Pesticide Residue Monitoring Program Fiscal Year 2015 Pesticide Report

U.S. Food and Drug Administration

http://www.fda.gov/food/foodborneillnesscontaminants/pesticides/default.htm

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Acknowledgments

This report was compiled through the efforts of the following FDA staff: Laurie A. Bates, Xuhui Zhao, Terry Councell, Mallory Kelly, Standra Purnell, Lauren Robin, Charlotte Liang, Chris Sack, and Kevin Robinson in the Center for Food Safety and Applied Nutrition; Krisztina Z. Atkinson and Randall Lovell, in the Center for Veterinary Medicine, and Susan Kelley, Siobhan Delancey, and Jason Strachman-Miller in the Office of Foods and Veterinary Medicine.

FDA Pesticide Residue Monitoring Program

For more information about FDA pesticide residue monitoring program reports, see http://www.fda.gov/Food/FoodborneIllnessContaminants/Pesticides/ucm2006797.htm. Since 1987, annual pesticide reports have been prepared to summarize results of the Food and Drug Administration's (FDA or the Agency) pesticide residue monitoring program. Reports from Fiscal Year (FY) 1987 to FY 1993 were published in the Journal of the Association of Official Analytical Chemists/Journal of AOAC International. FY 1993 and FY 1994 reports were published in the journal and also made available on the public FDA website (www.fda.gov). Subsequent reports are only available on the FDA website. Each report is available in the format(s) used at the time they were written.

In addition to the annual reports, specific pesticide monitoring data and statistical analyses of human foods for each year are also available in text format on the FDA website as "database" files. The database files include statistical analysis of findings by multiple country/commodity/pesticide combinations, along with data for individual samples from which the summary information was compiled. Instructions and explanations of the data and statistical analyses are provided for each database file. The database files are available from FY 1996 on.

Executive Summary

Growers often use pesticides to protect their products from insects, weeds, fungi, and other pests. U.S. regulators help ensure that food produced with the use of pesticides is safe to eat by setting allowable levels for pesticide chemical residues and monitoring foods in the market to determine if those levels are being met.

The role of the Environmental Protection Agency (EPA) is to establish pesticide tolerances, or limits on the amount of a pesticide chemical residue a food can contain. The Food and Drug Administration (FDA) is responsible for enforcing those tolerances for domestic foods shipped in interstate commerce and foods imported into the U.S.[i]

This report summarizes the results of FDA's pesticide monitoring program for FY 2015. The findings show that the levels of pesticide chemical residues measured by FDA in the U.S. food supply are generally in compliance with EPA pesticide tolerances.

FDA employs a three-fold strategy to enforce EPA's pesticide tolerances in human and animal foods. In its regulatory pesticide residue monitoring program, FDA selectively monitors a broad range of imported and domestic commodities for residues of about 700 different pesticides and selected industrial compounds. FDA may also carry out focused sampling surveys for specific commodities or selected pesticides of special interest. In addition, FDA monitors the levels of pesticide chemical residues in foods prepared for consumption in its Total Diet Study (TDS), an ongoing program that monitors contaminants and nutrients in the average U.S. diet.

In FY 2015 (October 1, 2014 through September 30, 2015), FDA analyzed 5,989 samples in its regulatory monitoring program: 5,572 human foods and 417 animal foods. Because the violation rates of import samples are generally higher than for domestic samples, FDA tests more imported than domestic commodities (4,737 import and 835 domestic samples). We collected imported human food samples from 111 countries and domestic human food samples from 39 states, the District of Columbia, and U.S. territories.

FDA found over 98% of domestic and 90% of imported foods were compliant with federal standards; and no pesticide chemical residues were found in 49.8% of the domestic and 56.8% of the imported human food samples that we analyzed. We found residues in violation of federal standards (residues above the tolerance or residues for which no tolerance has been established) in less than 2 percent of domestic samples and less than 10 percent of import samples.

In FY 2015, FDA also analyzed 417 animal food samples (215 domestic and 202 imported) for pesticides. The Agency found no pesticide chemical residues in 51.6% of the domestic and 57.9% of the import animal food samples. Most of these samples were from foods for livestock and poultry; 30 of the samples were pet food. Fewer than 3% of the animal food

[i] With the exception of meat, poultry, and certain egg products regulated by the Food Safety Inspection Service (FSIS) of the U.S. Department of Agriculture (USDA).

samples (four domestic and eight imported) contained violative pesticide chemical residues.

In some commodity groups, the violation rate was higher for import samples. The higher violation rate confirms the effectiveness of the regulatory program in targeting imported commodities more likely to contain violative pesticide chemical residues, and the countries more likely to export them. Factors considered in targeting imported commodities include past problem areas, findings from state and federal monitoring, and foreign pesticide usage data. The higher violation rate for imports also demonstrates the comprehensiveness of FDA's pesticide analytical protocols.

FDA also conducted one focused sampling survey of pesticides in FY 2015 for domestically produced game meats for an assignment related to an ongoing European Union audit. None of the 17 game meat samples contained pesticide chemical residues, with the exception of one sample of elk that contained DDT below the FDA action level.

FDA analyzed 1061 total samples in the TDS program in FY 2015. No foods contained violative pesticide levels. The most frequently observed pesticide chemical residues are consistent with those reported in FY 2014. Residues of 157 different pesticides were found in the TDS foods, most at trace levels. Of all the residues found in TDS foods, 88% percent were at levels below 0.01 parts per million (ppm), and less than 2% were above 0.1 ppm.

Glossary and Abbreviations

Term	Definition
Action level	Food or feed may contain a pesticide chemical residue from sources of contamination that cannot be avoided by good agricultural or manufacturing practices, such as contamination by a pesticide that persists in the environment. In the absence of an EPA tolerance, or tolerance exemption, FDA may establish an "action level" for such unavoidable pesticide chemical residues. An action level is a recommended level of a contaminant not to exceed. An action level is not legally binding and FDA may take enforcement action on a case-by-case basis whether a contaminant is below, at, or above an action level. (http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/ucm077969.htm)
Agency	U.S. Food and Drug Administration, unless otherwise denoted
APEC	Asia Pacific Economic Cooperation
CFR	U.S. Code of Federal Regulations
CFSAN	FDA Center for Food Safety and Applied Nutrition
Codex	Codex Alimentarius Commission
CVM	FDA Center for Veterinary Medicine
Domestic sample	Sample of a commodity produced and held for sale in the U.S.
DWPE	Detention Without Physical Examination
EPA	U.S. Environmental Protection Agency
FFDCA	Federal Food, Drug, and Cosmetic Act
FDA	U.S. Food and Drug Administration
FSCF	Food Safety Cooperation Forum
FSIS	USDA Food Safety and Inspection Service
FY	Fiscal Year
Import sample	Sample of products, which originate from another country, collected while the goods are in import status.
JIFSAN	Joint Institute for Food Safety and Applied Nutrition

Term	Definition
ORA	FDA Office of Regulatory Affairs
LOD	Limit of Detection – The minimum concentration of a pesticide chemical residue that can be reliably distinguished from zero.[1]
LOQ	Limit of Quantitation – The minimum concentration of a pesticide chemical residue that can be quantified with acceptable precision.[1]
MOU	Memorandum of Understanding
MRL	Maximum Residue Level
MRM	Multiresidue Method – FDA pesticide method designed to analyze multiple pesticide chemical residues during a single analysis
No-tolerance violation	Pesticide chemical residue found at, or above, a quantifiable level for pesticides in a commodity in which EPA has not established a tolerance for that particular pesticide/commodity combination or a tolerance exemption
Over-tolerance violation	Pesticide chemical residue found at a level above an EPA tolerance.
PDP	USDA Pesticide Data Program
PPB	Parts per billion – residue concentration equivalent to microgram/kilogram
Ppm	Parts per million – residue concentration equivalent to milligram/kilogram
SPS	Sanitary and Phytosanitary
SRM	Selective Residue Method – FDA pesticide method designed to analyze specific selected pesticide chemicals or a single pesticide chemical
TDS	Total Diet Study
Tolerance	The EPA established maximum residue level of a specific pesticide chemical that is permitted in or on a human or animal food in the United States. The tolerances are listed in 40 CFR Part 180 – Tolerances and Exemptions for Pesticide Chemical Residues in Food
Trace level	Residue level less than the LOQ but greater than, or equal to, the LOD
USDA	U.S. Department of Agriculture
WTO	World Trade Organization

FDA Pesticide Residue Monitoring Program

Three federal government agencies share responsibility for the regulation and oversight of pesticide chemical residues in or on food. The U. S. Environmental Protection Agency (EPA) registers (i.e., approves) the use of pesticides and establishes tolerances for pesticide chemical residues in or on food resulting from the use of the pesticides. Tolerances are the EPA established maximum residue levels of a specific pesticide chemical that is permitted in or on a human or animal food in the United States.[2] EPA also provides a strong U.S. preventative controls program by licensing pesticide applicators, conducting pesticide use inspections, and establishing and enforcing pesticide labelling provisions. FDA enforces tolerances in both imported foods and in domestic foods shipped in interstate commerce, except for meat, poultry, and certain egg products for which the Food Safety and Inspection Service (FSIS) of the U.S. Department of Agriculture (USDA) is responsible. FDA also monitors pesticide chemical residue levels in commodities representative of the U.S. diet by carrying out market basket surveys under the TDS.

Regulatory Monitoring and Enforcement

FDA samples individual lots of domestically produced and imported foods and analyzes them to determine whether they contain pesticide chemical residues that are "unsafe" within the meaning of the FFDCA. This activity is carried out pursuant to the enforcement of tolerances established by EPA and includes the monitoring of food for residues of cancelled pesticides used in the past that persist in the environment, which may be addressed by FDA action levels. Domestic samples of foods produced and held for sale in the U.S. are typically collected close to the point of production in the distribution system, e.g., growers, packers, and distributors. Import samples are collected when products are offered for entry into U.S. commerce. Because the EPA tolerances are established primarily for raw agricultural commodities, the emphasis of FDA's sampling is on the unwashed, whole (unpeeled) raw commodity; some processed foods are also sampled.

FDA may take regulatory action against food commodities containing pesticide chemical residues when they are found:

- at a level above an EPA tolerance for the pesticide/commodity combination
- when present in a commodity for which EPA has not established a tolerance or a tolerance exemption for that particular pesticide/commodity combination ("no tolerance" violations)

Food or feed may contain a pesticide chemical residue from sources of contamination that cannot be avoided by good agricultural or manufacturing practices, such as contamination by a pesticide that persists in the environment. FDA may establish an "action level" for unavoidable residues that do not have a tolerance or tolerance exemption. The action level is not legally binding, but FDA monitors unavoidable residues and may take enforcement action on a case-by-case basis, considering the action level and other factors.

For domestic foods, FDA may issue Warning Letters to the responsible growers and invoke other sanctions such as seizure to remove the food from commerce, or injunction to correct the cause of the violation. Imported shipments may be refused entry into U.S. commerce. Firms may be placed under an Import Alert

(http://www.accessdata.fda.gov/cms_ia/ialist.html) and "Detention Without Physical Examination," or DWPE, may be invoked for future imported shipments of that firm's commodity based on the finding of a single violative shipment. Congress has authorized FDA to refuse admission of regulated articles based on information that causes an article to appear to violate the FFDCA. Typically, the information is obtained by physical examination of the entry, however physical examination is not required. For example, entries of imported foods with a violative history, based on the results obtained from previous examinations of the same foods that were found to contain "unsafe" pesticide residues, would likely create an appearance of adulteration under the FFDCA for future shipments of the imported foods. DWPE can be applied to a product or products from specific growers, manufacturers, or shippers, and may extend to a geographic area or country if the problem is demonstrated to be sufficiently broad-based.

FDA's import alerts describe current DWPEs for pesticide chemical residues and other food issues. There are currently four import alerts that address food products that are under DWPE for pesticides:

- Import Alert 99-05, "Detention Without Physical Examination of Raw Agricultural Products for Pesticides"
- Import Alert 99-08, "Detention Without Physical Examination of Processed Foods for Pesticides"
- Import Alert 99-14, "Countrywide Detention Without Physical Examination of Raw Agricultural Products for Pesticides"
- Import Alert 99-15, "Countrywide Detention Without Physical Examination of Processed Foods for Pesticides"

Growers, manufacturers, and shippers that have products under import alert must provide evidence of compliance for each lot of product exported to the U.S. This procedure places the burden of demonstrating product compliance with U.S. tolerances for pesticide chemical residues on the importer before the entry can be released into domestic commerce. Firms can have their product(s) removed from DWPE under an FDA import alert by providing evidence establishing that the conditions that gave rise to the appearance of a violation have been resolved and that there is sufficient evidence for the Agency to have confidence that future entries will be in compliance with the FFDCA. Additionally, a minimum of five consecutive non-violative commercial shipments, as demonstrated by providing FDA with acceptable reports of private laboratory analyses, is expected to remove a grower's, manufacturer's, or shipper's product from an import alert. Removal of a countrywide or geographic area import alert would typically require submission to FDA of an effective, detailed approach to correcting the problem, along with acceptable laboratory reports demonstrating compliance of the commodity in question.

Regulatory Monitoring Program Sampling Design

The goal of FDA's pesticide residue monitoring program is to carry out selective monitoring to achieve an adequate level of consumer protection. FDA samples are primarily of the surveillance type; i.e., there is no specific prior knowledge or evidence that a particular food shipment contains illegal residues. However, FDA's monitoring is not random or statistically designed; rather, emphasis is given to the sampling of commodities most frequently consumed or imported, commodities and places of origin with a history of

violations, and to a lesser extent, larger-size shipments.

Some of the factors considered by FDA in planning the types and origin of commodities to sample include the following:

- analysis of past problem areas
- commodity/pesticide findings from state, USDA, and FDA monitoring
- foreign pesticide usage data and regional intelligence on pesticide use
- dietary significance of the food
- volume and product value of individual commodities of domestic food produced and entered into interstate commerce and of imported food offered for entry into the U.S.
- origin of imported food
- chemical characteristics and toxicity of the pesticide(s) used

One important consideration when designing the FDA pesticide residue monitoring program is the distinction between domestic and imported commodities. Historically, the violation rate of import samples is 3-5 times higher than the rate for domestic samples. For example, in FY 2011 – 2014 the violation rate for domestic samples ranged from 1.4 – 2.8 %, whereas the rate for import samples ranged from 7.1 – 12.6 %. Because the violation rate of import samples is higher than for domestic samples, FDA allocates more of its resources towards testing imported compared with domestic commodities. Typically, imported commodities comprise approximately 80 % of all samples analyzed each year.

In addition to increased sampling of imported commodities, FDA further targets specific commodities and countries that might warrant special attention based upon historically high violation rates and trends. FDA also utilizes available foreign pesticide usage data and data from the USDA's Pesticide Data Program (PDP), a statistically representative survey of pesticide residues in selected food commodities, to develop sampling guidance (https://www.ams.usda.gov/datasets/pdp).

Other federal agencies and several states have their own monitoring programs for pesticides. Through collaboration and agreements, they provide FDA information and data on violative samples found in domestic commerce (see Cooperative Arrangements and International Activities section). FDA leverages that data to focus its resources where they are most efficiently and effectively used.

Sampling levels and bias for particular imported or domestic commodities can vary significantly from year to year, e.g., in response to changing weather patterns, new or re-emergent pests, new invasive pest species, or developed resistance to pesticides. Pesticide use changes due to such factors and some countries historically have more problems than others. Targeted commodities may not be the largest imports by volume from a particular country. A high violation rate for a targeted commodity does not mean that a country's overall violation rate for all commodities is high; rather it is an indicator of the effectiveness of FDA's sampling design to select commodities and production sources that are likely to be higher risk.

Considering the above and available Agency resources, FDA has not attempted to develop a monitoring program that would be statistically based. The current pesticide sampling program, coupled with broad-based enforcement strategies for imports, allows FDA to

achieve the program's main objective of consumer protection.

Focused Sampling

In addition to samples collected for routine regulatory monitoring, FDA may conduct special "focused sampling" assignments to target specific food commodities for analysis. Focused sampling is generally used to follow up on suspected problem areas or to acquire residue data on selected commodities not usually covered during regulatory monitoring. Typically, samples collected for a focused sampling assignment are analyzed using routine pesticide procedures; however, in some cases, targeted residues of interest are analyzed.

In the early 1990s, FDA conducted statistically based comprehensive incidence and level monitoring studies of four major foods and published the results.[3,4] However, due to resource constraints, incidence and level monitoring was replaced by regulatory based "focused sampling." Incidence and level monitoring data are provided by FDA's TDS program and the USDA PDP.

Animal Food

In addition to monitoring food for human consumption, FDA also samples and analyzes domestic and imported animal food for pesticide chemical residues. FDA's Center for Veterinary Medicine (CVM) directs this portion of the Agency's surveillance program via its Animal Food Contaminants Program. CVM's program focuses on animal food that is consumed by livestock and poultry animals that ultimately become or produce food for human consumption.

Analytical Methods and Pesticide Coverage

To analyze large numbers of samples with unknown pesticide treatment history, FDA utilizes both multi-residue methods (MRMs) capable of simultaneously determining many different pesticide chemical residues, and selective residue methods (SRMs) that target specific pesticide(s). The complete list of pesticides analyzed in FY 2015 is provided in Appendix A.

The FDA MRMs can detect the majority of the approximately 400 pesticides with EPA tolerances, and many others that have no tolerances [see the Code of Federal Regulations (CFR), 40 CFR part 180]. They are also able to detect many metabolites, impurities, and alteration products of pesticides, and selected industrial chemicals. FDA pesticide SRMs are optimized to determine one or several specific pesticide chemical residues in foods. They are more resource intensive and therefore employed more judiciously. SRMs are sometimes needed to analyze pesticides that are not adequately extracted or detected using standard MRMs or to target specific pesticide/commodity combinations.

The lower limit of residue measurement in FDA's determination of a specific pesticide is well below typical tolerance levels, which range from 0.1 to 50 parts per million (ppm). Most pesticides analyzed are easily quantified at FDA's default limit of quantitation (LOQ) of 0.01 ppm[5]. Residue levels detected above the limit of detection (LOD) but below the LOQ are designated as "trace" values.

FDA conducts ongoing research to update its pesticide residue monitoring program. This research includes testing the behavior of new or previously untested pesticides through

existing analytical methods, as well as developing new methods to improve efficiencies and detection capabilities. Newer extraction procedures and more sensitive detection techniques have increasingly replaced older methods, allowing for a greater level of pesticide coverage.

FDA Total Diet Study

An important complement to FDA's regulatory pesticide residue monitoring program is the FDA TDS program. The TDS is distinct from FDA's regulatory pesticide residue monitoring program. The TDS monitors levels of pesticide chemicals in foods representing the totality of the American diet. Data from the TDS are used to calculate exposures to pesticides from the U.S. diet.

Regulatory monitoring determines pesticide chemical residues primarily in raw commodities, but the TDS monitors foods prepared table-ready for consumption. Therefore, depending on the TDS food, the sample may be washed, peeled, and/or cooked before analysis, simulating typical consumer handling. In addition to being analyzed for pesticide chemical residues, TDS foods also are selectively analyzed for toxic and nutrient elements, industrial chemicals, and other chemical contaminants.

Another distinction from FDA's pesticide-residue regulatory monitoring is that TDS foods are analyzed at levels 10–100 times lower than the regulatory monitoring program. TDS residue levels as low as 0.1 parts per billion (ppb) are reported routinely.

TDS foods are collected for sampling as "market baskets," with each market basket comprising samples of about 266 different foods that represent the average U.S. consumer's diet, bought from the same retail venues from which consumers buy them. Each year, the market baskets are collected from four different regions of the country, from three different cities in each of those regions. For each region, samples from the three cities are combined to form a single composite prior to analysis.

Analytical results and additional information about the history and design of the TDS can be found on FDA's TDS website.[6] The Agency is in the process of updating the website with additional TDS data.

Cooperative Agreements and International Activities

FDA collaborates with local, state, federal, and international authorities, leveraging their programs and capacities to maximize the effectiveness of its pesticide program. For example, the FDA and USDA have a Memorandum of Understanding (MOU) in which USDA alerts FDA monthly of presumptive tolerance violations they find in the PDP. FDA uses this information when designing the annual pesticide residue monitoring program, and to direct immediate sample collection efforts, as appropriate.

FDA-State Cooperation

FDA field offices interact with their counterparts in many states to enhance the effectiveness of the Agency's pesticide residue monitoring program. Partnership Agreements and MOUs have been established between FDA and many state agencies. These agreements provide for more efficient residue monitoring by both parties by coordinating efforts, broadening coverage, and eliminating duplication of effort. These

agreements are specific to each state and take into account available resources. The agreements stipulate how FDA and the state will jointly plan work for collecting and analyzing samples, sharing data, and enforcing compliance follow-up responsibilities for individual commodities of imported and domestic products.

International Activities

FDA is subject to the obligations placed on countries by the World Trade Organization (WTO) Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement). Pesticide residue tolerances and monitoring activities are included as sanitary measures under the SPS Agreement. FDA's obligations under this agreement include the requirement that standards are based on an assessment, as appropriate to the circumstances, of the risk to human and animal life or health, and on international standards except when a more stringent standard can be scientifically supported. The standards must also be applied equally to domestic and imported products unless there is scientifically based justification for doing otherwise.

Similarly, FDA is subject to obligations arising from several free trade agreements, the most notable of which is the North American Free Trade Agreement (NAFTA). These bilateral or multilateral free trade agreements contain provisions on sanitary measures that are consistent with the provisions of the SPS Agreement. As with the SPS Agreement, the sanitary provisions of these agreements include provisions relating to pesticide residues.

FDA pesticide residue monitoring activities, for domestic and imported products, are a part of the Agency's overall food safety programs and are in keeping with these international obligations. Additionally, arrangements FDA makes with other countries with respect to food safety programs, and the activities that FDA carries out internationally with respect to food safety, can also affect how some of our monitoring is conducted.

FDA maintains a number of cooperative arrangements with counterpart agencies in foreign governments. Such arrangements include MOUs, Confidentiality Agreements, or other formal communications. These arrangements most often contain information-sharing provisions that include the ability to share analytical findings about pesticide residues. Several of the MOUs have specific provisions relating to pesticide residue information sharing or cooperative efforts relating to pesticide residues.

FDA participates regularly in meetings with food safety regulatory agencies of foreign governments, in a variety of settings including bilateral and multilateral fora, and in formal and informal technical and policy meetings. FDA carries out bilateral discussions on food safety with our regulatory partners from around the world; pesticide control programs and pesticide residue issues can be subjects for discussion at these meetings. Multilateral fora in which FDA participates include the Food Safety Cooperation Forum (FSCF) of the Asia Pacific Economic Cooperation (APEC), which promotes regulatory cooperation in food safety including pesticide Maximum Residue Levels (MRLs).

FDA participates in the work of international standards-setting organizations, including that of the Codex Alimentarius Commission (Codex). Within Codex, FDA is an active participant in the work of the Codex Committee on Pesticide Residues. In addition, FDA supports the Joint Institute for Food Safety and Applied Nutrition (JIFSAN), which implements several training programs on pesticide risk assessment and the use of pesticide

residue analytical methods.

Results and Discussion

This report discusses results of the FY 2015 FDA pesticide residue monitoring program in accordance with the threefold design of the program, i.e., the regulatory pesticide monitoring program, focused sampling surveys, and the TDS program. Additionally, the report examines data to evaluate imported products that may warrant special attention.

In FY 2015, FDA analyzed 5,989 samples under the regulatory monitoring program, of which 5,572 were human foods and 417 were animal foods. Results for the testing of human and animal foods are reviewed under separate headings, "Regulatory Monitoring of Human Foods" and "Regulatory Monitoring of Animal Foods." Sampling and analytical data were obtained from the FDA Field Accomplishment and Compliance Tracking System (FACTS) database.

Regulatory Monitoring of Human Foods

The 5,572 human foods analyzed include results from the focused sampling assignment "European Union Game Meat Assignment." Results of the assignment are discussed separately in the section "Focused Sampling"; however, the findings are included in the sample summaries and statistics for human foods.

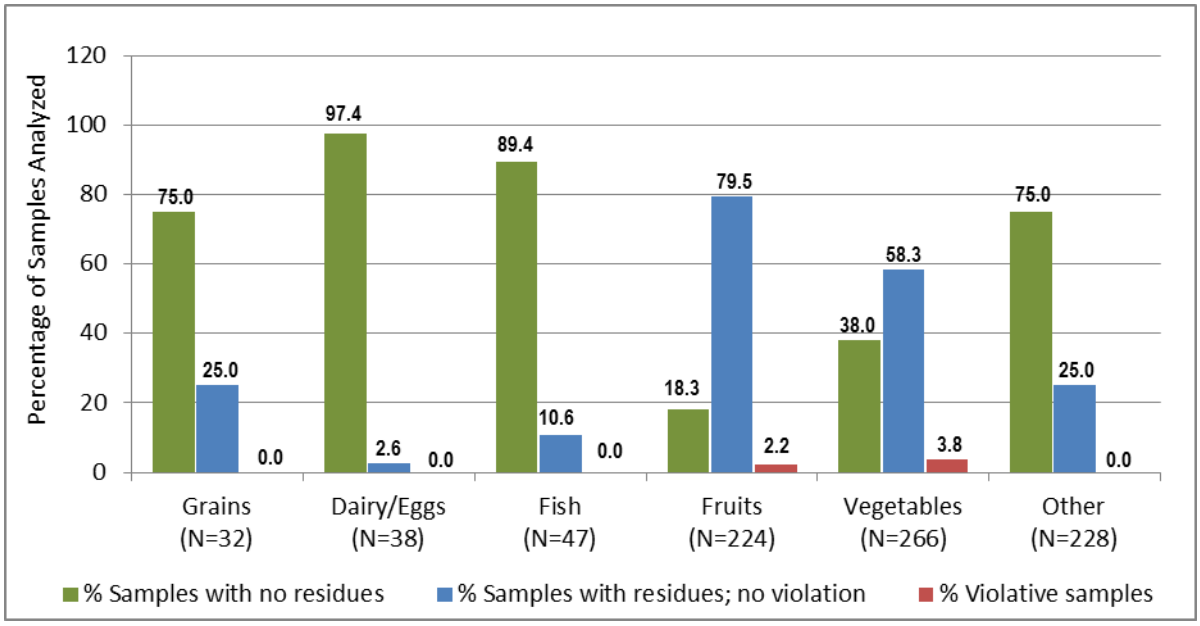
Of the human foods analyzed for pesticides in FY 2015, 835 were domestic samples and 4,737 were import samples. Results for the domestic samples are tabulated in Appendix B, "Analysis of Domestic Samples by Commodity Group in FY 2015," and results for the import samples are tabulated in Appendix C, "Analysis of Import Samples by Commodity Group in FY 2015." Each appendix includes information on the total number of samples analyzed, the number and percentage of samples with no residues detected, and the number and percentage of violative samples including the nature of the violation (over-tolerance vs. no-tolerance). Results are summarized for all samples analyzed, by commodity groups and by subgroups.

Discussion

For human foods, the domestic violation rate was 1.8 % and the import violation rate was 9.4 %, based on testing for the pesticides listed in Appendix A. The violation rates for FY 2015 are consistent with those from FY 2012 - 2014, i.e., 1.4 - 2.8 % for domestic samples and 11.1 – 12.6 % for import samples.

Of the 835 domestic samples analyzed in FY 2015, 98.2 % were in compliance and 49.8 % had no detectable residues (Appendix B). Fruits and vegetables accounted for the majority (58.7 %) of domestic samples.

Figure 1 - Results of Domestic Samples by Commodity Group

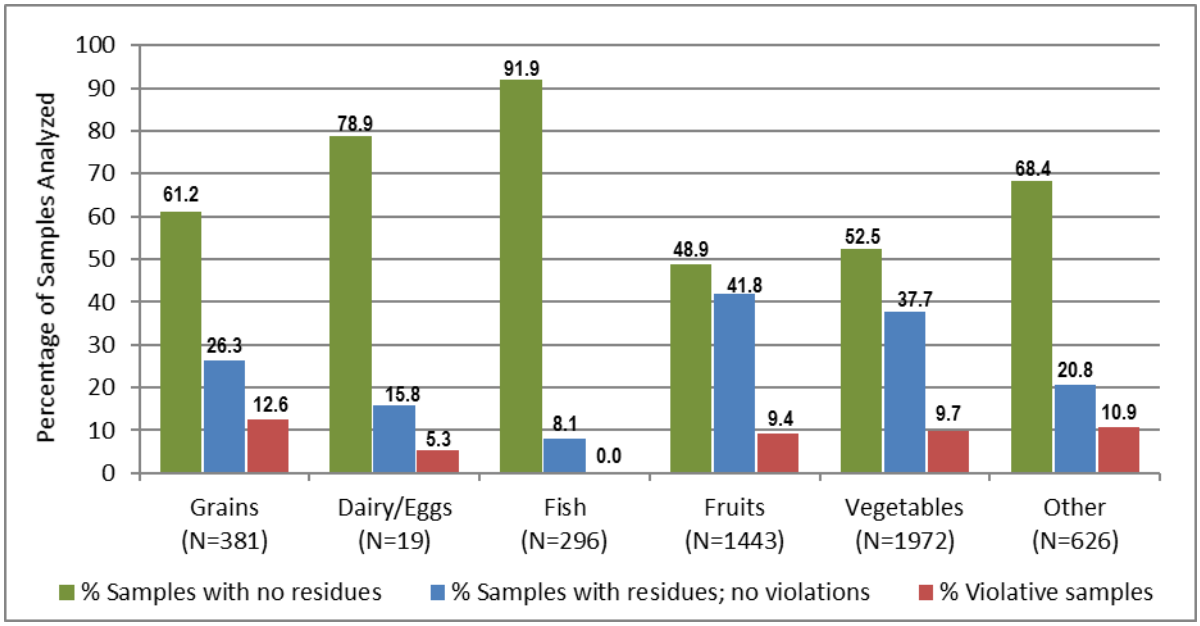


N = Number of samples analyzed for commodity group

Figure 1 summarizes the number of samples analyzed and the residue findings in domestic samples by commodity groups. No violative residues were found in the samples analyzed in four of the commodity groups: Grains (grains and grain products), Dairy/Eggs (milk/dairy products/eggs), Fish (fish/shellfish/other aquatic products), and Other (other food products including nuts, seeds, snack foods, beverages, and spices among other foods). No residues were detected in 75.0 % of the samples in the Grains group, 97.4 % of the samples in the Dairy/Eggs group, 89.4 % of the samples in the Fish group, and 75.0 % of the samples in the Other group. In the Fruits and Vegetables commodity groups, 18.3 % and 38.0 % of the samples, respectively, were found to contain no detectable residues; 2.2 % of the fruit samples and 3.8 % of the vegetable samples contained violative residues.

Of the 4,737 import samples analyzed in FY 2015, 90.6 % were in compliance and 56.8 % had no detectable residues (Appendix C). Fruits and vegetables accounted for the majority (72.1 %) of import samples.

Figure 2 - Results of Import Samples by Commodity Group



N = Number of samples analyzed for commodity group

Figure 2 summarizes the number of samples analyzed and the residue findings in import samples by commodity groups. In the imported Grains commodity group, 61.2 % had no detectable residues, and 12.6 % contained violative residues. No residues were found in 78.9 % of samples of the imported Dairy/Eggs commodity group and one sample (5.3 %) had violative residues. For the Fish commodity group, no residues were found in 91.9 % of the samples and none contained violative residues. No residues were detected in 48.9 % of imported fruit samples and 9.4 % of imported fruit samples had violative residues. Of the vegetable samples, 52.5 % of samples had no residues detected and 9.7 % of samples had violative residues. In the "Other" foods group consisting largely of nuts, seeds, oils, honey, candy, beverages, spices, multiple food products, and dietary supplements, 68.4 % of the samples analyzed had no residues detected, while 10.9 % of the samples (mostly dietary supplements, spices and olives) had violative residues.

Geographic Coverage

Domestic: A total of 835 domestic samples were collected from 39 states, the District of Columbia and Puerto Rico. Table 1 lists the number of domestic samples from each state and territory, in descending order.

Table 1. Domestic Samples Collected and Analyzed per State/Territory

State/Territory	Samples (N)	State/Territory	Samples (N)
California	132	Arizona	10
Washington	66	Virginia	8
New York	59	Indiana	8

State/Territory	Samples (N)	State/Territory	Samples (N)
Texas	57	Alabama	6
Florida	53	Montana	6
Minnesota	50	Puerto Rico	6
Kansas	37	New Mexico	5
Wisconsin	32	Louisiana	5
Idaho	30	Kentucky	5
Oregon	29	North Carolina	4
New Jersey	29	Delaware	4
Michigan	24	Iowa	3
Illinois	21	Maine	3
North Dakota	19	South Carolina	3
Colorado	19	Wyoming	2
Massachusetts	18	New Hampshire	1
Missouri	18	District of Columbia	1
Ohio	18	Rhode Island	1
Tennessee	15	Mississippi	1
Pennsylvania	14	Georgia	1
Maryland	12		

No domestic samples were collected from the states of Alaska, Arkansas, Connecticut, Hawaii, Nebraska, Nevada, Oklahoma, South Dakota, Utah, Vermont and West Virginia.

Imports: A total of 4,737 import samples were collected representing food shipments from 111 countries. Table 2 lists the number of samples and names of countries from which ten or more samples were collected. Table 2a lists the countries of origin that had fewer than ten samples collected.

Table 2. Import Samples Collected and Analyzed per Country of Origin for Countries with Ten or More Samples Collected

Country	Samples (N)	Country	Samples (N)
Mexico	1860	Poland	28
China	477	France	26
Canada	229	Egypt	23
India	217	Honduras	23
Chile	166	Germany	22
Italy	127	Argentina	20

Country	Samples (N)	Country	Samples (N)
Peru	113	Brazil	20
Guatemala	100	Indonesia	20
Spain	92	South Korea	20
Turkey	86	Malaysia	20
Pakistan	81	United Kingdom	19
Vietnam	80	Philippines	19
Thailand	78	Bolivia	16
Dominican Republic	67	Lebanon	15
Greece	57	Jamaica	14
Costa Rica	48	Colombia	13
United States	45	Russia	13
Netherlands	43	Ukraine	13
Ecuador	38	Afghanistan	12
United Arab Emirates	35	Morocco	12
Israel	35	Japan	11
Taiwan	35	Norway	10
Belgium	30	Serbia	10

Table 2a. Countries from Which Fewer Than Ten Samples Were Collected and Analyzed

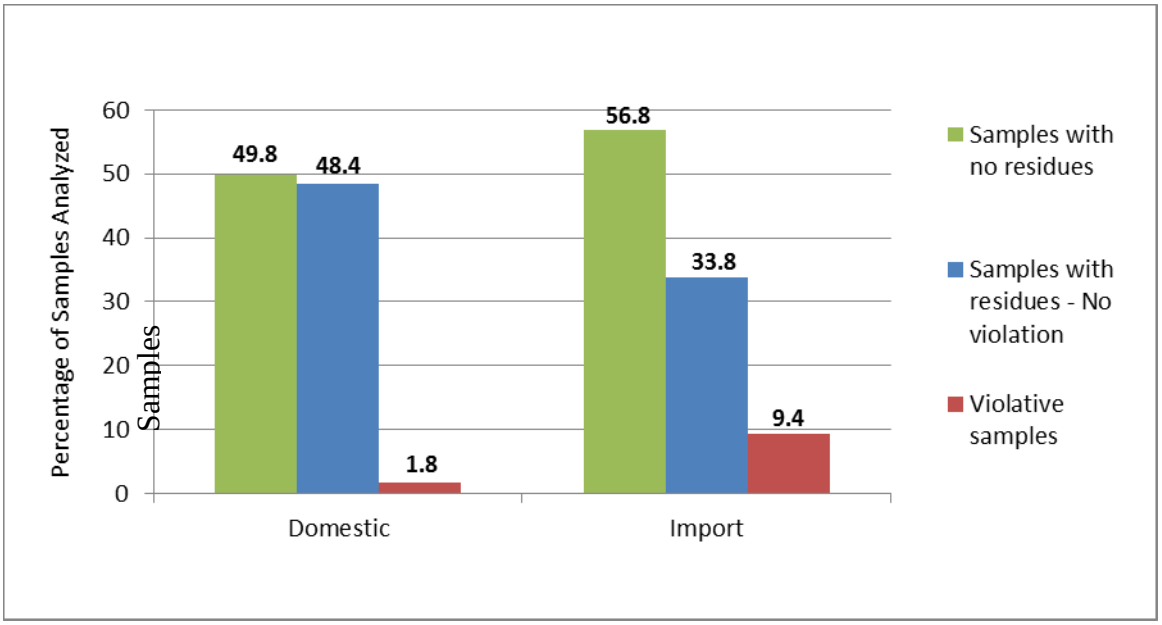
Countries		
Albania	Georgia	Papua New Guinea
Algeria	Ghana	Paraguay
Armenia	Grenada	Portugal
Australia	Guyana	Romania
Austria	Haiti	Rwanda
Bangladesh	Hong Kong SAR	Saudi Arabia
Belarus	Hungary	South Africa
Belize	Iraq	Sri Lanka
Bosnia-Hercegovina	Ireland	Surinam
Brunei Darussalam	Ivory Coast	Sweden
Bulgaria	Jordan	Tajikistan
Burma	Kazakhstan	Tonga
Cameroon	Kenya	Trinidad & Tobago
Cyprus	Kuwait	Tunisia

Countries		
Czech Republic	Lithuania	Uganda
Denmark	Madagascar	Uruguay
El Salvador	Malawi	Uzbekistan
Estonia	Myanmar	Vanuatu
Ethiopia	New Zealand	Venezuela
Faroe Islands	Nicaragua	West Bank
Fiji	Nigeria	Zambia
Finland	Panama	

Comparison of Domestic/Import Violation Rates

In total, 835 domestically produced and 4,737 imported human food samples were collected and analyzed. Violative residues were found in 1.8 % of the domestic samples and 9.4 % of the import samples. No residues were found in 49.8 % of domestic and 56.8 % of import samples (Figure 3).

Figure 3. Summary of Results of Domestic vs. Import Food Samples



For several commodity groups, the violation rate was higher for import samples. For example, 12.6 % of imported grain samples were violative; however, none of the domestic grain samples were violative. Similarly, 9.4 % of the imported fruit samples were violative compared to only 2.2 % of the domestic fruit samples; and 9.7 % of imported vegetables were violative, whereas only 3.8 % of domestic vegetables were violative. In the category "Other" (mostly nuts, seeds, oils, honey, candy, beverages, spices, multiple food products,

and botanical dietary supplements), the violation rate was 10.9 % for import samples; but no violations were found in the 228 "Other" domestic samples analyzed. Botanicals and herbal supplements accounted for most of the violative samples for the import "Other" foods group.

Of the 15 domestic violative samples, 13 were found to contain pesticide chemical residues that have no EPA tolerance, i.e., "no-tolerance" violations; and only 2 were found to contain pesticide chemical residues that exceeded an EPA tolerance, i.e., "over-tolerance" violations.

Of the 444 import violative samples, 436 were found to contain no-tolerance pesticide chemical residues; and 19 were found to contain pesticide chemical residues that exceeded an EPA tolerance; 11 of the 19 samples had residues in both these categories.

Pesticides Found

In FY 2015, FDA pesticide methods could detect 696 pesticides and industrial chemicals (Appendix A). Of these chemicals, residues of 207 different pesticides were actually found in the samples analyzed. They are listed in Table 3 in order of frequency of detection along with the number of samples in which they were found. Eleven pesticide chemical residues found in FY 2015, which had not been previously detected in the FDA regulatory pesticide monitoring program, are flagged with an asterisk.

Table 3. Pesticides Found in Human Foods in FY 2015

Pesticides		
Imidacloprid (362)	Thiophanate-methyl (352)	Boscalid (319)
Chlorpyrifos (310)	Acetamiprid (240)	Azoxystrobin (231)
Tebuconazole (190)	Cypermethrin (176)	Fludioxonil (160)
Pyraclostrobin (158)	Metalaxyl (154)	Bifenthrin (142)
Thiamethoxam (138)	Pyrimethanil (136)	Chlorantraniliprole (135)
Iprodione (126)	Difenoconazole (119)	Myclobutanil (116)
Cyprodinil (114)	Permethrin (109)	Lambda-cyhalothrin (105)
Malathion (99)	Thiabendazole (96)	Piperonyl butoxide (94)
Dimethoate (93)	Propiconazole (93)	Clothianidin (92)
Fenhexamid (81)	Propamocarb (73)	Spinosad (73)
Methoxyfenozide (69)	Methamidophos (66)	Thiacloprid (66)
Captan (65)	Methomyl (64)	Buprofezin (61)
Flonicamid (58)	Trifloxystrobin (58)	Linuron (56)
Dimethomorph (51)	Tricyclazole (51)	Fenpropathrin (46)
Pyriproxyfen (46)	Chlorothalonil (43)	Flubendiamide (43)
Acephate (42)	Acibenzolar-S-methyl (41)	Fenbuconazole (41)
Oxamyl (41)	Carbaryl (40)	Bifenazate (37)

Pesticides		
Pirimiphos methyl (37)	Phosmet (36)	Spinetoram (35)
Hexythiazox (31)	Imazalil (31)	Endosulfan (30)
Indoxacarb (29)	Cyfluthrin (28)	Dinotefuran (26)
Chlorpropham (25)	DDT (25)	Mandipropamid (25)
Novaluron (25)	Spiromesifen (25)	Spirotetramat (23)
Ethoxyquin (22)	Propargite (22)	Diflubenzuron (21)
DCPA (20)	Fenpyroximate, e- (20)	Spirodiclofen (20)
Phenylphenol, o- (19)	Fenuron (18)	Isoprothiolane (17)
Carbofuran (16)	Chlorfenapyr (16)	Monocrotophos (16)
Quinoxyfen (16)	Triazophos (16)	Diazinon (15)
Diphenylamine (15)	Prochloraz (15)	Pyridaben (14)
Fipronil (13)	Profenofos (13)	Famoxadone (12)
Dichlobenil (11)	Dichlorvos (11)	Fluoxastrobin (11)
Cyazofamid (10)	Dicloran (10)	Fluopicolide (10)
Penthiopyrad (10)	Triadimenol (10)	Esfenvalerate (9)
Kresoxim-methyl (9)	Pirimicarb (9)	Procymidone (9)
Quintozene (9)	Cyromazine (8)	Dodine (8)
Fenvalerate (8)	Tebufenpyrad (8)	Cyproconazole (7)
Fenamidone (7)	Flutriafol (7)	Etoxazole (6)
Fenazaquin (6)	Fluopyram (6)	Fluxapyroxad (6)*
Hexaconazole (6)	Metrafenone (6)	Phoxim (6)
Tebufenozide (6)	Atrazine (5)	Chlorpyrifos methyl (5)
Diuron (5)	Fenbutatin oxide (5)	Formetanate HCl (5)
Oxadixyl (5)	Paclobutrazol (5)	Triadimefon (5)
Triflumizole (5)	BHC (4)	Deltamethrin (4)
Ethion (4)	Fenpropimorph (4)	Flusilazole (4)
Mepanipyrim (4)	Metaflumizone (4)	Methidathion (4)
Metribuzin (4)	MGK 264 (4)	Phorate (4)
Pymetrozine (4)	Tetraconazole (4)	Azinphos-methyl (3)
Bupirimate (3)	Diafenthiuron (3)	Diethofencarb (3)
Emamectin benzoate (3)	Etofenprox (3)	Fluvalinate (3)
Folpet (3)	Isocarbophos (3)	Pendimethalin (3)
Tetramethrin (3)	Trifluralin (3)	Ametoctradin (2)
Bendiocarb (2)	Biphenyl (2)	Bromopropylate (2)

Pesticides		
Clofentezine (2)	Cymoxanil (2)	Ethofumesate (2)
Flufenoxuron (2)	Fluridone (2)	Forchlorfenuron (2)
Iprovalicarb (2)	Methiocarb (2)	Methoprene (2)
Metolachlor (2)	Parathion methyl (2)	Phenmedipham (2)
Phosalone (2)	Prometryn (2)	Pronamide (2)
Propoxur (2)	Resmethrin (2)	Temephos (2)*
Acetochlor (1)	Bitertanol (1)	Butralin (1)
Carfentrazone ethyl ester (1)*	Coumaphos (1)	Cycloate (1)
Cyflufenamid (1)	Cyflumetofen (1)*	DEF (1)
Dicofol (1)	Diniconazole (1)	Epoxiconazole (1)
Ethiprole (1)*	Ethoprop (1)	Fenitrothion (1)
Fenobucarb (1)	Fenpyrazamine (1)*	Flumioxazin (1)*
Isoprocarb (1)	Lufenuron (1)	Mefenacet (1)*
Metaldehyde (1)	Metconazole (1)	Nicotine (1)
Penconazole (1)	Pyracarbolid (1)	Quinalphos (1)
Rotenone (1)	Sebuthylazine (1)*	Simazine (1)
Spiroxamine (1)	Sulprofos (1)*	Tecnazene (1)
Teflubenzuron (1)	Tetradifon (1)	Thiodicarb (1)*

*Pesticide not found previously in FDA regulatory monitoring program.

Regulatory Monitoring of Animal Foods

In FY 2015, a total of 417 animal food samples were analyzed for pesticides by the FDA under the Feed Contaminants Compliance Program. The breakdown of samples by type of animal food and number of positive and violative samples is shown in Table 4.

Of the 417 animal food samples, 215 samples were domestic and 202 samples were imports. Of the 215 domestic surveillance samples, 111 (51.6 %) contained no detectable residues and 104 (48.4 %) contained one or more residues, of which 4 (1.9 %) were violative. Of the 202 import samples, 117 (57.9 %) contained no detectable residues and 85 (42.1 %) contained one or more residues. Of the 202 import samples, 8 (4.0 %) were violative.

The four domestic animal food samples found to contain one or more violative residues were from different commodities. Wheat middlings collected from Iowa contained 0.022 ppm chlorpropham which has tolerances only for potatoes and potato products. A sample of cottonseed collected from Utah was found to contain 0.037 ppm permethrin; no tolerance is listed for permethrin in cotton or cottonseed. Cubed alfalfa hay from Kansas contained 0.025 ppm propargite; no tolerance is listed for propargite in alfalfa hay. Barley from Virginia was found to contain 0.734 ppm chlorpyrifos; no tolerance is listed for chlorpyrifos in this commodity.

The eight import animal food samples that were found to contain one or more violative residues were from several countries, one each from India and France, and two each from Canada, the United Kingdom and China. Flax meal and quinoa imported from Canada were found to contain imidacloprid at 1.05 ppm and chlorpyrifos at 0.417 ppm, respectively. Imidacloprid is only allowed up to 0.05 ppm on flax seed, and there is no tolerance for chlorpyrifos in quinoa. Two herbal products from the United Kingdom each contained multiple violative pesticide chemical residues for which no tolerances are established: a sample of raspberry leaves contained mepanipyrim and difenconazole; and a mixed botanical product intended for horses was found to contain chlorpyrifos, carbendazim, bromuconazole, difenconazole, dinicoazole, triadimenol, and phorate.

A sample of pelleted sweet potato flour and another of dried distillers grain from China each contained a pesticide chemical residue for which no tolerance is listed; the sweet potato contained carbendazim and the dried distillers grain contained fenitrothion. A sample of biocholine powder from India was found to contain carbendazim, for which there are not U.S. tolerances. An alfalfa nutrient concentrate sample from France contained propamocarb, for which no tolerance is established in alfalfa.

Table 4. Summary of Animal Foods Analyzed for Pesticides

Commodity Type	Samples Analyzed N	Without Residues N (%†)	Violative Samples N (%†)
Totals – All Samples	417	228 (54.7)	12 (2.9)
Sample Origin			
Domestic	215	111 (51.6)	4 (1.9)
Import	202	117 (57.9)	8 (4.0)
Commodity Type			
Whole and Ground Grains/Seeds	198	143 (72.2)	4 (2)
Mixed Livestock Food Rations	83	23 (27.7)	3 (3.6)
Medicated Livestock Food Rations	18	1 (5.6)	0 (0)
Plant Byproducts	60	35 (58.3)	2 (3.3)
Hay and Silage	8	3 (37.5)	1 (12.5)
Pet Food/Treats	30	10 (33.3)	0 (0)
Other Animal Food Ingredients	20	13 (65)	2 (10)

†Percentage of the number of samples analyzed per commodity type

A total of 64 different pesticides were found in animal foods. Table 5 lists the 40 pesticides detected in at least two samples; 24 other pesticides were found in only one sample each, and are not shown in the table. Of the 417 samples analyzed, 189 were found to contain at least one pesticide (includes both violative and non-violative samples), 104 in

domestic samples and 85 in imported samples. A total of 363 residues were detected in all samples, 207 in domestic samples and 156 in import samples. For all samples, ethoxyquin and malathion were the most frequently found pesticides and together accounted for 42.4 % of all residues detected (Table 5). Piperonyl butoxide was the third most commonly detected residue contributing 7.7 % to the total.

Table 5. Pesticides Most Commonly Reported in Samples of Foods for Animals

Pesticide*	**Samples N (%)†**	**Median (ppm)††**	**Range (ppm)**
Ethoxyquin	77 (18.5)	0.858	Trace - 110
Malathion	77 (18.5)	0.024	Trace - 1.36
Piperonyl butoxide	28 (6.7)	0.013	Trace - 0.608
Carbendazim	10 (2.4)	0.021	Trace - 0.181
Chlorpyrifos	10 (2.4)	0.041	Trace - 0.734
Azoxystrobin	9 (2.2)	0.010	Trace - 0.047
Chlorpyrifos methyl	8 (1.9)	0.048	Trace - 0.159
Phenylphenol, o-	8 (1.9)	0.015	Trace - 0.219
Chlorpropham	7 (1.7)	0.140	Trace - 0.435
Diflubenzuron	7 (1.7)	0.012	Trace - 0.075
Tebuconazole	7 (1.7)	Trace	Trace - 0.015
Deltamethrin	5 (1.2)	0.028	Trace - 0.057
Difenoconazole	5 (1.2)	Trace	Trace - 0.044
Pirimiphos methyl	5 (1.2)	Trace	Trace - 0.024
Propiconazole	5 (1.2)	0.020	Trace - 0.025
Triazophos	5 (1.2)	Trace	Trace - 0.012
Chlorantraniliprole	4 (1)	Trace	Trace - 0.091
Lambda-cyhalothrin	4 (1)	0.131	0.015 - 0.231
Methoprene	4 (1)	0.138	0.036 - 0.685
Thiamethoxam	4 (1)	0.010	Trace - 0.014
Acetamiprid	3 (0.7)	Trace	Trace
Boscalid	3 (0.7)	Trace	Trace - 6.99
DEF	3 (0.7)	0.162	0.016 - 0.545
Diuron	3 (0.7)	0.026	Trace - 0.233
Flubendiamide	3 (0.7)	0.016	Trace - 0.019
Imidacloprid	3 (0.7)	0.036	Trace - 1.05
Permethrin	3 (0.7)	0.014	Trace - 0.037
Phosmet	3 (0.7)	Trace	Trace

Pesticide*	Samples N (%)†	Median (ppm)††	Range (ppm)
Propargite	3 (0.7)	0.025	Trace - 0.080
Pyraclostrobin	3 (0.7)	Trace	Trace - 0.947
Atrazine	2 (0.5)	Trace	Trace
DDT	2 (0.5)	0.173	0.103 - 0.243
Fenpyroximate, e-	2 (0.5)	Trace	Trace
Fludioxonil	2 (0.5)	0.031	0.026 - 0.036
Flutriafol	2 (0.5)	0.016	0.015 - 0.017
Metolachlor	2 (0.5)	0.010	Trace - 0.011
Propamocarb	2 (0.5)	Trace	Trace - 0.015
Pyrimethanil	2 (0.5)	0.034	0.030 - 0.038
Thiabendazole	2 (0.5)	0.137	0.109 - 0.166
Thidiazuron	2 (0.5)	Trace	Trace - 0.012

*64 different pesticides were found in foods for animals. The 40 pesticides with frequency of finding in at least 2 samples are listed. 24 additional pesticides were identified in a single sample only and were not presented in this table.

† Number of samples in which the residue was found with percentage () of all 417 samples tested

†† Median level determination includes trace levels

Focused Sampling

In FY 2015, FDA issued one field assignment for pesticides, related to an ongoing European Union audit. The European Union (EU) audit-related assignments have been conducted since 2010 to assess the levels of certain drug residues, pesticides, and contaminants in specific domestically produced foods of animal origin. In 2015, FDA completed the collection and analysis of 17 game meat samples as part of the ongoing EU audit; results are listed in Table 6.

Table 6. Pesticides Found in Samples for EU Game Meat Assignment

Game Meat	Samples (#)	Residues
Bison	6	None found
Elk	4	0.029 ppm DDT found in one sample
Rabbit	3	None found
Venison	4	None found

None of the game meat samples were found to contain pesticide chemical residues with the exception of one sample of elk that contained DDT below FDA's action level.

Total Diet Study

In FY 2015, FDA analyzed four market baskets (Market Baskets 2014-4, 2015-1, 2015-2, and 2015-3) in the TDS program. Each Market Basket consisted of 266 different foods with exception of Market Basket 2015-3 which consisted of 263 foods. Altogether, 1061 samples were analyzed. Residues of 157 different pesticides were found in the TDS foods, all below the tolerance levels. Most were found at very low levels; the residue levels in 88 % of the samples were below 0.01 ppm, and fewer than 2 % were above 0.1 ppm.

Table 7 lists the most frequently found pesticide residues (i.e., residues found in at least 2 % of the samples) in TDS foods, the total number of findings, and the occurrence as a percentage of all 1061 items analyzed in FY 2015. The most frequently observed pesticide chemical residues are consistent with those reported in FY 2014.

Table 7. Frequency of Occurrence of Pesticide Residues in the Total Diet Study

Pesticide[1]	**Samples N (%)[2]**	**Range, ppm**
Boscalid	339 (32.0)	0.0001-0.710
Imidacloprid	319 (30.1)	0.0001-0.145
Piperonyl butoxide	221 (20.8)	0.0002-0.072
Azoxystrobin	221 (20.8)	0.0001-0.320
Bifenthrin	186 (17.5)	0.0002-0.044
DDT	173 (16.3)	0.0001-0.035
Malathion	171 (16.1)	0.0002-0.048
Chlorantraniliprole	166 (15.6)	0.0001-0.097
Acetamiprid	145 (13.7)	0.0001-0.069
Thiabendazole	123 (11.6)	0.0002-0.315
Carbendazim	123 (11.6)	0.0001-0.037
Difenoconazole	122 (11.5)	0.0001-0.127
Thiamethoxam	117 (11.0)	0.0001-0.022
Clothianidin	115 (10.8)	0.0001-0.021
Metalaxyl	110 (10.4)	0.0001-0.037
Tebuconazole	109 (10.3)	0.0001-0.141
Chlorpyrifos methyl	109 (10.3)	0.0001-0.029
Chlorpropham	94 (8.9)	0.0002-1.662
Chlorpyrifos	78 (7.4)	0.0001-0.177
Myclobutanil	77 (7.3)	0.0001-0.032
Pyrimethanil	76 (7.2)	0.0003-1.810
Novaluron	74 (7.0)	0.0001-0.033
Pyraclostrobin	74 (7.0)	0.0001-0.270
Fludioxonil	71 (6.7)	0.0001-0.909

Pesticide[1]	**Samples N (%)[2]**	**Range, ppm**
Captan	68 (6.4)	0.002-0.264
Methoxyfenozide	67 (6.3)	0.0001-0.449
Deltamethrin	65 (6.1)	0.001-0.057
Cyprodinil	57 (5.4)	0.0005-0.550
Lambda-cyhalothrin	56 (5.3)	0.0005-0.037
Fluxapyroxad	53 (5.0)	0.0001-0.004
Trifloxystrobin	51 (4.8)	0.0001-0.011
2,4-D[3]	50 (4.7)	0.0003-0.063
Propamocarb	50 (4.7)	0.0002-0.148
Buprofezin	49 (4.6)	0.0001-0.051
Phenylphenol, o-	47 (4.4)	0.0004-0.029
Bifenazate	47 (4.4)	0.0001-0.010
Carbaryl	44 (4.1)	0.0001-0.042
Dichlobenil	42 (4.0)	0.0002-0.018
Clopyralid[3]	41 (3.9)	0.001-0.064
Fluopicolide	39 (3.7)	0.0001-0.489
MGK 264	37 (3.5)	0.0003-0.006
Permethrin	33 (3.1)	0.002-1.736
Propiconazole	32 (3.0)	0.0005-0.028
Hexythiazox	31 (2.9)	0.0001-0.006
Imazamox c	31 (2.9)	0.0001-0.003
Imazalil	30 (2.8)	0.0003-0.239
Dimethomorph	29 (2.7)	0.0001-0.058
Spinetoram	29 (2.7)	0.0002-0.023
Fenhexamid	29 (2.7)	0.0006-0.161
Thiacloprid	29 (2.7)	0.0003-0.034
Diflubenzuron	28 (2.6)	0.0001-0.006
Quinoxyfen	28 (2.6)	0.0001-0.041
Mandipropamid	28 (2.6)	0.0002-0.462
Spinosad	27 (2.5)	0.0002-0.059
Flonicamid	27 (2.5)	0.0002-0.190
Metribuzin	27 (2.5)	0.0001-0.015
Diphenylamine	26 (2.5)	0.0005-0.372
Acephate	25 (2.4)	0.0004-0.186
Fluopyram	24 (2.3)	0.0001-0.002
Indoxacarb	23 (2.2)	0.0002-0.011
Linuron	23 (2.2)	0.0002-0.019

Pesticide[1]	Samples N (%)[2]	Range, ppm
Dimethoate	23 (2.2)	0.0001-0.004
Pirimiphos methyl	22 (2.1)	0.0002-0.070
Quinclorac[3]	21 (2.0)	0.0003-0.028
Spirotetramat	21 (2.0)	0.0002-0.084
Penthiopyrad	21 (2.0)	0.0002-0.162
Flubendiamide	21 (2.0)	0.0004-0.333
DCPA	20 (1.9)	0.0001-0.022
Omethoate	20 (1.9)	0.0001-0.004
Tetraconazole	19 (1.8)	0.0001-0.022
Fenpyroximate, e-	19 (1.8)	0.0002-0.076
Metolachlor	18 (1.7)	0.0001-0.0006
Propargite	18 (1.7)	0.0001-0.150
Fenamidone	17 (1.6)	0.0002-0.382
Methamidophos	17 (1.6)	0.0007-0.056
Phosmet	16 (1.5)	0.0004-0.022
Ethion	16 (1.5)	0.0002-0.004
Cypermethrin	16 (1.5)	0.007-1.643

[1] Isomers, metabolites, and related compounds are included with the 'parent' pesticide.

[2] Based on 4 market baskets consisting of 1061 total items.

[3] Reflects overall incidence; i.e., based on analysis of all samples, though only 64 selected foods per market basket (256 items total) were analyzed for acid herbicides. (Samples not analyzed are counted as negative for the residues of acid herbicides.)

Imported Products That May Warrant Special Attention

The design of the FDA pesticide program focuses on products that have a history of violations or are suspected of violations based on available intelligence. Historically, the violation rate for imported foods is much higher than for domestic foods; results from FY 2015 continue that trend. The violation rate for imported foods (9.4 %) was over five times higher than the rate for domestic foods (1.8 %). The majority of the violations for the commodities listed in Table 8 are no-tolerance violations and about 80 % of them are < 0.1 ppm. Examination of the FY 2015 pesticide data from the analysis of imported human foods indicates that the commodities listed in Table 8 may warrant special attention in FY 2016.

The following criteria were applied to the FY 2015 data to select imported commodities that may warrant special attention:

- Commodities with at least 20 samples analyzed OR with a minimum of 3 violations, AND
- A violation rate of 10 % or higher

Table 8 lists the imported commodities analyzed in FY 2015 that meet the above criteria. The commodities are sorted alphabetically and include the total number of samples analyzed and violation rate per commodity.

Some of the commodity counts in Table 8 differ from those found in Appendix C because of differences in the way commodities are grouped. To simplify reporting in Appendix C, similar commodities have sometimes been consolidated; however, in Table 8, those same commodities might be extracted and reported separately. For example, Appendix C indicates FDA analyzed 211 imported rice and rice products in FY 2015. Of those, 192 samples (17 whole grain and 175 processed) have been flagged as warranting special attention in Table 8. The other 19 rice product samples have been excluded from Table 8 because they are highly processed products, e.g. rice cakes and snacks.

Table 8. Imported Commodities That May Warrant Special Attention

Commodity†	Samples Analyzed	Violation Rate (%)
Cabbage	15	26.7
Chia seeds	26	15.4
Choyote, chayote	25	12.0
Cilantro*	22	27.3
Cocoa beans and products	16	31.3
Dragon fruit/juice	5	80.0
Jackfruit fruit/juice	24	29.2
Mushroom*	86	26.7
Nectarine fruit/juice	47	10.6
Olive oil*	57	12.3
Orange fruit/juice	52	11.5
Parsley	18	22.2
Peas*	68	13.2
Pepper, hot*	293	10.9
Pineapple fruit/juice*	39	15.4
Prickle pear fruit/juice*	44	27.3
Quinoa seed*	33	12.1
Radish	21	19.1
Raisins	20	15.0
Rambutan	14	21.4
Rice, processed*	175	21.1
Rice, whole grain*	17	17.7

Commodity†	Samples Analyzed	Violation Rate (%)
Scallions and shallots	21	19.1
Squash* (Mexico)	73	15.1
Strawberries fruit/juice*	89	15.7
Taro, dasheen*	14	42.9
Wolfberry	10	40.0

† Data listed for the commodities in this table are based upon specific product definitions, and may not be directly comparable to product summary subcategories listed in Appendix B.
*Commodity was on the FY 2014 table of imported commodities warranting special attention.

References

[1]Guidelines for the Validation of Chemical Methods for the FDA FVM Program, 2nd Edition, 2015
http://www.fda.gov/downloads/ScienceResearch/FieldScience/UCM273418.pdf

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[3]Roy, Ronald R., *et al*. (1995) U.S. Food and Drug Administration Pesticide Program: Incidence/Level Monitoring of Domestic and Imported Pears and Tomatoes. *J. AOAC Int.* **78**, 930-940.

[4]Roy, Ronald, R., *et al*. (1997) Monitoring of Domestic and Imported Apples and Rice by the U.S. Food and Drug Administration Pesticide Program, *J. AOAC Int*, **80**, 883-894.

[5]Pesticide Analytical Manual Volume I, 3rd Ed., 1999, Chapter 1, Section 105, http://www.fda.gov/downloads/Food/FoodScienceResearch/ucm111496.pdf

[6]FDA Total Diet Study, http://www.fda.gov/Food/FoodScienceResearch/TotalDietStudy/default.htm.

Appendices

Appendix A lists the 696 pesticides and industrial chemicals analyzed using FDA methods in 2015. In addition to these chemicals, FDA analytical procedures detect other metabolites and isomers associated with the pesticides listed below.

All residue findings are summarized in Appendices B and C based upon their origin, domestic or import. In FY 2015, 140 different domestic food commodities and 622 different imported food commodities were tested. In both appendices, all commodities have been assigned to the same six commodity group categories:

Grains and Grain Products
Milk/Dairy Products/Eggs
Fish/Shellfish/Other Aquatic Products
Fruits
Vegetables
Other Food Products

Within each commodity group, the commodities are further categorized. The subcategories include commodities derived from a single agricultural commodity and commodities derived from multiple ingredients. For example, the subcategory "Wheat and wheat products" includes multiple types of whole wheat grain and several processed wheat products that contain only wheat such as milled wheat, wheat flour, wheat germ, wheat malt, wheat bran, wheat gluten, etc. Multiple-ingredient, processed-food products consisting primarily of grains are listed in the subcategory "Other grains and grain products."

Although the commodity groups are the same for both the domestic and import appendices, the subcategories are different because the numbers and kinds of individual imported commodities are different than for domestic commodities. For example, 14 "Fruit" subcategories are listed for the domestic samples, but over 40 "Fruit" subcategories are listed for the import samples. The additional import "Fruit" subcategories are mostly for fruits not available domestically.

A. Pesticides and Industrial Chemicals Analyzed by FDA Pesticide Methods in FY 2015

Pesticides		
2,3,4,6-tetrachlorophenol	2,4,5-T	2,4-D
2,4-DB	2,6-dimethylaniline	2,6-DIPN
3,4-dichloroaniline*	Abamectin	Acephate
Acequinocyl	Acetamiprid	Acetochlor
Acibenzolar-S-methyl	Acifluorfen methyl ester	Aclonifen
Acrinathrin	Alachlor	Alanycarb
Aldicarb	Aldrin	Allethrin
Allidochlor	Ametoctradin	Ametryn
Amicarbazone	Amidithion	Aminocarb
Amisulbrom	Amitraz	Ancymidol
Anilofos	Aramite	Aspon
Atraton	Atrazine	Azaconazole
Azamethiphos	Azinphos ethyl	Azinphos-methyl
Aziprotryne	Azocyclotin	Azoxystrobin
BAM†	Barban	Beflubutamid
Benalaxyl	Bendiocarb	Benfluralin
Benfuracarb	Benfuresate	Benodanil
Benoxacor	Bentazon	Bentazone methyl
Benthiavalicarb-isopropyl	Benzoximate	Benzoylprop ethyl
BHC	Bifenazate	Bifenox
Bifenthrin	Binapacryl	Biphenyl
Bitertanol	Bithionol	Bixafen
Boscalid	Bromacil	Bromfenvinphos ethyl
Bromfenvinphos methyl	Bromobutide	Bromocyclen
Bromophos	Bromophos-ethyl	Bromopropylate
Bromoxynil	Bromoxynil octanoate	Bromuconazole
Bufencarb	Bupirimate	Buprofezin
Butachlor	Butafenacil	Butamifos
Butocarboxim	Butoxycarboxim	Butralin
Butylate	Cadusafos	Cafenstrole
Captafol	Captan	Carbaryl

Pesticides		
Carbendazim	Carbetamide	Carbofuran
Carbophenothion	Carbosulfan	Carboxin
Carfentrazone ethyl ester	Carpropamid	Chloramben
Chlorantraniliprole	Chlorbromuron	Chlorbufam
Chlordane	Chlordecone	Chlordimeform
Chlorethoxyfos	Chlorfenapyr	Chlorfenethol
Chlorfenprop-methyl	Chlorfenvinphos	Chlorfenvinphos methyl
Chlorfluazuron	Chlormephos	Chlorobenzilate
Chloroneb	Chloropropylate	Chlorothalonil
Chlorotoluron	Chloroxuron	Chlorpropham
Chlorpyrifos	Chlorpyrifos methyl	Chlorthiamid
Chlorthion	Chlorthiophos	Chlozolinate
Cinidon-ethyl	Clethodim	Clodinafop-propargyl
Cloethocarb	Clofentezine	Clomazone
Cloquintocet-mexyl	Clothianidin	Coumaphos
Crimidine	Crotoxyphos	Cumyluron
Cyanazine	Cyanofenphos	Cyanophos
Cyazofamid	Cyclafuramid	Cycloate
Cycloxydime	Cycluron	Cyenopyrafen
Cyflufenamid	Cyflumetofen	Cyfluthrin
Cyhalofop butyl ester	Cymiazole	Cymoxanil
Cypermethrin	Cyphenothrin	Cyprazine
Cyproconazole	Cyprodinil	Cyprofuram
Cyromazine	Cythioate	Daimuron
Dazomet	DCPA	DDT
DEET	DEF	Deltamethrin
Demeton	Desmedipham	Desmetryn
Diafenthiuron	Dialifor	Diallate
Diazinon	Dicamba	Dicapthon
Dichlobenil	Dichlofenthion	Dichlofluanid
Dichlormid	Dichlorobenzene, 1,3-	Dichlorprop
Dichlorvos	Diclobutrazol	Diclocymet
Diclofop	Diclomezine	Dicloran
Dicofol	Dicrotophos	Dicyclanil

Pesticides		
Dieldrin	Diethatyl-ethyl	Diethofencarb
Difenoconazole	Difenoxuron	Diflubenzuron
Diflufenican	Diflumetorim	Dimefluthrin
Dimefox	Dimepiperate	Dimethachlone
Dimethachlor	Dimethametryn	Dimethenamid
Dimethipin	Dimethirimol	Dimethoate
Dimethomorph	Dimetilan	Dimoxystrobin
Diniconazole	Dinitramine	Dinoseb
Dinotefuran	Dinoterb	Diofenolan
Diothyl	Dioxacarb	Dioxathion
Diphacinone	Diphenamid	Diphenylamine
Dipropetryn	Disulfoton	Ditalimfos
Dithianon	Dithiopyr	Diuron
DNOC	Dodemorph	Dodine
Doramectin	Drazoxolon	Edifenphos
Emamectin benzoate	Endosulfan	Endrin
EPN	Epoxiconazole	Eprinomectin
EPTC	Esfenvalerate	Esprocarb
Etaconazole	Ethalfluralin	Ethidimuron
Ethiofencarb	Ethiolate	Ethion
Ethiprole	Ethirimol	Ethofumesate
Ethoprop	Ethoxyquin	Ethychlozate
Etobenzanid	Etofenprox	Etoxazole
Etridiazole	Etrimfos	Famoxadone
Famphur	Fenamidone	Fenamiphos
Fenarimol	Fenazaquin	Fenbuconazole
Fenbutatin oxide	Fenchlorazole-ethyl	Fenclorim
Fenfuram	Fenhexamid	Fenitrothion
Fenobucarb (BPMC)	Fenothiocarb	Fenoxanil
Fenoxaprop-ethyl	Fenoxycarb	Fenpiclonil
Fenpropathrin	Fenpropidin	Fenpropimorph
Fenpyrazamine	Fenpyroximate, e-	Fenson
Fensulfothion	Fenthion	Fenuron
Fenvalerate	Ferimzone	Fipronil

Pesticides		
Flamprop-isopropyl	Flamprop-methyl	Flonicamid
Fluacrypyrim	Fluazifop butyl ester	Fluazifop-p-butyl
Fluazolate	Fluazuron	Flubendiamide
Flubenzimine	Fluchloralin	Flucycloxuron
Flucythrinate	Fludioxonil	Fluensulfone
Flufenacet	Flufenoxuron	Flumetralin
Flumiclorac-pentyl	Flumioxazin	Flumorph
Fluometuron	Fluopicolide	Fluopyram
Fluoranthene	Fluorene	Fluorochloridone
Fluorodifen	Fluoroglycofen	Fluoroimide
Fluotrimazole	Fluoxastrobin	Fluquinconazole
Flurenol n-butyl ester	Flurenol-methyl ester	Fluridone
Fluroxypyr	Flurprimidol	Flurtamone
Flusilazole	Flusulfamide	Fluthiacet-methyl
Flutolanil	Flutriafol	Fluvalinate
Fluxapyroxad	Folpet	Fomesafen
Fonofos	Forchlorfenuron	Formetanate
Formothion	Fosthiazate	Fuberidazole
Furalaxyl	Furametpyr	Furathiocarb
Furilazole	Furmecyclox	Gardona
Halfenprox	Halofenozide	Haloxyfop
Heptachlor	Heptenophos	Hexachlorobutadiene
Hexaconazole	Hexaflumuron	Hexazinone
Hexythiazox	Hydramethylnon	Hydroprene
IBP	Imazalil	Imazamethabenz methyl
Imazapyr	Imazasulfuron	Imazethapyr
Imibenconazole	Imidacloprid	Indaziflam
Indoxacarb	Ioxynil	Ipconazole
Iprodione	Iprovalicarb	Isazofos
Isobenzan	Isocarbamid	Isocarbophos
Isodrin	Isofenphos	Isomethiozin
Isoprocarb	Isopropalin	Isoprothiolane
Isoproturon	Isopyrazam	Isoxaben
Isoxadifen-ethyl	Isoxaflutole	Isoxathion

Pesticides		
Ivermectin	Jodfenphos	Karbutilate
Kresoxim-methyl	Lactofen	Lambda-cyhalothrin
Lenacil	Leptophos	Lindane
Linuron	Lufenuron	Malathion
Maleic hydrazide	Mandipropamid	MCPA
MCPA-butoxyethyl ester	MCPB	Mecarbam
Mecoprop	Mefenacet	Mefenpyr-diethyl
Mefluidide	Mepanipyrim	Mephosfolan
Mepronil	Mesotrione	Metaflumizone
Metalaxyl	Metaldehyde	Metamitron
Metazachlor	Metconazole	Methabenzthiazuron
Methacrifos	Methamidophos	Methfuroxam
Methidathion	Methiocarb	Methomyl
Methoprene	Methoprotryne	Methoxychlor
Methoxyfenozide	Metobromuron	Metolachlor
Metolcarb	Metominostrobin	Metoxuron
Metrafenone	Metribuzin	Metsulfuron methyl
Mevinphos	Mexacarbate	MGK 264
Mirex	Molinate	Monalide
Monocrotophos	Moxidectin	Myclobutanil
Naftalofos	Naled	Naphthalene
Naphthaleneacetamide	Napropamide	Naptalam
Neburon	Nicotine	Nitenpyram
Nitrapyrin	Nitrofen	Nitrothal-isopropyl
Norflurazon	Novaluron	Noviflumuron
Nuarimol	Octhilinone	Octyldiphenyl PO_4
Ofurace	Orbencarb	Orysastrobin
Oryzalin	Ovex	Oxabetrinil
Oxadiazon	Oxadixyl	Oxamyl
Oxydemeton-methyl	Oxyfluorfen	Oxythioquinox
Paclobutrazol	Parathion	Parathion methyl
Pebulate	Penconazole	Pencycuron
Pendimethalin	Penflufen	Pentachlorophenol
Pentanochlor	Penthiopyrad	Permethrin

Pesticides		
Perthane	Phenkapton	Phenmedipham
Phenothrin	Phenthoate	Phenylphenol, *o*-
Phorate	Phosalone	Phosfolan
Phosmet	Phosphamidon	Phoxim
Phthalide	Picloram	Picolinafen
Picoxystrobin	Pindone	Pinoxadin
Piperalin	Piperonyl butoxide	Piperophos
Pirimicarb	Pirimiphos ethyl	Pirimiphos methyl
Plifenate	Potasan	Prallethrin
Pretilachlor	Probenazole	Prochloraz
Procymidone	Prodiamine	Profenofos
Profluralin	Prohydrojasmon	Promecarb
Prometon	Prometryn	Pronamide
Propachlor	Propamocarb	Propanil
Propaphos	Propargite	Propazine
Propetamphos	Propham	Propiconazole
Propisochlor	Propoxur	Propoxycarbazone
Proquinazid	Prosulfocarb	Prothioconazole
Prothiofos	Prothoate	Pymetrozine
Pyracarbolid	Pyraclofos	Pyraclostrobin
Pyraflufen ethyl	Pyrazon	Pyrazophos
Pyrazoxyfen	Pyrene	Pyributicarb
Pyridaben	Pyridalyl	Pyridaphenthion
Pyridate	Pyrifenox	Pyrifluquinazon
Pyriftalid	Pyrimethanil	Pyrimidifen
Pyriminobac-methyl	Pyriofenone	Pyriproxyfen
Pyroquilon	Pyroxasulfone	Quinalphos
Quinoclamine	Quinoxyfen	Quintozene
Quizalofop ethyl	Rabenzazole	Resmethrin
Ronnel	Rotenone	Salithion
Schradan	Sebuthylazine	Secbumeton
Sedaxane	Siduron	Silafuofen
Silthiofam	Silvex	Simazine
Simeconazole	Simetryne	Spinetoram

Pesticides		
Spinosad	Spirodiclofen	Spiromesifen
Spirotetramat	Spiroxamine	Sulfallate
Sulfentrazone	Sulfluramid	Sulfotepp
Sulfoxaflor	Sulprofos	Swep
Tebuconazole	Tebufenozide	Tebufenpyrad
Tebupirimfos	Tebutam	Tebuthiuron
Tecnazene	Teflubenzuron	Tefluthrin
Temephos	TEPP	Tepraloxydim
Terbacil	Terbucarb	Terbufos
Terbumeton	Terbuthylazine	Terbutryn
Tetraconazole	Tetradifon	Tetramethrin
Tetrasul	Thenylchor	Thiabendazole
Thiacloprid	Thiamethoxam	Thiazopyr
Thidiazuron	Thifluzamide	Thiobencarb
Thiocyclam	Thiodicarb	Thiofanox
Thiometon	Thionazin	Thiophanate-methyl
Thioquinox	Tiadinil	Tiocarbazil
Tolclofos methyl	Tolfenpyrad	Tolyfluanid
Transfluthrin	Triadimefon	Triadimenol
Tri-allate	Triamiphos	Triapenthenol
Triazophos	Triazoxide	Tributoxy PO_4
Trichlamide	Trichlorfon	Trichlorobenzene, 1,2,4-
Trichloronat	Trichlorophenol	Triclopyr butoxyethyl ester
Tricyclazole	Tridemorph	Trietazine
Trifenmorph	Trifloxystrobin	Trifloxysulfuron sodium
Triflumizole	Triflumuron	Trifluralin
Triflusulfuron methyl ester	Triforine	Trimethacarb
Triphenyl PO_4	Tris(1,3-dichloro-2-propyl) PO_4	Tris(beta-chloroethyl) PO_4
Tris(chloropropyl) PO_4	Triticonazole	Tycor
Uniconazole	Vamidothion	Vernolate
Vinclozolin	XMC	Zoxamide

*3,4-dichloroanaline is a metabolite of multiple pesticides

†BAM is a degradant of both fluopicolide and dichlobenil

B. Analysis of Domestic Human Foods by Commodity Group in FY 2015

Commodity Group	Samples Analyzed (N)	Without Residues (N) (%†)	Violative Samples* (N) (%†)	Over Tolerance Violations (N)	No Tolerance Violations (N)
Totals - All Domestic Samples	**835**	**416 (49.8)**	**15 (1.8)**	**2**	**13**
Grains and Grain Products					
Barley and barley products	1	1 (100)	0	0	0
Corn and corn products	13	12 (92.3)	0	0	0
Oats and oat products	1	0	0	0	0
Soybeans and soybean products	2	2 (100)	0	0	0
Wheat and wheat products	7	4 (57.1)	0	0	0
Other grains and grain products	8	5 (62.5)	0	0	0
Group Subtotal	**32**	**24 (75)**	**0**	**0**	**0**
Milk/Dairy Products/Eggs					
Eggs	2	2 (100)	0	0	0
Milk, cream and milk products	36	35 (97.2)	0	0	0
Group Subtotal	**38**	**37 (97.4)**	**0**	**0**	**0**
Fish/Shellfish/Other Aquatic Products					
Aquaculture seafood	10	7 (70)	0	0	0
Fish and fish products	24	22 (91.7)	0	0	0
Shellfish and crustaceans	13	13 (100)	0	0	0
Group Subtotal	**47**	**42 (89.4)**	**0**	**0**	**0**
Fruits					
Apple fruit/juice	64	2 (3.1)	0	0	0
Blueberry fruit/juice	1	1 (100)	0	0	0
Cherry fruit/juice	1	1 (100)	0	0	0
Cranberry fruit/juice	1	0	0	0	0
Grape fruit/juice, raisins	12	2 (16.7)	0	0	0
Nectarine fruit/juice	24	1 (4.2)	2 (8.3)	0	2
Peach fruit/juice	28	1 (3.6)	0	0	0
Pear fruit/juice	22	2 (9.1)	2 (9.1)	0	2
Plum fruit/juice, prunes	15	7 (46.7)	0	0	0
Raspberry fruit/juice	13	6 (46.2)	1 (7.7)	1	0
Strawberries	10	2 (20)	0	0	0
Watermelon	11	6 (54.5)	0	0	0
Other fruits/fruit products	2	0	0	0	0

Commodity Group	Samples Analyzed (N)	Without Residues (N) (%†)	Violative Samples* (N) (%†)	Over Tolerance Violations (N)	No Tolerance Violations (N)
Fruit jams, jellies, preserves, syrups, toppings, etc.	20	10 (50)	0	0	0
Group Subtotal	**224**	**41 (18.3)**	**5 (2.2)**	**1**	**4**
Vegetables					
Asparagus	1	1 (100)	0	0	0
Carrots	8	1 (12.5)	0	0	0
Cauliflower	1	0	1 (100)	0	1
Celery	14	0	0	0	0
Collards	1	0	0	0	0
Corn	4	4 (100)	0	0	0
Cucumbers	4	0	0	0	0
Eggplant	2	1 (50)	0	0	0
Kale	12	0	1 (8.3)	0	1
Lettuce, head	2	0	0	0	0
Lettuce, leaf	6	2 (33.3)	0	0	0
Mushrooms and truffles	21	9 (42.9)	0	0	0
Okra	1	0	0	0	0
Onions/leeks/scallions/shallots	0	0	0	0	0
Peas (green/snow/sugar/sweet)	5	4 (80)	0	0	0
Peppers, hot	2	2 (100)	0	0	0
Peppers, sweet	25	7 (28)	0	0	0
Potatoes	1	0	0	0	0
Radishes	2	1 (50)	0	0	0
Spinach	12	0	2 (16.7)	0	2
Squash	11	6 (54.5)	0	0	0
String beans (green/snap/pole/long)	38	24 (63.2)	1 (2.6)	0	1
Sweet potatoes	6	1 (16.7)	0	0	0
Tomatoes	30	12 (40)	1 (3.3)	1	0
Other bean and pea products	22	15 (68.2)	0	0	0
Other leaf and stem vegetables	19	6 (31.6)	3 (15.8)	0	3
Other root and tuber vegetables	8	2 (25)	1 (12.5)	0	1
Other vegetables/vegetable products	8	3 (37.5)	0	0	0
Group Subtotal	**266**	**101 (38)**	**10 (3.8)**	**1**	**9**
Other Food Products					
Beverages and beverage base	1	1 (100)	0	0	0

Commodity Group	Samples Analyzed (N)	Without Residues (N) (%†)	Violative Samples* (N) (%†)	Over Tolerance Violations (N)	No Tolerance Violations (N)
Confections	3	2 (66.7)	0	0	0
Edible seeds and seed products	1	1 (100)	0	0	0
Animal products/byproducts	17	16 (94.1)	0	0	0
Honey	15	15 (100)	0	0	0
Miscellaneous foods	191	136 (71.2)	0	0	0
Group Subtotal	**228**	**171 (75)**	**0**	**0**	**0**

†Percentage of the number of samples analyzed per commodity group
*Total number of violative samples may not equal sum of samples with "Over Tolerance" and "No Tolerance" violations because one sample can contain pesticide chemical residues of both violation types.

C. Analysis of Import Human Foods by Commodity Group in FY 2015

Commodity Group	Samples Analyzed (N)	Without Residues (N) (%†)	Violative Samples* (N) (%†)	Over Tolerance Violations (N)	No Tolerance Violations (N)
Totals - All Import Samples	**4737**	**2689 (56.8)**	**444 (9.4)**	**19**	**436**
Grains and Grain Products					
Bakery products, doughs, crackers	15	11 (73.3)	1 (6.7)	0	1
Barley and barley products	10	10 (100)	0	0	0
Breakfast cereals	15	10 (66.7)	0	0	0
Corn and corn products	18	12 (66.7)	0	0	0
Macaroni and noodles	37	24 (64.9)	0	0	0
Oats and oat products	2	2 (100)	0	0	0
Rice and rice products	211	114 (54)	42 (19.9)	1	42
Soybeans and soybean products	7	7 (100)	0	0	0
Wheat and wheat products	39	22 (56.4)	4 (10.3)	0	4
Other grains and grain products	27	21 (77.8)	1 (3.7)	0	1
Group Subtotal	**381**	**233 (61.2)**	**48 (12.6)**	**1**	**48**
Milk/Dairy Products/Eggs					
Eggs	1	1 (100)	0	0	0
Milk, cream and cheese products	18	14 (77.8)	1 (5.6)	0	1
Group Subtotal	**19**	**15 (78.9)**	**1 (5.3)**	**0**	**1**
Fish/Shellfish/Other Aquatic Products					
Aquaculture seafood	180	162 (90)	0	0	0
Fish and fish products	69	63 (91.3)	0	0	0
Shellfish and crustaceans	43	43 (100)	0	0	0
Other aquatic animals and products	4	4 (100)	0	0	0
Group Subtotal	**296**	**272 (91.9)**	**0**	**0**	**0**
Fruits					
Ackees, lychees, longans	10	8 (80)	2 (20)	0	2
Apple fruit/juice	51	25 (49)	2 (3.9)	1	2
Apricot fruit/juice	23	11 (47.8)	0	0	0
Avocado fruit/juice	25	12 (48)	2 (8)	0	2
Bananas, plantains	50	39 (78)	0	0	0
Bitter melon	3	2 (66.7)	0	0	0

Commodity Group	Samples Analyzed (N)	Without Residues (N) (%†)	Violative Samples* (N) (%†)	Over Tolerance Violations (N)	No Tolerance Violations (N)
Blackberry fruit/juice	54	13 (24.1)	2 (3.7)	0	2
Blueberry fruit/juice	37	14 (37.8)	0	0	0
Breadfruit, jackfruit	24	12 (50)	7 (29.2)	0	7
Cantaloupe	23	5 (21.7)	0	0	0
Cherry fruit/juice	36	6 (16.7)	2 (5.6)	2	2
Cranberry fruit/juice	10	9 (90)	0	0	0
Currant fruit/juice	6	1 (16.7)	2 (33.3)	0	2
Date fruit/juice	33	26 (78.8)	4 (12.1)	0	4
Fig fruit/juice	7	6 (85.7)	0	0	0
Grapefruit fruit/juice	2	0	0	0	0
Grapes fruit/juice, raisins	55	12 (21.8)	4 (7.3)	1	3
Guava fruit/juice	16	10 (62.5)	3 (18.8)	0	3
Honeydew melon	14	8 (57.1)	0	0	0
Fruit jams, jellies, preserves, syrups, toppings	39	20 (51.3)	10 (25.6)	1	10
Kiwi fruit/juice	9	4 (44.4)	1 (11.1)	0	1
Lemon fruit/juice	18	8 (44.4)	2 (11.1)	0	2
Lime fruit/juice	77	36 (46.8)	8 (10.4)	0	8
Mango fruit/juice	60	55 (91.7)	0	0	0
Nectarine fruit/juice	47	0	5 (10.6)	0	5
Olives	92	85 (92.4)	2 (2.2)	0	2
Orange fruit/juice	52	30 (57.7)	6 (11.5)	0	6
Papaya fruit/juice	54	15 (27.8)	5 (9.3)	0	5
Peach fruit/juice	81	25 (30.9)	2 (2.5)	0	2
Pear fruit/juice	27	15 (55.6)	2 (7.4)	1	1
Pineapple fruit/juice	39	22 (56.4)	6 (15.4)	0	6
Plum fruit/juice, prunes	30	10 (33.3)	0	0	0
Pomegranate fruit/juice	6	1 (16.7)	2 (33.3)	0	2
Prickly pear fruit/juice	43	31 (72.1)	12 (27.9)	0	12
Raspberry fruit/juice	52	19 (36.5)	5 (9.6)	0	5
Strawberry fruit/juice	89	23 (25.8)	14 (15.7)	2	14
Watermelon	56	34 (60.7)	2 (3.6)	0	2
Other berry fruit/juice	24	11 (45.8)	6 (25)	0	6
Other citrus fruit/juice	2	1 (50)	0	0	0
Other fruits and fruit products	22	13 (59.1)	6 (27.3)	1	6
Other melons/vine fruit/juice	3	1 (33.3)	0	0	0
Other stone fruit/juice	3	2 (66.7)	0	0	0

Commodity Group	Samples Analyzed (N)	Without Residues (N) (%†)	Violative Samples* (N) (%†)	Over Tolerance Violations (N)	No Tolerance Violations (N)
Other pome/core fruit/juice	3	3 (100)	0	0	0
Other sub-tropical fruit/juice	36	22 (61.1)	9 (25)	0	9
Group Subtotal	**1443**	**705 (48.9)**	**135 (9.4)**	**9**	**133**
Vegetables					
Artichokes	24	22 (91.7)	1 (4.2)	0	1
Asparagus	32	26 (81.2)	1 (3.1)	1	0
Bamboo shoots	12	12 (100)	0	0	0
Bean sprouts and seeds	0	0	0	0	0
Bok choy and Chinese cabbage	4	1 (25)	0	0	0
Broccoli	37	18 (48.6)	3 (8.1)	0	3
Brussels sprouts	30	7 (23.3)	2 (6.7)	0	2
Cabbage	15	8 (53.3)	4 (26.7)	0	4
Carrots	54	29 (53.7)	0	0	0
Cassava	38	38 (100)	0	0	0
Cauliflower	21	20 (95.2)	0	0	0
Celery	18	9 (50)	2 (11.1)	1	2
Choyote/chayote	25	16 (64)	3 (12)	0	3
Cilantro	22	4 (18.2)	6 (27.3)	0	6
Collards	3	2 (66.7)	0	0	0
Corn	19	16 (84.2)	0	0	0
Cucumbers	92	33 (35.9)	5 (5.4)	0	5
Eggplant	30	21 (70)	0	0	0
Endive	8	6 (75)	0	0	0
Garbanzo beans	17	15 (88.2)	0	0	0
Garlic	18	16 (88.9)	0	0	0
Ginger	21	14 (66.7)	2 (9.5)	0	2
Kale	31	12 (38.7)	3 (9.7)	1	3
Kidney beans	5	5 (100)	0	0	0
Leeks	7	6 (85.7)	0	0	0
Lettuce, head	5	2 (40)	2 (40)	0	2
Lettuce, leaf	11	4 (36.4)	0	0	0
Mung beans	17	15 (88.2)	0	0	0
Mushrooms/truffles/fungi	88	55 (62.5)	23 (26.1)	0	23
Mustard greens	3	1 (33.3)	1 (33.3)	0	1
Okra	15	8 (53.3)	2 (13.3)	0	2
Onions	23	20 (87)	1 (4.3)	0	1

Commodity Group	Samples Analyzed (N)	Without Residues (N) (%†)	Violative Samples* (N) (%†)	Over Tolerance Violations (N)	No Tolerance Violations (N)
Peas (green/snow/sweet)	58	24 (41.4)	8 (13.8)	0	8
Peppers, hot	301	71 (23.6)	33 (11)	0	33
Peppers, pimiento	3	2 (66.7)	0	0	0
Peppers, sweet	104	55 (52.9)	9 (8.7)	0	9
Potatoes	23	6 (26.1)	0	0	0
Pumpkins	4	2 (50)	0	0	0
Radishes	22	12 (54.5)	4 (18.2)	0	4
Red beets	12	9 (75)	0	0	0
Scallions and shallots	21	9 (42.9)	4 (19)	0	4
Soybeans	21	10 (47.6)	2 (9.5)	0	2
Spinach	49	20 (40.8)	6 (12.2)	0	6
Squash	73	35 (47.9)	11 (15.1)	1	10
String beans (green/snap/pole/long)	70	35 (50)	5 (7.1)	1	4
Sugar snap peas	13	6 (46.2)	1 (7.7)	0	1
Sweet potatoes	37	30 (81.1)	3 (8.1)	0	3
Taro/dasheen	14	8 (57.1)	6 (42.9)	0	6
Tomatoes/tomatillos	158	84 (53.2)	3 (1.9)	0	3
Turnips	2	2 (100)	0	0	0
Vegetable juice/drinks	4	3 (75)	0	0	0
Vegetables, breaded, or with sauce	17	11 (64.7)	0	0	0
Vegetables, other, or mixed	41	32 (78)	3 (7.3)	2	1
Other bean/pea vegetables/products	44	39 (88.6)	0	0	0
Other cucurbit vegetables	0	0	0	0	0
Other leaf and stem vegetables	114	54 (47.4)	29 (25.4)	2	28
Other root and tuber vegetables	22	16 (72.7)	4 (18.2)	0	4
Group Subtotal	**1972**	**1036 (52.5)**	**192 (9.7)**	**9**	**186**
Other Food Products					
Animal products and byproducts	1	1 (100)	0	0	0
Baby foods/formula	5	4 (80)	0	0	0
Beverages and beverage bases	39	30 (76.9)	1 (2.6)	0	1
Candy, confections, chocolate, cocoa products	23	13 (56.5)	5 (21.7)	0	5
Coconut and coconut products	7	7 (100)	0	0	0
Condiments and dressings	0	0	0	0	0
Dietary supplement, botanical/herbal	77	38 (49.4)	20 (26)	0	20
Dietary supplement, other	16	11 (68.8)	5 (31.2)	0	5

Commodity Group	Samples Analyzed (N)	Without Residues (N) (%†)	Violative Samples* (N) (%†)	Over Tolerance Violations (N)	No Tolerance Violations (N)
Food additives, colors, flavorings, extracts	6	3 (50)	1 (16.7)	0	1
Food sweeteners, not honey	21	21 (100)	0	0	0
Honey and honey products	36	33 (91.7)	1 (2.8)	0	1
Multi-ingredient foods (dinners, sauces, specialties)	19	7 (36.8)	0	0	0
Nuts, almonds	2	2 (100)	0	0	0
Nuts, cashews	13	10 (76.9)	0	0	0
Nuts, other nuts and nut products	24	22 (91.7)	0	0	0
Nuts, peanuts and peanut products	9	5 (55.6)	1 (11.1)	0	1
Nuts, pecans	20	19 (95)	0	0	0
Oil, olive	57	43 (75.4)	7 (12.3)	0	7
Oil, vegetable	35	22 (62.9)	2 (5.7)	0	2
Oil, vegetable, seed stock	5	3 (60)	0	0	0
Pepper sauce	10	7 (70)	0	0	0
Seeds, edible and seed products	114	82 (71.9)	9 (7.9)	0	9
Spices, basil	5	0	3 (60)	0	3
Spices, capsicums	6	0	3 (50)	0	3
Spices, other	39	22 (56.4)	5 (12.8)	0	5
Tea	2	2 (100)	0	0	0
Tea, botanical/herbal, other	16	7 (43.8)	4 (25)	0	4
Water and ice	0	0	0	0	0
Other food products	17	13 (76.5)	1 (5.9)	0	1
Other nonfood items	2	1 (50)	0	0	0
Group Subtotal	**626**	**428 (68.4)**	**68 (10.9)**	**0**	**68**

†Percentage of the number of samples analyzed per commodity group

*Total number of violative samples may not equal sum of samples with "Over Tolerance" and "No Tolerance" violations because one sample can contain pesticide chemical residues of both violation types.