcass that based on herd history or ante-mortem or post-mortem findings inspection findings may contain a violative drug residue. IPP are to follow the instructions provided in Directive 10,800.1, Rev 1, chapter three for circumstances warranting a KIS ™ test and Chapter Four for performing KIS™ tests and documenting the task in PHIS. The PHV selects a carcass for sampling based on the criteria outlined in FSIS Directive 10,800.1, Rev 1 (i.e., animal with disease signs and symptoms, producer history, or as a follow-up to results from random scheduled sampling). Usually, the sample is screened in the plant by the IPP and the screen-result verified when necessary by a PHV. Other samples are sent directly to the laboratory for analysis. For example, if the IPP suspects the misuse of a veterinary drug in an animal, she/he can perform the relevant in-plant screening analysis. If the result of a screening analysis is positive, the carcass is held (if it is not already condemned for other pathology or conditions that would make it unfit for human consumption), and the liver, kidney, and muscle samples from the carcass are then sent to an FSIS laboratory for analysis and confirmation.

ii. Sampling of Suspect Animal Populations

Sampling for suspect animal populations is directed by an FSIS regulation (9 CFR 310.21) and Directive 10,800.1, Rev 1. This is outlined for healthy appearing bob veal calves and show animals.

b. Targeted Sampling

FSIS implements targeted sampling plans (exploratory assessments) in response to information (obtained by FDA and EPA and provided to FSIS) about misuse of animal drugs and/or exposure to environmental chemicals, as well as in response to Tier 1 analytical results. The duration of these sampling plans vary based on the situation. FSIS may conduct studies to develop information on the frequency and concentration at which some residues like trace metals and industrial components may be inadvertently present in animals. These sampling plans could be designed to distinguish components of meat, poultry and egg products in which residue problems exist, to measure the extent of problems, and to evaluate the impact of actions taken to reduce the occurrence of residues in the food animal population.

Sampling tasks are assigned through PHIS. The sampling task provides instructions to the IPP on when to collect the sample (collection window) and which slaughter production class to collect from. The establishment holds or controls livestock carcasses selected for testing pending the test results. For

directed residue testing of poultry, the IPP recommends to the establishment that the establishments hold the specific poultry carcasses selected for residue testing pending the test results.

In 2016, targeted sampling included old breeder turkeys, and sheep, goats.

3. Tier 3

The Tier 3 sampling plan is similar in structure to the targeted sampling (exploratory assessment) program in Tier 2, with the exception that Tier 3 will encompass targeted testing at a herd or flock level. A targeted testing program designed for livestock or flocks originating from the same farm or geographic region may be necessary on occasion to determine the level of exposure to a chemical or chemicals. For instance, producers may administer some veterinary drugs to a herd or a flock (for example, growth promotants or antibiotics given in the feed) in a way that involves misuse. In addition, livestock and birds may be exposed unintentionally to an environmental contaminant. Therefore, a targeted testing program designed for livestock or flocks originating from the same farm or region may be necessary on occasion to determine the level of a chemical or chemicals to which the livestock or the birds in the flock have been exposed. Tier 3 will provide a vehicle for developing information that will support future policy development within the NRP.

In FY 2016, no Tier 3 sampling was performed.

Import Reinspection Sampling Plan

Imported meat, poultry, and egg products are sampled through the port-of-entry Import Reinspection Sampling Plan, a chemical residue monitoring program conducted to verify the equivalence of inspection systems in exporting countries to the United States standards. All imported products are subject to reinspection, and one or more types of inspection (TOI) are conducted on every lot[2] of product before it enters the U. S. Chemical residue sampling is included in the reinspection of imported products. The following three levels of chemical residue reinspection include:

- 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 that failed to meet U. S. requirements.

The data obtained from laboratory analyses are entered into PHIS, an FSIS database designed to generate reinspection assignments, receive and store results, and compile histories for the performance of foreign establishments certified by the inspection system in the exporting country.

The import reinspection sampling program is structured using the Tier 1 and Tier 2 criteria used to develop the domestic plan. In FY2016, FSIS collected approximately 2676 import samples.

[2] An import lot is a group of products defined statistically and/or scientifically by production segments and certified from one country, one establishment. A lot consists entirely of the same species, process category, and product standard of identity (sub-category). A single lot can contain shipping cartons with varying sizes of immediate containers.

Policy and procedures for holding or controlling product under NRP

As of February 2013, the Agency requires official establishments and importers of record to hold or maintain control of lots of product tested for adulterants until acceptable results become available. FSIS stated that the policy would apply to livestock carcasses subject to FSIS testing for residue on domestic products. FSIS explained that it will not hold poultry carcasses pending test results for residues due to historically low residue problems and large lot size. This was outlined in a published Federal Register Notice 76 FRN 19955.

The Hold and Test policy also applies to normal and increased import reinspection sampling. Additionally, for intensified import sampling, the lot must be retained pending laboratory results.

Domestic Scheduled Sampling Program

This section reports the summary results from the FSIS Domestic Scheduled Sampling Plan. The summary results are associated with specific Animal Class. All data reported in the following tables were collected from the FSIS Data Warehouse and PHIS databases.

Table 1 identifies the animal classes and methods/chemical classes which are in the 2016 NRP

Table 2 summarizes the number of Domestic Scheduled samples and Inspector-generated samples tested by animal class.

Table 3 summarizes the number of residue Domestic Scheduled samples analyzed by animal class, including summary results.

Table 4 summarizes the number of residue Domestic Scheduled samples tested per chemical method by animal class.

Table 5 summarizes Domestic Scheduled Sampling -number of chemical analyses tested per chemical method by animal class.

Table 6 summarizes domestic scheduled sampling violation results by animal class.

Note: Residue detected results with "**8888**" indicate instances when residues were detected, but were not quantitated.

Summary of Domestic Residue Sampling Program

Table 1. FY 2016 Tier I and II List of Animal Class by Method/Chemical Class (Analyses Performed)

Animal Category	Animal Class	Chemical Class Oct 2015- Sep 2016									
		Aminoglycosides	**Arsenic**	**Avermectins**	**βeta-Agonists**	**Carbadox**	**Hormones**	**Metals**	**MRM**	**Nitrofurans**	**Pesticides**
Bovine	Beef Cows	√	√	√	√	--	√	√	√	--	√
	Bob Veal	√	√	√	√	--	√	√	√	--	√
	Dairy Cows	√	√	√	√	--	√	√	√	--	√
	Heifers	√	√	√	√	--	√	√	√	--	√
	Steers	√	√	√	√	--	√	√	√	--	√
Porcine	Market Swine	√	√	√	√	--	--	√	√	--	--
	Roaster Swine	√	√	√	-	√	--	√	√	--	√
	Sows	√	√	√	√	--	--	√	√	--	√
Poultry	Mature Turkeys	√	√	--	--	--	--	√	-	√	--
	Young Chickens	√	√	--	--	--	--	√	√	√	√
	Young Turkeys	√	√	--	--	--	--	√	√	√	√
Minor Species	Goats	√	√	√	--	--	--	--	√	--	--
	Sheep	√	√	√	--	--	--	--	√	--	--

Table 2. FY 2016 Number of Scheduled Residue Samples Tested, by Animal Class

Animal Category	Animal Class	Domestic Scheduled Sampling		Inspector-generated Sampling Tier-2 Suspect Animals	
		Tier-1 & Tier- 2* U.S. Federal Plants	Tier-1 U.S. State Plants	KIS™ Test	COLLEGEN/ SHOW/STATE *
Bovine	Beef Cows	670	60	15,936	12
	Bob Veal	574	--	23,333	4
	Bulls	--	--	1,618	2
	Dairy Cows	720	19	99,660	23
	Formula-Fed Veal	--	--	640	--
	Heavy Calves	--	--	426	--
	Heifers	397	129	2,537	6
	Non-Formula-Fed Veal	--	--	161	--
	Steers	366	145	8,705	16
Porcine	Boars/Stags	--	--	99	--
	Market Swine	684	116	18,754	46
	Roaster Swine	281	--	1,527	--
	Sows	733	36	6,461	3
Poultry	Mature Turkeys**	93	--	--	--
	Young Chickens	742	18	--	--
	Young Turkeys	648	9	--	--
	Goats**	337	--	618	7
Minor Species	Lambs**	--	--	1,224	10
	Sheep**	290	--	485	--
	Total	**6,535**	**532**	**182,184***	**129**

* An additional **129** inspector-generated samples were collected and sent to FSIS labs for analysis. These samples are associated with project codes: **75** COLLGEN, **42** SHOW, and **12** STATE, samples.

** Animal Classes associated with NRP Tier 2 domestic sampling

Table 3. FY 2016 NRP Domestic Scheduled Samples Analyzed by Animal Class – and Summary Results

Animal Category	Animal Class	Number of Non-Detect Samples	Number of Non-Violative Positives Samples	Number of Violative Samples	Total Samples
Bovine	Beef Cows	727	2	**1**	730
	Bob Veal	568	3	**3**	574
	Dairy Cows	736	--	**3**	739
	Heifers	519	5	**2**	526
	Steers	507	4	--	511
Porcine	Market Swine	798	2	--	800
	Roaster Swine	271	4	**6**	281
	Sows	765	3	**1**	769
Poultry	Mature Turkeys	93	--	--	93
	Young Chickens	759	1	--	760
	Young Turkeys	657	--	--	657
Minor Species	Goats	330	--	**7**	337
	Sheep	287	--	**3**	290
	Total	**7017**	**24**	**26**	**7,067**

Note: The results include Tier 1 and Tier 2 animal classes
Data Source: FSIS Data Warehouse and PHIS databases.

Table 4. FY2016 NRP Residue Scheduled Samples -Number of Residue Samples Tested Per Chemical Method by Animal Class

Animal Class (# Samples Collected)	Number of Samples per Chemical Method									
	Aminoglycosides	**Arsenic**	**Avermectins**	**βeta-Agonists**	**Carbadox**	**Hormones**	**Metals**	**MRM**	**Nitrofurans**	**Pesticides**
Beef Cows (730)	725	397	392	289	--	357	114	730	--	286 **(1)**
Bob Veal (574)	571	326	323 **(1)**	216	--	294	118	574 **(2)**	--	211
Dairy Cows (739)	737	395	392	302	--	348	112	739 **(2)**	--	304 **(1)**
Heifers (526)	524	313	310	180	--	294 **(2)**	114	526	--	177
Steers (511)	510	306	303	175	--	276	107	511	--	175
Market Swine (800)	798	447	442	150	2	--	127	799	--	333
Roaster Swine (281)	280	65	64	--	215 **(4)**	--	17	281 **(2)**	--	--
Sows (769)	764	427	421	135	-	1	111	769	--	290 **(1)**
Mature Turkeys (93)	1	1	--	--	--	--	93	1	--	--
Young Chickens (760)	759	408	--	--	--	--	155	760	340	316
Young Turkeys (657)	656	371	1	--	--	--	154	657	275	141
Goats (337)	260	195	198 **(7)**	1	--	--	--	337	--	141
Mature Sheep (290)	200	155	153 **(1)**	1	--	--	--	290	--	131 **(2)**
Total (7,067)	**6,785**	**3,806**	**2,999**	**1,449**	**217**	**1,570**	**1,222**	**6,974**	**615**	**2,505**

Note: Number of violative samples **(in parenthesis)**

Data Source: FSIS Data Warehouse and PHIS databases.

Table 5. FY 2016 NRP Residue Scheduled Samples - Number of Chemical Analytes Tested Per Chemical Method by Animal Class

Animal Class (# Samples Collected)	Number of Chemical Analytes per Chemical Method										
	Aminoglycosides	**Arsenic**	**Avermectins**	**βeta-Agonists**	**Carbadox**	**Hormones**	**Metals**	**MRM**	**Nitrofurans**	**Pesticides**	**Total**
Beef Cows (730)	7,259	397	1,958	1,732	--	1,785	1,198	58,305	--	24,417	97,051
Bob Veal (574)	5,728	326	1,612	1,296	--	1,470	1,361	46,094	--	17,751	75,638
Dairy Cows (739)	7,379	395	1,960	1,808	--	1,740	1,235	59,252	--	25,724	99,493
Heifers (526)	5,249	313	1,550	1,061	--	1,468	1,397	42,138	--	14,832	68,008
Steers (511)	5,109	306	1,513	1,033	--	1,380	1,262	41,071	--	14,647	66,321
Market Swine (800)	7,999	447	2,205	896	2	--	1,480	69,240	--	28,134	110,403
Roaster Swine (281)	2,836	65	320	--	215	--	298	28,137	--	--	31,871
Sows (769)	7,658	427	2,102	805	-	5	1,081	67,045	--	24,516	103,639
Mature Turkeys (93)	10	1	--	--	--	--	1,008	93	--	--	1,112
Young Chickens (760)	7,599	408	--	--	--	--	1,743	64,022	1,700	26,716	102,188
Young Turkeys (657)	6,569	371	5	--	--	--	1,925	54,081	1,374	21,110	85,435
Goats (337)	2,600	195	984	6	--	--	--	28,061	--	11,826	43,672
Mature Sheep (290)	2,000	155	762	2	--	--	--	23,260	--	11,115	37,294
Total (7,067)	**67,995**	**3,806**	**14,971**	**8,639**	**217**	**7,848**	**13,988**	**580,799**	**3,074**	**220,788**	**922,125**

Note: Multiple analytes may be associated with the same sample. Not all samples are tested for all chemical method. Number of samples per chemical method is indicated in Table 4

Data Source: FSIS Data Warehouse and PHIS databases.

Table 6. FY 2016 Domestic Scheduled Sampling Plan Violations

Animal	Tissue	Compound	Concentration	Units	Tolerance Level Value	Authority (CFR Citation)
Beef Cow	Muscle	Piperonyl Butoxide	0.162	ppm	0.1	40 CFR 180.127
Bob Veal	Muscle	Sulfamethazine	22.500	ppm	0.1	21 CFR 556.670
Bob Veal	Muscle	Sulfamethazine	0.190	ppm	0.1	21 CFR 556.670
	Liver	Sulfamethazine	0.304	ppm	0.1	21 CFR 556.670
Bob Veal	Muscle	Moxidectin	16.1	ppb	0	21 CFR 556.426
Dairy Cow	Liver	Sulfadimethoxine	0.114	ppm	0.1	21 CFR 556.640
Dairy Cow	Liver	Sulfadimethoxine	1.064	ppm	0.1	21 CFR 556.640
Dairy Cow	Muscle	Permethrin (Cis and Trans)	0.213	ppm	0.1	40 CFR 180.378
Heifer	Muscle	Melengestrol Acetate	2.2	ppb	None	21 CFR 556.380
Heifer	Muscle	Melengestrol Acetate	1.3	ppb	None	21 CFR 556.380
Roaster Swine	Liver	Sulfamethazine	0.702	ppm	0.1	21 CFR 556.670
	Muscle	Sulfamethazine	0.237	ppm	0.1	21 CFR 556.670
Roaster Swine	Liver	Carbadox	78.035	ppb	30	21 CFR 556.100
Roaster Swine	Liver	Carbadox	131.001	ppb	30	21 CFR 556.100
Roaster Swine	Liver	Carbadox	31.406	ppb	30	21 CFR 556.100
Roaster Swine	Liver	Carbadox	68.511	ppb	30	21 CFR 556.100
Roaster Swine	Muscle	Sulfamethazine	0.117	ppm	0.1	21 CFR 556.670
	Liver	Sulfamethazine	0.227	ppm	0.1	21 CFR 556.670
Sow	Muscle	DDT and Metabolites	***			
Goat	Muscle	Moxidectin	77.05	ppb	Not Approved	21 CFR 556.426
Goat	Muscle	Moxidectin	29.45	ppb	Not Approved	21 CFR 556.426
Goat	Muscle	Moxidectin	48.4	ppb	Not Approved	21 CFR 556.426
Goat	Muscle	Moxidectin	30.9	ppb	Not Approved	21 CFR 556.426

Table 6. FY 2016 Domestic Scheduled Sampling Plan Violations – Federal Plants

Animal	Tissue	Compound	Concentration	Units	Tolerance Level Value	Authority (CFR Citation)
Goat	Muscle	Moxidectin	56.8	ppb	Not Approved	21 CFR 556.426
Goat	Muscle	Ivermectin	72.45	ppb	Not Approved	21 CFR 556.344
Goat	Liver	Moxidectin	224	ppb	Not Approved	21 CFR 556.426
Sheep	Muscle	DDT and Metabolites	***			
Sheep	Muscle	Pentachlorobenzene	***			
Sheep	Muscle	Doramectin	168.5	ppb	30	21 CFR 556.225

Note:
******:** Violative residue results were residue were detected but not quantified
Not Approved- Residue detected is not approved per species

Data Source: FSIS Data Warehouse and PHIS databases.

Summary of Domestic Inspector -Generated Sampling Program

PHVs, and CSIs under the guidance of a PHV, conduct Inspector-generated residue sampling when an animal is suspected to have undergone drug treatment and may possibly contains violative levels of chemical residues. The PHVs and CSIs also are encouraged to collect samples for residue testing at the FSIS labs when a chemical contamination is suspected. Samples are screened using the KIS™ test. If KIS™ test kits are not available; the PHV submits the sample to the FSIS laboratory for testing.

Table 7 summarizes the total number in-plants screens tests using the KIS™ test, which includes the number of in-plants screens with negative results, number of positive screens sent to FSIS labs for conformation, and the number of carcasses with violations for each animal class.

Table 8 summarizes the total number of samples analyzed and the number of carcasses with violations for each animal class under additional inspector-generated program projects such as COLLGEN, SHOW, and STATE.

Table 9 summarize the results for specific chemical compounds that were detected **(violative**) within inspector-generated sampling project (including the KIS™) across animal class.

Table 10 summarize the results for specific chemical compounds that were detected (**non-violative**) within inspector-generated sampling project (including the KIS™) across animal class.

Note: Data in this document were obtained from the FSIS Data Warehouse and PHIS databases.

Table 7. FY 2016 Tier II Inspector Generated Sampling (KIS ™) Test

Animal Category	Animal Class	KIS ™ Test			
		Total Number of In-plant Samples	**Number of In-plant Negative Samples**	**Number of In-plant Positive Samples**	**Number of Samples With Confirmed Lab Violations**
Bovine	Beef Cows	15,936	15,582	354	**51**
	Bob Veal	23,333	22,961	372	**103**
	Bulls	1,618	1,565	53	**13**
	Dairy Cows	99,660	97,384	2276	**480**
	Formula-Fed Veal	640	627	13	**1**
	Heavy Calves	426	404	22	**9**
	Heifers	2,537	2,486	51	**5**
	Non-Formula-Fed Veal	161	157	4	**0**
	Steers	8,705	8,530	175	**33**
Porcine	Boars/Stags	99	98	1	**0**
	Market Swine	18,754	18,579	175	**4**
	Roaster Swine	1,527	1,507	20	**1**
	Sows	6,461	6,354	107	**21**
Minor Species	Goats	618	614	4	**0**
	Lambs	1,224	1,212	12	**2**
	Sheep	485	475	10	**1**
	Total	**182,184**	**178,535**	**3,649**	**** 724**

**** 883** KIS ™ test violative analytes in **724** lab confirmed KIS ™ test violative samples**.** Multiple violative analytes in different tissue types may be associated with a single sample (Carcass).

Data Source: FSIS Data Warehouse and PHIS databases.

Table 8. FY 2016 Tier II Inspector-Generated Sampling (COLLGEN/ STATE/ SHOW) Projects

Animal Category	Animal Class	COLLGEN		SHOW		STATE	
		Number of Samples	**Number of Samples With Confirmed Lab Violations**	Number of Samples	**Number of Samples With Confirmed Lab Violations**	Number of Samples	**Number of Samples With Confirmed Lab Violations**
Bovine	Beef Cows	7	--	--	--	5	**1**
	Bob Veal	4	**2**	--	--		--
	Bulls	1	--	--	--	1	--
	Dairy Cows	23	**2**	--	--	--	--
	Formula-Fed Veal	--	--	--	--	--	--
	Heavy Calves	--	--	--	--	--	--
	Heifers	5	**1**	--	--	1	--
	Non-Formula-Fed Veal	--	--	--	--	--	--
	Steers	4	--	11	--	1	--
Porcine	Boars/Stags	--	--	--	--	--	--
	Market Swine	22	--	21	**1**	3	--
	Roaster Swine	--	--	--	--	--	--
	Sows	3	--	--	--	--	--
Minor Species	Goats	3	--	4	--	--	--
	Lambs	3	--	6	--	1	**1**
	Sheep	--	--	--	--	--	--
	Total	**75**	**5**	**42**	**1**	**12**	**2**

Note: Results include two violative residues from two dairy cow (penicillin, florfenicol and sulfamethazine), two bob veal (penicillin and sulfamethazine), a beef cow (desfuroylceftiofur) and one heifer (sulfadimethoxine), one market swine (sulfamethazine) and a lamb (penicillin).

Data Source: FSIS Data Warehouse and PHIS databases.

Table 9. FY 2016 Number of Residue Violations results in Inspector Generated Sampling by Chemical Residue and Animal Class (include KIS ™ test, COLLGEN/ STATE/ SHOW project codes)

Chemical Residue	Beef Cows	Bob Veal	Bulls	Dairy Cow	Formula Fed Veal	Heavy Calves	Heifer	Steers	Market Swine	Roaster Swine	Sows	Lamb	Sheep	Total
Amikacin	--	--	--	1	--	--	--	--	--	--	--	--	--	**1**
Ampicillin	--	--	--	28	--	--	--	--	--	--	--	--	--	**28**
Cefazolin	--	--	--	1	--	--	--	--	--	--	--	--	--	**1**
Ciprofloxacin	--	--	1	1	--	1	--	1	--	--	1	--	--	**5**
Desethylene Ciprofloxacin	--	1	--	--	--	--	--	--	--	--	--	--	--	**1**
Desfuroylceftiofur	13	7	3	192	--	--	2	6	--	--	--	--	--	**223**
Dihydrostreptomycin	--	2	--	3	--	--	--	--	--	--	--	--	--	**5**
Enrofloxacin	--	1	--	--	--	--	--	--	--	--	--	--	--	**1**
Florfenicol	15	2	8	11	--	6	--	7	--	--	--	--	--	**49**
Flunixin	6	6	1	49	--	1	2	3	--	--	2	1		**71**
Gentamycin Sulfate	4	--	--	4	--	--	--	3	--	--	--	--	1	**12**
Ketoprofen	--	--	--	2	--	--	--	--	--	--	--	--	--	**2**
Lincomycin	--	--	--	5	--	--	--	--	--	--	--	--	--	**5**
Meloxicam	--	--	1	3	--	--	--	--	--	--	--	--	--	**4**
Moxidectin	1	--	--	--	--	--	--	--	--	--	--	--	--	**1**

Note: Multiple violative analytes in different tissue types may be associated with a single sample (carcass).

Data Source: FSIS Data Warehouse and PHIS databases.

Table 9. FY 2016 Number of Residue Violations results in Inspector Generated Sampling by Chemical Residue and Animal Class (include KIS ™ test, COLLGEN/ STATE/ SHOW project codes) (*cont.*)

Chemical Residue	Beef Cows	Bob Veal	Bulls	Dairy Cow	Formula Fed Veal	Heavy Calves	Heifer	Steers	Market Swine	Roaster Swine	Sows	Lamb	Sheep	Total
Neomycin	--	57	--	2	--	2	--	3	--	--	--	--	--	**64**
Oxyphenylbutazone	--	--	--	--	--	--	--	1	--	--	--	--	--	**1**
Oxytetracycline	2	--	3	8	--	--	--	--	--	--	--	--	--	**13**
Penicillin	18	13	1	153	1	1	--	9	1	1	16	2	--	**216**
Phenylbutazone	1	--	--	--	--	--	--	--	--	--	--	--	--	**1**
Ractopamine	--	--	--	--	--	--	--	1	--	--	--	--	--	**1**
Sulfadiazine	--	2	--	--	--	--	--	--	--	--	--	--	--	**2**
Sulfadimethoxine	3	5	--	67	--	--	1	--	--	--	--	--	--	**76**
Sulfadoxine	--	--	1	4	--	--	--	--	--	--	1	--	--	**6**
Sulfamethazine	5	16	2	27	--	4	--	8	5	--	1	--	--	**68**
Sulfamethoxazole	--	5	--	1	--	--	--	--	--	--	--	--	--	**6**
Sulfamethoxypyridazine	--	--	--	1	--	--	--	--	--	--	--	--	--	**1**
Tetracycline	--	--	--	1	--	--	--	--	--	--	--	--	--	**1**
Tilmicosin	6	3	1	8	--	2	1	3	--	--	--	--	--	**24**
Tylosin	1	--	--	2	--	--	--	1	--	--	--	--	--	**4**
Total	**75**	**120**	**22**	**574**	**1**	**17**	**6**	**46**	**6**	**1**	**21**	**3**	**1**	**893**

Note: Multiple violative analytes in different tissue types may be associated with a single sample (carcass)
Data Source: FSIS Data Warehouse and PHIS databases.

Table 10. FY 2016 Number of Non-Violative results in Inspector Generated Sampling by Chemical Residue and Animal Class (include KIS ™ test, COLLGEN/ STATE/ SHOW project codes)

Chemical Residue	Beef Cows	Bob Veal	Bulls	Dairy Cows	Formula - Fed Veal	Heavy Calves	Heifers	Non Formula - Fed Veal	Steer	Boar/Stag	Market Swine	Roaster Swine	Sows	Lambs	Total
Chlortetracycline	1	--	1	--	--	--	--	1	--	--	2	--	--	--	**5**
Desfuroylceftiofur	--	--	--	18	--	--	--	--	2	--	--	--	--	--	**20**
Dihydro Streptomycin	--	--	--	2	--	--	--	--	--	--	--	--	--	--	**2**
Dihydrostreptomycin	--	--	--	1	--	--	--	--	--	--	--	--	--	--	**1**
Enrofloxacin	1	--	1	1	--	1	--	--	2	--	2	--	2	--	**10**
Eprinomectin	3	--	--	14	--	--	2	--	3	--	--	--	--	--	**22**
Fenbendazole	--	--	--	4	--	--	--	--	--	--	--	--	--	--	**4**
Fenbendazole sulfone	1	--	--	2	--	--	--	--	--	--	--	--	--	--	**3**
Florfenicol	3	--	1	6	--	--	--	--	3	--	--	--	--	--	**13**
Flunixin	3	--	1	40	--	1	1	--	1	--	--	--	3	--	**50**
Gamithromycin	2	--	--	6	--	1	1	--	2	--	--	--	--	--	**12**
Ivermectin	--	--	1	--	--	--	--	--	--	--	--	--	--	--	**1**
Lincomycin	--	--	--	--	--	--	--	--	--	--	15	--	5	--	**20**

Note: Multiple violative analytes in different tissue types may be associated with a single sample (Carcass).

Data Source: FSIS Data Warehouse and PHIS databases.

Table 10. FY 2016 Number of Non-Violative results in Inspector Generated Sampling by Chemical Residue and Animal Class (include KIS ™ test, COLLGEN/ STATE/ SHOW project codes) (*cont.*)

Chemical Residue	Beef Cows	Bob Veal	Bulls	Dairy Cows	Formula - Fed Veal	Heavy Calves	Heifers	Non Formula - Fed Veal	Steer	Boar/Stag	Market Swine	Roaster Swine	Sows	Lambs	Total
Moxidectin	2	--	1	--	--	--	--	--	--	--	--	--	--	--	**3**
Neomycin	3	25	--	8	--	3	--	1	4	--	--	--	--	--	**44**
Oxytetracycline	38	29	9	61	--	4	1	--	7	--	--	--	3	1	**153**
Penicillin	6	2	2	71	1	--	--	--	3	--	--	--	--	--	**85**
Pirlimycin	--	1	--	10	--	--	--	--	--	--	--	--	--	--	**11**
Ractopamine	--	--	--	--	--	--	--	--	1	--	5	--	--	--	**6**
Spectinomycin	4	6	1	19	--	2	1	--	1	--	--	--	--	--	**34**
Sulfadimethoxine	2	--	--	10	--	--	1	--	--	--	--	--	--	--	**13**
Sulfamethazine	--	2	--	3	--	1	--	1	2	--	--	1	--	--	**10**
Tetracycline	3	2	--	30	--	--	--	--	--	--	--	--	--	--	**35**
Tildipirosin	3	--	--	1	--	1	2	--	4	--	--	--	--	--	**11**
Tilmicosin	3	--	1	1	--	--	--	--	--	--	--	1	3	--	**9**
Tulathromycin	29	4	7	36	--	2	16	--	54	1	2	--	--	--	**151**
Total	**107**	**71**	**26**	**344**	**1**	**16**	**25**	**3**	**89**	**1**	**26**	**2**	**16**	**1**	**728**

Note: Multiple violative analytes in different tissue types may be associated with a single sample (Carcass).
Data Source: FSIS Data Warehouse and PHIS databases.

Import Residue Reinspection Sampling Program

In FY2016, FSIS collected 2,676 import samples and analyzed for 169,490 residue analytes from 25 export countries. Twenty Two violations were detected (20 from uruguaw, and two from Nicaragua). For more information, refer to the list of tables below.

Table 11 summarizes the – import number of residue samples tested per chemical method by Production Class and Product Type

Table 12 summarizes the number of import residue samples by inspection level, per exporting country and production type

Table 13 summarizes the number of import residue samples analyzed, by exporting country and Production Type

Table 14 summarizes the number of import residue samples analyzed, number of chemical analyates tested per exporting country and production type

Table 15 summarize number of samples and chemical residues under the import residue sample program, by exporting country

Table 16 summarize import residue sample program (Non-Violative and Violative) results, by exporting country chemical residues and production class

information for countries wanting to import to the United States can be found at:
Importing products to the United States

Information on US products eligible for export can be found at:
Export Library

Table 11. FY 2016 NRP Import Residue Samples - Number of Residue Samples Tested Per Chemical Method by Production Class and Product Type

Methods	Number of Samples Tested										
	Beef		Pork		Veal	Lamb/Mutton	Goat	Chicken		Turkey	
	Fresh	Processed	Fresh	Processed	Fresh	Fresh	Fresh	Fresh	Processed	Fresh	Processed
MRM	252	--	115	--	68	51	22	106	--	60	--
Aminoglycoside	251	--	198	--	68	50	20	107	--	59	--
Pesticides	719	--	128	--	45	50	37	57	--	40	--
Hormones	166	--	--	--	--	--	--	--	--	--	--
βeta-Agonists	110	--	91	--	39	5	1	1	--	--	--
Avermectins	125	117	100	51	25	48	21	--	--	1	--
Arsenic	127	115	100	51	25	48	21	57	31	23	61
Metals	71	18	57	41	24	--	--	41	11	18	24
Sulfonamides	--	32	---	46	1	--	--	1	--	--	24

Data Source: FSIS Data Warehouse and PHIS databases.

Table 12. FY 2016 Number of Import Residue Samples by Inspection Level, per Exporting Country and Production Type

Country	Normal		Increased	Intensified		Total
	Fresh	Processed	Processed	Fresh	Processed	
Australia	160	8	--	--	--	**168**
Brazil	64	63	--	--	--	**127**
Canada	517	141	--	--	6	**664**
Chile	142	10	--	--	--	**152**
Costa Rica	12	--	--	--	--	**12**
Denmark	24	9	--	--	--	**33**
Finland	3	--	--	--	--	**3**
France	--	2	--	--	--	**2**
Germany	--	12	--	--	--	**12**
Iceland	48	--	--	--	--	**48**
Ireland	103	--	--	--	--	**103**
Israel	--	85	--	--	--	**85**
Italy	--	11	--	--	--	**11**
Japan	37	--	--	--	--	**37**
Korea, Republic Of	--	1	--	--	--	**1**
Lithuania	5	30	--	--	--	**35**
Mexico	173	20	--	--	2	**195**
Netherlands	16	--	--	--	--	**16**
New Zealand	99	12	--	--	--	**111**
Nicaragua	85	--	4	45	--	**134**
Northern Ireland	15	--	--	--	--	**15**
Poland	16	11	--	--	--	**27**
Spain	47	2	--	--	--	**49**
United Kingdom	58	--	--	--	--	**58**
Uruguay	156	35	179	208	--	**578**
Total	**1,780**	**452**	**183**	**253**	**8**	**2,676**

Data Source: FSIS Data Warehouse and PHIS databases.

Table 13. FY 2016 Number of Import Residue Samples Analyzed, by Exporting Country and Production Type

Country	Production Type											
	Beef		Pork		Veal	Lamb Mutton	Goat	Chicken		Turkey		Total
	Fresh	Processed	Fresh	Processed	Fresh	Fresh	Fresh	Fresh	Processed	Fresh	Processed	
Australia	77	8	--	--	20	26	37	--	--	--	--	**168**
Brazil	--	63	64	--	--	--	--	--	--	--	--	**127**
Canada	131	32	92	72	75	11	--	166	14	42	29	**664**
Chile	6	--	23	--	--	--	--	38	10	75	--	**152**
Costa Rica	12	--	--	--	--	--	--	--	--	--	--	**12**
Denmark	--	--	24	9	--	--	--	--	--	--	--	**33**
Finland	--	--	3	--	--	--	--	--	--	--	--	**3**
France	--	--	v	2	--	--	--	--	--	--	--	**2**
Germany	--	--	--	12	--	--	--	--	--	--	--	**12**
Iceland	--	--	--	--	--	48	--	--	--	--	--	**48**
Ireland	89	--	14	--	--	--	--	--	--	--	--	**103**
Israel	--	--	--	--	--	--	--	--	14	--	71	**85**
Italy	--	--	--	11	--	--	--	--	--	--	--	**11**
Japan	37	--	--	--	--	--	--	--	--	--	--	**37**
Korea, Republic Of	--	--	--	--	--	--	--	--	1	--	--	**1**
Lithuania	5	12	--	18	--	--	--	--	--	--	--	**35**

Table 13. FY 2016 Number of Import Residue Samples Analyzed, by Exporting Country and Production Type (*Cont.*)

Country	Production Type											
	Beef		Pork		Veal	Lamb Mutton	Goat	Chicken		Turkey		Total
	Fresh	Processed	Fresh	Processed	Fresh	Fresh	Fresh	Fresh	Processed	Fresh	Processed	
Mexico	152	6	16	3	--	--	5	--	4	--	9	**195**
Netherlands	--	--	12	--	4	--	--	--	--	--	--	**16**
New Zealand	24	12	--	--	38	19	18	--	--	--	--	**111**
Nicaragua	134	--	--	--	--	--	--	--	--	--	--	**134**
Northern Ireland	--	--	15	--	--	--	--	--	--	--	--	**15**
Poland	--	--	16	11	--	--	--	--	--	--	--	**27**
Spain	--	--	47	2	--	--	--	--	--	--	--	**49**
United Kingdom	--	--	58	--	--	--	--	--	--	--	--	**58**
Uruguay	542	35	--	--	1	--	--	--	--	--	--	**578**
Total	**1,209**	**168**	**384**	**140**	**138**	**104**	**60**	**204**	**43**	**117**	**109**	**2,676**

Data Source: FSIS Data Warehouse and PHIS databases.

Table 14. FY 2016 Number of Chemical Analytes Tested Per Exporting Country and Production Type

Country	Production Type											
	Beef		Pork		Veal	Lamb Mutton	Goat	Chicken		Turkey		Total
	Fresh	Processed	Fresh	Processed	Fresh	Fresh	Fresh	Fresh	Processed	Fresh	Processed	
Australia	4,449	60	--	--	1,412	2,235	3,249	--	--	--	--	**11,405**
Brazil	--	366	5,123	--	--	--	--	--	--	--	--	**5,489**
Canada	8,662	174	7,695	414	5,973	844	--	11,974	63	3,337	161	**39,297**
Chile	399	--	2,124	--	--	--	--	2,955	11	6,185	--	**11,674**
Costa Rica	650	--	--	--	--	--	--	--	--	--	--	**650**
Denmark	--	--	1,910	56	--	--	--	--	--	--	--	**1,966**
Finland	--	--	315	--	--	--	--	--	--	--	--	**315**
France	--	--	--	12	--	--	--	--	--	--	--	**12**
Germany	--	--	--	78	--	--	--	--	--	--	--	**78**
Iceland	--	--	--	--	--	3,894	--	--	--	--	--	**3,894**
Ireland	5,218	--	1,161	--	--	--	--	--	--	--	--	**6,379**
Israel	--	--	--	--	--	--	--	--	78	--	132	**210**
Italy	--	--	--	63	--	--	--	--	--	--	--	**63**
Japan	2,224	--	--		--	--	--	--	--	--	--	**2,224**
Korea, Republic Of	--	--	--	--	--	--	--	--	1	--	--	**1**
Lithuania	320	96	--	145	--	--	--	--	--	--	--	**561**

Table 14. FY 2016 Number of Chemical Analyates Tested Per Exporting Countries and Production Type (*Cont.*)

Country	Production Class											
	Beef		Pork		Veal	Lamb Mutton	Goat	Chicken		Turkey		Total
	Fresh	Processed	Fresh	Processed	Fresh	Fresh	Fresh	Fresh	Processed	Fresh	Processed	
Mexico	9,262	30	1,314	23	--	--	384	--	20	--	25	**11,058**
Netherlands	--	--	1,129	--	293	--	--	--	--	--	--	**1,422**
New Zealand	1,521	62	--	--	2,658	1,740	1,652	--	--	--	--	**7,633**
Nicaragua	9,369	--	--	--	--	--	--	--	--	--	--	**9,369**
Northern Ireland	--	--	1,438	--	--	--	--	--	--	--	--	**1,438**
Poland	--	--	1,331	61	--	--	--	--	--	--	--	**1,392**
Spain	--	--	3,820	12	--	--	--	--	--	--	--	**3,832**
United Kingdom	--	--	4,956	--	--	--	--	--	--	--	--	**4,956**
Uruguay	43,907	177	--	--	88	--	--	--	--	--	--	**44,172**
Total	**85,981**	**965**	**32,316**	**864**	**10,424**	**8,713**	**5,285**	**14,929**	**173**	**9,522**	**318**	**169,490**

Note: Multiple violative analytes in different tissue types may be associated with a single sample (Carcass).
Data Source: FSIS Data Warehouse and PHIS databases.

Table 15. FY 2016 Number of Samples and Chemical Residues under the Import Residue Sample Program, by Exporting Country

Country	Number of Samples	Samples with Detected Non-Violative	Samples with Residue Detected Violative	Chemical Residues Analysis*
Australia	168	--	--	11,405
Brazil	127	8	--	5,489
Canada	664	1	--	39,297
Chile	152	--	--	11,674
Costa Rica	12	--	--	650
Denmark	33	--	--	1,966
Finland	3	--	--	315
France	2	--	--	12
Germany	12	--	--	78
Iceland	48	--	--	3,894
Ireland	103	--	--	6,379
Israel	85	--	--	210
Italy	11	--	--	63
Japan	37	--	--	2,224
Korea, Republic Of	1	--	--	1
Lithuania	35	--	--	561
Mexico	195	2	--	11,058
Netherlands	16	--	--	1,422
New Zealand	111	--	--	7,633
Nicaragua	134	--	2	9,368
Northern Ireland	15	--	--	1,438
Poland	27	--	--	1,392
Spain	49	--	--	3,832
United Kingdom	58	--	--	4,956
Uruguay	578	1	20	44,172
TOTAL	2,676	12	22	169,490

Note: * Multiple violative analytes in different tissue types may be associated with a single sample (Carcass).
Data Source: FSIS Data Warehouse and PHIS databases.

Table 16. FY 2016 Import Residue Sample Program (Non-Violative and Violative) Results, by Exporting Countries, Chemical Residues and Production Class

Country	Chemical Residue	Veal	Beef	
		Residue Detected Non-Violative	Residue Detected Non-Violative	Residue Detected Violative
Brazil	Doramectin	--	1	--
	Ivermectin	--	7	--
Canada	Sulfamethazine	**1**	--	--
Mexico	Ivermectin	--	1	--
	Levamisole	--	1	--
Nicaragua	Ethion	--	--	**2**
Uruguay	Diazinon	--	--	**1**
	Ethion	--	--	**19**
	Ivermectin	--	1	--
	Total	**1**	**11**	**22**

Note: Multiple violative analytes in different tissue types may be associated with a single sample (Carcass).**Data Source:** FSIS Data Warehouse and PHIS databases.

Appendix I

NRP Non-Violative Positive and Violative Residue Samples Results

In addition to the publication of the FY2016 United States National Residue Program samples results, FSIS will post the detailed positive non-violative, and positive violative residue results associated with the NRP sampling program in a spreadsheet format on the FSIS website:

https://www.fsis.usda.gov/wps/portal/fsis/topics/data-collection-and-reports/chemistry/red-books/red-book

This sheet includes detailed information regarding samples taken by FSIS in both the "scheduled" sampling and the "inspector-generated" sampling. FSIS plans to publish this detailed results on an ongoing basis. The purpose is to provide the residue testing results, and to increase program transparency for all stakeholders. The detailed results include :sample collection and reviewed date, the project code, the animal class, tissue type, chemical residue name, concentration value, sample results (whether positive non-violative or postive violative), chemcial concentration values (if any) and the CFR reference per chemical listed in the data sheet.

Appendix II

Statistical Table

Scheduled sampling is done to provide some assurance of detection of a violation that affects a given percentage of the sample population.

Prior to FY 2012, FSIS tested 230 to 300 samples from each production class/residue compound class pairing to obtain results that were statistically meaningful. The testing sample sizes of 230 or 300 ensured FSIS a 90 percent or 95 percent probability, respectively, of detecting at least one chemical residue violation if the violation rate is equal to or greater than one percent in the population being sampled. Starting in FY 2012, FSIS stated in its residue sampling plan that the sample size selected/tested would increase to about 800 samples for each of the nine major production class tested under Tier 1.

The statistical table provides the calculated number of samples required to ensure detection of at least one violation that affects a given percentage of the sampled population. Statistically, for a binomial distribution with sample size "n" and violation rate "v" (in decimal), if v is the true violation rate in the population and n is the number of samples, the probability, p, of finding at least one violation among the n samples (assuming random sampling) is $p = 1 - (1 - v)^n$

For example, if the true violation rate is 1% the probability of detecting at least one violation with sample sizes of 230,300,390,460, and 800 are 90%, 95%, 98%, 99%,and 99.97% respectively.

In the table below the probability of detecting at least one violation with a sample size of 800 is italicized and bolded.

Statistical Table – 2016 U.S. National Residue Program

Percentage % Violative in the population (v)	Number of samples required to detect at least one violation in (n) samples with a probability (p)				
	0.90	0.95	0.98	0.99	0.9997
	Sample Size required "n"				
10	22	29	37	44	77
5	45	59	76	90	158
1	230	300	389	459	***807***
0.57	403	525	684	***806***	1,419
0.50	460	598	***780***	919	1,618
0.37	620	***808***	1,055	1,242	2,188
0.29	***793***	1,032	1,347	1,586	2,793
0.10	2,302	2,995	3,910	4,603	8,108

The procedure to calculate the required sample size needed:

$p = 1 - (1 - v)^n$ ← Probability of detecting at least one violation in n sample of binomial distribution with violation rate v

$1 - p = (1 - v)^n$ ← Subtract one from both side of the equation. This gives the probability of detecting No violations in n samples

$\log(1 - p) = \log(1 - v)^n$ ← Apply logarithmic function to both side of the equation

$\log(1 - p) = n * \log(1 - v)$ ← A logarithmic function property

$n = \frac{\log(1 - p)}{\log(1 - v)}$ ← Sample size based on violation rate (v) and probability of detecting (p)

Appendix III

List of Chemical Residues by Class/Method

i. Veterinary Drugs

For 2016 domestic sampling, FSIS has scheduled the following classes of veterinary drug analytes:

Multi-residue method

2-Aminosulfone Albendazole	DCCD	Gamithromycin	Oxytetracycline	Sulfamethoxypyridazine
2-Amino-Flubendazole	Desethylene Ciprofloxacin	Haloperidol	Penicillin G	Sulfanitran
2-Quinoxaline Carboxylic Acid (QCA)	Diclofenac	Ipronidazole	Phenylbutazone	Sulfapyridine
Abamectin	Dicloxacillin	Ipronidazole - OH	Pirlimycin	Sulfaquinoxaline
Acepromazine	Difloxacin	Ketamine	Prednisone	Sulfathiazole
Albendazole	Dimetridazole	Ketoprofen	Ractopamine	Tetracycline
Amoxicillin	Dimetridazole - OH	Levamisole	Ronidazole	Thiabendazole
Ampicillin	Dipyrone	Lincomycin	Salbutamol	Tildipirosin
Azaperone	Doramectin	Melengestrol Acetate	Sarafloxacin	Tilmicosin
Butorphanol	Doxycycline	Meloxicam	Selamectin	Tolfenamic Acid
Carazolol	Emamectin Benzoate	Metronidazole	Sulfachloropyridazine	Tulathromycin A
Cefazolin	Enrofloxacin	– Metronidazole-OH	Sulfadiazine	Tylosin
Chloramphenicol	Eprinomectin	Morantel tartrate	Sulfadimethoxine	Tyvalosin
Chlortetracycline	Erythromycin A	Moxidectin	Sulfadoxine	Virginiamycin
Cimaterol	Fenbendazole	Nafcillin	Sulfaethoxypyridazine	Xylazine
Ciprofloxacin	Fenbendazole sulphone	Norfloxacin	Sulfamerazine	Zeranol (β-Zearalanol)
Clindamycin	Florfenicol	Orbifloxacin	Sulfamethazine	
Cloxacillin	Flubendazole	Oxacillin	Sulfamethizole	
Danofloxacin	Flunixin	Oxyphenylbutazone	Sulfamethoxazole	

Aminoglycoside Method

Amikacin	Gentamicin	Neomycin
Apramycin	Hygromycin B	Spectinomycin
Dihydrostreptomycin	Kanamycin	Streptomycin

Hormones Method

Megestrol	Melengestrol Acetate	Hexestrol	Zeranol

Beta-Agonist Method

Cimaterol	Ractopamine	Zilpaterol
Clenbuterol	Salbutamol	

Avermectin Method

Doramectin	Ivermectin	Moxidectin

Nitrofuran Method

3-Amino-2-oxazolidinone (AOZ)	1-Aminohydantoin (AHD)	Semicarbazide (SEM)
3-Amino-5-morpholinomethyl-2-oxazolidinone (AMOZ)		

Carbadox Method
Quinoxaline-2-carboxylic acid

ii. Pesticides and environmental contaminants

a. Pesticide Method

1-Naphthol	Coumaphos O	Fluroxypyr-1-Methylhepyl-Ester	Pentachlorobenzene (PCB)
3-Hydroxycarbofuran	Coumaphos S	Fluvalinate	Permethrin (cis&trans)
Acephate	DDD o,p’	Heptachlor	Piperonyl butoxide
Acetamiprid	DDD p,p’ + DDT, o,p'	Heptachlor epoxide (cis+ trans) or (B+A)	Pirimiphos methyl
Alachlor	DDE o,p’	Hexachlorobenzene (HCB)	Prallethrin
Aldicarb	DDE p,p’	Hexazinone	Profenofos
Aldicarb sulfone	DDT p,p’	Hexythiazox	Pronamide
Aldicarb sulfoxide	Deethylatrazine	Imazalil	Propachlor
Aldrin	Diazinon	Imidacloprid	Propanil
Atrazine	Dichlorvos (DDVP)	Indoxacarb	Propetamphos
Azinphos methyl	Dieldrin	Lindane (BHC gamma)	Propiconazole
Azoxystrobin	Difenoconazole	Linuron	Pyraclostrobin
Benoxacor	Diflubenzuron	Malathion	Pyrethrin I
Bifenthrin	Dimethoate	Metalaxyl	Pyrethrin II
Boscalid	Diuron	Methamidophos	Pyridaben
Buprofezin	Endosulfan I	Methomyl	Pyriproxyfen
Carbaryl	Endosulfan II	Methoxyfenozide	Resmethrin (cis&trans)
Carbofuran	Endosulfan sulfate	Metolachlor	Simazine
Carfentrazone ethyl	Ethion	Metribuzin	Sulprofos
Chlordane cis	Ethion monoxon	MGK-264 (isomers 1 & 2)	Tebufenozide

Chlordane trans	Ethofumesate	Myclobutanil	Tefluthrin
Chloroneb	Fenoxaprop ethyl	Nonachlor cis	Tetrachlorvinphos
Chlorothalonil	Fenpropathrin	Nonachlor trans	Tetraconazole
Chlorpropham	Fipronil	Norflurazon	Thiabendazole
Chlorpyrifos	Fipronil desulfinyl	Omethoate	Thiamethoxam
Chlorpyrifos methyl	Fipronil sulfide	Oxychlordane	Thiobencarb
Clothianidin	Fluridone	Pentachloroaniline (PCA)	Trifloxystrobin
1-Naphthol	Coumaphos O	Fluroxypyr-1-Methylhepyl-Ester	Pentachlorobenzene (PCB)
3-Hydroxycarbofuran	Coumaphos S	Fluvalinate	Permethrin (cis&trans)
Acephate	DDD o,p’	Heptachlor	Piperonyl butoxide
Acetamiprid	DDD p,p’ + DDT, o,p'	Heptachlor epoxide (cis+ trans) or (B+A)	Pirimiphos methyl
Alachlor	DDE o,p’	Hexachlorobenzene (HCB)	Prallethrin
Aldicarb	DDE p,p’	Hexazinone	Profenofos
Aldicarb sulfone	DDT p,p’	Hexythiazox	Pronamide
Aldicarb sulfoxide	Deethylatrazine	Imazalil	Propachlor
Aldrin	Diazinon	Imidacloprid	Propanil
Atrazine	Dichlorvos (DDVP)	Indoxacarb	Propetamphos
Azinphos methyl	Dieldrin	Lindane (BHC gamma)	Propiconazole
Azoxystrobin	Difenoconazole	Linuron	Pyraclostrobin
Benoxacor	Diflubenzuron	Malathion	Pyrethrin I
Bifenthrin	Dimethoate	Metalaxyl	Pyrethrin II
Boscalid	Diuron	Methamidophos	Pyridaben
Buprofezin	Endosulfan I	Methomyl	Pyriproxyfen
Carbaryl	Endosulfan II	Methoxyfenozide	Resmethrin (cis&trans)
Carbofuran	Endosulfan sulfate	Metolachlor	Simazine
Carfentrazone ethyl	Ethion	Metribuzin	Sulprofos
Chlordane cis	Ethion monoxon	MGK-264 (isomers 1 & 2)	Tebufenozide
Chlordane trans	Ethofumesate	Myclobutanil	Tefluthrin
Chloroneb	Fenoxaprop ethyl	Nonachlor cis	Tetrachlorvinphos
Chlorothalonil	Fenpropathrin	Nonachlor trans	Tetraconazole
Chlorpropham	Fipronil	Norflurazon	Thiabendazole
Chlorpyrifos	Fipronil desulfinyl	Omethoate	Thiamethoxam

Chlorpyrifos methyl	Fipronil sulfide	Oxychlordane	Thiobencarb
Clothianidin	Fluridone	Pentachloroaniline (PCA)	Trifloxystrobin

b. Metals Method

Aluminum (Al)	Copper (Cu)	Selenium (Se)
Barium (Ba)	Iron (Fe)	Strontium (Sr)
Boron (B)	Lead (Pb)	Thallium (Tl)
Cadmium (Cd)	Manganese (Mn)	Vanadium (V)
Chromium (Cr)	Molybdenum (Mo)	Zinc (Zn)
Cobalt (Co)	Nickel (Ni)	

Appendix IV

U.S. NRP – Domestic Scheduled Sampling Program

Year	Number of Samples	Number of Violative Samples	Number of Non-Violative Positive Analytes	Number of Violative Chemical Residues
*** FY2013**	**4,583**	**19**	**23**	**8**
FY2014	**6,066**	**10**	**34**	**10**
FY2015	**6,445**	**12**	**23**	**8**
FY2016	**7,067**	**26**	**24**	**11**

* **Note:** FSIS moved to a fiscal evaluation period beginning with FY12. FY 2013 covers only Jan-Sept, 2013.

Appendix V

U.S. NRP – Import Re-inspection Sampling Program

Year	Number of Samples	Number of Violative Samples	Violative Residues
*** FY2013**	**817**	**4**	**Avermectins**
FY2014	**1,967**	**8**	**Ivermectin (7), Zilpaterol (1)**
FY2015	**2,922**	**7**	**Abamectin (1) Ethion (5), Piperonyl Butoxide (1)**
FY2016	**2,676**	**22**	**Ethion (21), Diazinon (1)**

*** Note:** FSIS moved to a fiscal evaluation period beginning with FY12. FY 2013 covers only Jan-Sept, 2013.

Appendix VI

NRP – Domestic Inspector Generated Sampling Program (*include* KIS™ *test*) & lab confirmed residue results

Year	Number of Samples / (Include In-plant KIS™ Screens Tests)	Number of Samples Tested in FSIS Labs / (include in-plant KIS™ screens positive)	Number of Lab-Confirmed Violative Analytes / Number of Violative Carcasses	Top Three Violative Chemical Residue	Number of Lab-Confirmed Non-Violative Positive Analytes	Top Three Non-Violative Chemical Residue
***FY2013**	170,692 / (**170,560**)	4,100 / (**3,968**)	1,265 / **1,053**	Ceftiofur Penicillin Neomycin	1,099	Oxytetracyline Neomycin Ceftiofur
FY2014	210,705 / (**210,516**)	5,048 / (**4,859**)	1,408 / **1,136**	Ceftiofur Penicillin Neomycin	1,150	Oxytetracyline Tulathromycin Penicillin
FY2015	184,167 / **(184,010)**	4,179 / (**4,022**)	1,024 / **796**	Ceftiofur Penicillin Sulfamethazine	873	Tulathromycin Oxytetracyline Neomycin
FY2016	182,313 / **(182,184)**	3,778 / (**3,649**)	893 / **732**	Ceftiofur Penicillin Sulfadimethoxine	728	Oxytetracycline Tulathromycin Penicillin

Note:

- (**Number of KIS™ test samples in paranthesis**)
- Multiple violative analytes in different tissue types may be associated with a single sample (Carcass).
- FSIS moved to a fiscal evaluation period beginning w/FY13. FY 2013 covers Jan-Sept, 2013 only.

Appendix VII

2016 FSIS Residue Sampling for Siluriformes

On December 2, 2015, FSIS published the final rule, "Mandatory Inspection of Fish of the Order Siluriformes and Products Derived From Such Fish." The 2008 Farm Bill amended the Federal Meat Inspection Act (FMIA), to make Siluriformes a species amendable to the FMIA and therefore, subject to FSIS inspection. FSIS is providing an 18 month transitional period for the inspection of Siluriformes and the residue testing will be done based on parameters set forth in the final rule. During the first 18 months, FSIS will schedule routine testing of Siluriformes for dyes (malachite green and gentian violet), nitrofurans, veterinary drugs, metals, and pesticides residues.

Note: The sampling scheme may change during the 18 month transitional period based on sampling results and findings by FSIS.

	Domestic	Imports	Total
Siluriformes	**77**	**84**	**161**

Siluriformes	Chemical Class May 2015- Sep 2016				
	Dyes	**Metals**	**MRM**	**Nitrofurans**	**Pesticides**
Domestic	√	√	√	√	√
Imports	√	√	√	√	√

Table 17. FY2016 NRP Residue Scheduled Samples -Number of Residue Samples Tested Per Chemical Method by Sampling Plan

Siluriformes (# Samples Collected)	Number of Samples per Chemical Method				
	Dyes	**Metals**	**MRM**	**Nitrofurans**	**Pesticides**
Domestic (77)	31 **(1)**	31	77	46	46
Import (84)	42	42	42 **(1)**	42 **(1)**	42
Total (161)	**73**	**73**	**119**	**88**	**88**

Note: Number of violative samples **(in parenthesis)**
Data Source: FSIS Data Warehouse and PHIS databases.

Table 18. FY 2016 NRP Residue Scheduled Samples - Number of Chemical Analytes Tested Per Chemical Method by Sampling Plan

Siluriformes (# Samples Collected)	Number of Chemical Analytes per Chemical Method					
	Dyes	Metals	MRM	Nitrofurans	Pesticides	Total
Domestic (77)	154	821	14,283	230	7,338	22,826
Import (84)	203	1181	8,105	210	6,274	15,973
Total (161)	**357**	**2,002**	**22,388**	**440**	**13,612**	**38,799**

Note: Multiple analytes may be associated with the same sample. Not all samples are tested for all chemical method. Number of samples per chemical method is indicated in Table 4

Data Source: FSIS Data Warehouse and PHIS databases.

Table 19. FY 2016 NRP Siluriformes Residue Inspection Program Violations

Animal	Sampling	Compound	Concentration	Units	Tolerance Level Value	Authority (CFR Citation)
Siluriformes	Domestic	Crystal Violet	0.162	ppm		
Siluriformes	Import	Enrofloxacin	22.500	ppm		
Siluriformes	Import	Gentian Violet	16.1	ppb		