Pesticide Residue Monitoring Program Fiscal Year 2020 Pesticide Report

U.S. Food and Drug Administration

https://www.fda.gov/food/chemicals-metals-pesticides-food/pesticides

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Acknowledgments

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FDA Pesticide Residue Monitoring Program Reports and Data

For more information about FDA pesticide residue monitoring program reports, see https://www.fda.gov/food/pesticides/pesticide-residue-monitoring-program-reports-and-data. 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 and animal 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 called tolerances for pesticide chemical residues and by monitoring foods in the market to determine if those levels are being exceeded.
The role of the Environmental Protection Agency (EPA) is to establish pesticide tolerances 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 United States (U.S.).*

This report summarizes the results of FDA's pesticide monitoring program for Fiscal Year (FY) 2020. 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 domestic and import commodities for residues of approximately 750 different pesticides and selected industrial compounds. The number of compounds (pesticides and industrial chemicals) in the analytical scope decreased slightly compared to FY 2019. Pesticides and industrial chemicals that are obsolete or detected rarely were removed from the scope as part of FDA's continuing modernization process.

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 2020 (October 1, 2019 through September 30, 2020), FDA analyzed 2,078 human food samples (316 domestic and 1,762 import samples) in its regulatory monitoring program. FDA collected domestic human food samples from 35 states and import human food samples from 79 countries/economies.

FDA found that 96.8% of domestic and 88.4% of import human foods were compliant with federal standards. No pesticide chemical residues were detected in 40.8% of the domestic and 48.4% of the import samples.

In FY 2020, FDA also analyzed 102 animal food samples (40 domestic and 62 import samples) for pesticides. The agency found that 100% of domestic and 96.8% of import animal food samples were compliant with federal standards. No pesticide chemical residues were detected in 30.0% of the domestic and 48.4% of the import animal food samples.

In some human food commodity groups, the violation rate was higher for import samples. The higher violation rate affirms the validity of the sampling design in targeting import commodities more likely to contain violative pesticide chemical residues, and the countries

*With the exception of meat; poultry; *Siluriformes* fish, including catfish; and certain egg products regulated by the Food Safety and Inspection Service (FSIS) of the U.S. Department of Agriculture (USDA).

more likely to export them. Factors considered in targeting import commodities include past problem areas, findings from state and federal monitoring, and foreign pesticide usage data.

Sample collection and analysis in FY 2020 was significantly impacted by the COVID-19 pandemic. Approximately 50% fewer human food samples and 70% fewer animal food samples were collected in FY 2020 compared with FY 2019. In addition, more import samples were collected in FY 2020 relative to domestic samples. Domestic samples were not collected for the "Domestically Produced Animal Derived Foods" assignment, conducted in recent years.

Glossary and Abbreviations

TERM	DEFINITION
Action level	Human or animal food 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
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
FACTS	FDA Field Accomplishment and Compliance Tracking System database
FDA	U.S. Food and Drug Administration
FFDCA	Federal Food, Drug, and Cosmetic Act
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.

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, the LOQ 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.
ORA	FDA Office of Regulatory Affairs
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 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 (MRLs) 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. preventive controls program by licensing pesticide applicators, conducting pesticide use inspections, and establishing and enforcing pesticide labeling provisions. The Food and Drug Administration (FDA) enforces tolerances in both import and domestic foods shipped in interstate commerce, except for meat; poultry; *Siluriformes* fish, including catfish; 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 regional and national collections under the Total Diet Study (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 Federal Food, Drug, and Cosmetic Act (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., at 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 regulatory sampling is on the unwashed, whole (unpeeled) raw commodity; however, 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, or
- in a commodity for which EPA has not established a tolerance or a tolerance exemption for that particular pesticide/commodity combination ("no-tolerance" violations).

Foods 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 seek other sanctions such as seizure to remove the food from commerce or injunction to correct the cause of the violation. Shipments of import food commodities may be refused entry into U.S. commerce. The responsible firm(s) and product(s) may be placed on an import alert under "Detention Without Physical Examination," or DWPE, which may be invoked for future shipments of that firm's commodity based on the finding of a single violative shipment. Section 801 of the FFDCA authorizes FDA to refuse admission of regulated articles that appear to be adulterated or misbranded. Typically, the information to make this determination is obtained by physical examination of the entry, although it is not required. For example, entries of imported foods with a violative history would likely create the appearance of adulteration under the FFDCA for future shipments, based on the results obtained from previous examinations of the same foods that were found to contain violative pesticide residues. 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 firms and products currently subject to DWPE for pesticide chemical residues and other food-related violations. There are currently four import alerts that address food products that are subject to 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 Human and Animal 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 subject to DWPE within an import alert may be asked to provide evidence of compliance for each shipment or lot of product exported to the United States. This procedure places the burden of demonstrating product compliance with U.S. tolerances for pesticide chemical residues on the importer of record before the product can be released into domestic commerce. Firms can request removal of their product(s) from DWPE under an FDA import alert by petitioning the Agency and 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. Generally, a minimum of five consecutive non-violative commercial shipments, as demonstrated by providing FDA with acceptable reports of private laboratory analyses, as well as an effective, detailed approach addressing the conditions that gave rise to the appearance of the violation is provided to support the corrective actions and removal of a grower's, manufacturer's, or shipper's product from DWPE.

Regulatory Monitoring Program Sampling Design

The goal of FDA's pesticide residue monitoring program is to carry out selective monitoring of human and animal foods for consumer protection. FDA samples are primarily of the surveillance type, meaning 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 certain commodities. Commodity choice is based upon multiple factors, including:

- most frequently consumed or imported;
- commodities and places of origin with a history of violations;
- size of shipments;
- 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 import food offered for entry into the United States;
- origin of imported food; and
- chemical characteristics and toxicity of the pesticide(s) used.

One important consideration when designing the FDA pesticide residue monitoring program for human foods is the distinction between domestic and import commodities. Historically, the violation rate of import samples is 3-5 times higher than the rate for domestic samples. For example, between FY 2013-2019, the violation rate for domestic samples ranged from 0.9-3.8%, whereas the rate for import samples ranged from 9.4-12.9%. Because the violation rate of import samples is higher than for domestic samples, FDA allocates more resources towards testing import compared with domestic commodities. Typically, import commodities comprise about 70% of all samples analyzed each year. In FY 2020, due to impacts on FDA surveillance and monitoring activities during the COVID-19 pandemic, about 85% of all samples were imports.

In addition to increased sampling of import commodities, FDA 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 its sampling program (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 these data to focus its resources where they are most efficiently and effectively used.

Sampling levels and bias for particular import or domestic commodities can vary significantly from year to year. Pesticide applications are modified in response to

changing weather patterns, new or re-emergent pests, or developed resistance to pesticides. 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 affirms FDA's sampling design to select commodities and production sources that are likely to be higher risk.

FDA's current pesticide sampling program, coupled with broad-based enforcement strategies for imports, allows FDA to achieve the program's main objective of consumer protection across a wide range of commodities. FDA has conducted statistically based and resource-intensive incidence and level monitoring studies of four major foods.[3,4] FDA's TDS program and the USDA PDP program collect incidence and level monitoring data, which support the pesticide regulatory monitoring program.

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 and/or selected pesticides, not usually or previously covered during regulatory monitoring. Typically, samples collected for a focused sampling assignment are analyzed using routine pesticide procedures; however, in some cases the samples are analyzed for targeted residues of interest.

Animal Food

In addition to monitoring food for human consumption, FDA samples and analyzes domestic and imported animal foods 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, although some pet food samples are also included.

Analytical Methods and Pesticide Coverage

To analyze large numbers of samples with unknown pesticide treatment history, FDA uses multi-residue methods (MRMs) capable of simultaneously determining many different pesticide chemical residues. These MRMs are also able to detect many metabolites, impurities, and alteration products of pesticides, as well as selected industrial chemicals. In addition, FDA uses selective residue methods (SRMs) that target specific pesticides. SRMs are sometimes needed to analyze pesticides that are not adequately extracted or detected using standard MRMs or to target specific pesticide/commodity combinations. 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. The complete list of pesticides analyzed in FY 2020 is provided in Appendix A.

FDA pesticide methods can detect approximately 81 percent of the pesticides with current or revoked EPA tolerances in Title 40 of the U.S. Code of Federal Regulations (CFR) part 180, as well as more than 400 other pesticide chemical residues that have no EPA

tolerance.[†] By testing for pesticides without EPA tolerances, FDA provides protection against pesticides that do not have EPA approval. The number of compounds (pesticides and industrial chemicals) in the analytical scope decreased slightly compared to FY 2019 (747 total compounds in FY 2020 vs. 812 in FY 2019). Pesticides and industrial chemicals that are obsolete or detected rarely were removed from the scope as part of FDA's continuing modernization process. FDA continues to expand the scope of its analytical testing as new pesticides are registered by EPA but acknowledges that some pesticides with EPA-established tolerances are not part of the current FDA testing scope, and FDA does not know the extent to which exposure to these pesticides may occur in the foods that FDA regulates.

The lower limit of residue measurement in FDA's determination of a specific pesticide is well below typical tolerance levels, which range from 0.01 to over 100 parts per million (ppm). Most pesticides analyzed can be 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 breadth of pesticide coverage.

FDA Total Diet Study

An important complement to FDA's regulatory pesticide residue monitoring program is the TDS program. TDS monitors levels of pesticide chemicals, toxic and nutritional elements, industrial chemicals, and radionuclides in foods representing the totality of the American diet. TDS is distinct from FDA's regulatory pesticide residue monitoring program and is focused on information gathering rather than enforcement. Regulatory monitoring determines pesticide chemical residues primarily in raw commodities, whereas TDS monitors foods prepared table-ready for consumption. TDS uses a modified version of the regulatory program extraction method that is too time-intensive for rapid regulatory follow-up, but it allows detection of pesticides at levels 10-100 times lower than in the regulatory monitoring program, i.e., residue levels as low as 0.1 parts per billion (ppb). Data from TDS can be used to calculate exposures to pesticides, nutrients, and contaminants from the U.S. diet, and to suggest potential areas of focus for FDA's food safety and nutrition programs. TDS pesticide results through FY 2017 were included in the pesticide residue monitoring program reports. TDS pesticide results from FY 2018 on will be posted on the FDA's TDS website, along with additional information about the history and design of the TDS.

[†] Additional information on EPA tolerances for pesticide ingredients can be found at: https://www.epa.gov/pesticide-tolerances/how-search-tolerances-pesticide-ingredients-code-federal-regulations (accessed March 31, 2022).

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 for directing 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 domestic and import products.

International Activities

As an agency of the U.S. government, FDA is subject to the obligations placed on World Trade Organization (WTO) members by the WTO Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement). FDA's enforcement of pesticide residue tolerances and monitoring activities fall under the definition of sanitary measures within the SPS Agreement. FDA's obligations under this agreement include the requirement that its measures 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 measures must also be applied equally to domestic and import products unless there is scientifically based justification for doing otherwise. Similarly, FDA is subject to obligations arising from several bilateral and multilateral free trade agreements with U.S. trading partners that contain provisions on sanitary measures that are consistent with the provisions of the SPS Agreement.

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 the agency's pesticide residue monitoring is conducted.

FDA maintains a number of cooperative arrangements with counterpart agencies in foreign governments, including MOUs and Confidentiality Commitments. These arrangements most often contain information-sharing provisions that encompass the ability to share analytical findings about pesticide residues, while protecting any confidential information from external disclosure. Several of these 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 information sharing on pesticide MRLs.

FDA also 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.

Results and Discussion

This report discusses results of the FY 2020 FDA pesticide residue monitoring program. Additionally, the report examines data to evaluate import products that may warrant special attention.

In FY 2020, FDA analyzed 2,180 samples under the regulatory monitoring program, of which 2,078 were human foods and 102 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. Results in this report represent samples with a collection date occurring in FY 2020.

Sample collection in FY 2020 was significantly impacted by the Covid-19 pandemic. This resulted in approximately 50% fewer samples collected for the human food pesticide monitoring program and 70% fewer for the animal food monitoring program compared with FY 2019. In addition, more import samples were collected in FY 2020 relative to domestic samples. Domestic samples were not collected for the "Domestically Produced Animal Derived Foods" assignment, conducted in recent years.

Regulatory Monitoring of Human Foods

The 2,078 human foods analyzed in FY 2020 include 316 domestic samples and 1,762 import samples. Results for the domestic samples are tabulated in Appendix B, "Analysis of Domestic Human Foods by Commodity Group in FY 2020," and results for the import samples are tabulated in Appendix C, "Analysis of Import Human Foods by Commodity Group in FY 2020." 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.

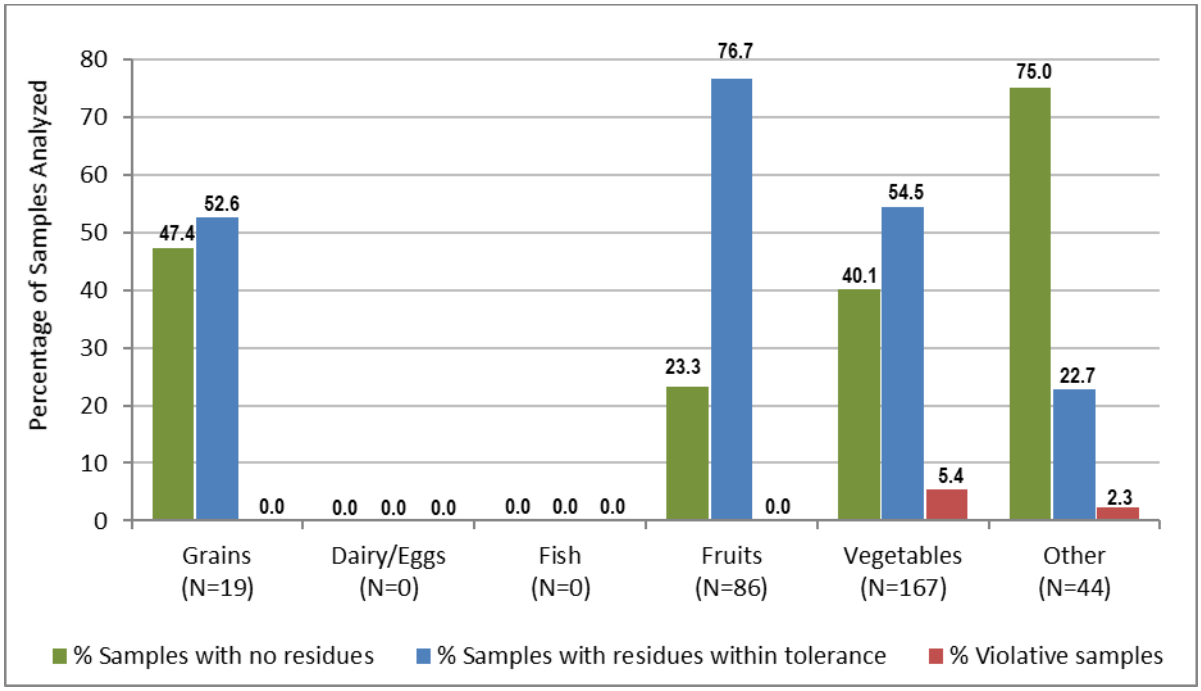
Results

Of the 316 domestic samples analyzed in FY 2020, 96.8% were in compliance and 40.8% had no detectable residues (Appendix B). Samples collected under the domestic commodity groups "Fruits" and "Vegetables" accounted for the majority (80.1%) of domestic samples.

Figure 1 summarizes the number of samples analyzed and the residue findings in domestic samples by commodity groups. For the grains and grain products commodity group, no residues were detected in 47.4% of the 19 samples analyzed and no samples contained violative residues. No samples were collected in the milk/dairy products/eggs commodity group or the fish/shellfish/other aquatic products commodity group. In the fruits commodity group, no residues were found in 23.3% of the 86 samples analyzed and no samples contained violative residues. For the vegetables commodity group, no residues were found in 40.1% of the 167 samples analyzed and 9 samples (5.4%) contained violative residues. In the commodity group of other food products, consisting largely of

nuts, seeds, and oils, no residues were found in 75.0% of the 44 samples analyzed and 1 sample (2.3%) contained violative residues.

Figure 1. Results of Domestic Human Food Samples by Commodity Group

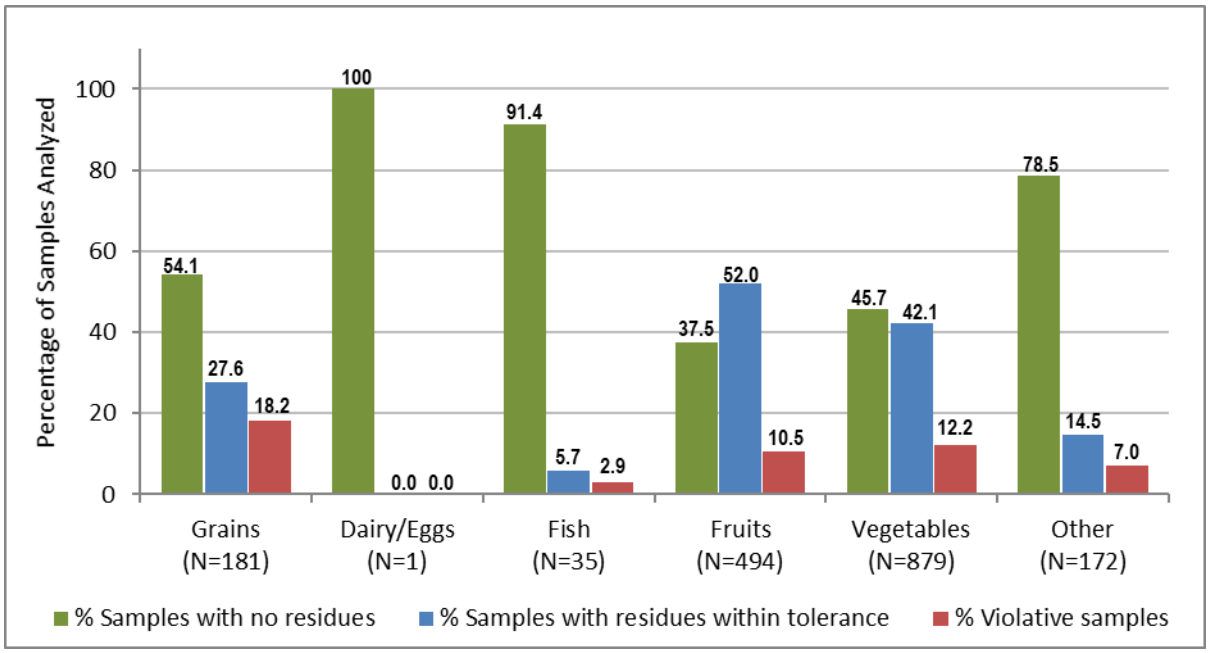


N = Number of samples analyzed for commodity group

Of the 1,762 import samples analyzed in FY 2020, 88.4% were in compliance and 48.4% had no detectable residues (Appendix C). Fruits and vegetables accounted for the majority (77.9%) of import samples.

Figure 2 summarizes the number of samples analyzed and the residue findings in import samples by commodity groups. In the import grains and grain products commodity group, 54.1% of the 181 samples analyzed had no detectable residues and 33 samples (18.2%) contained violative residues. Rice comprised most of the violations in this commodity group; 30 (90.9%) of the 33 grain product violations were rice and rice products. For the import milk/dairy products/eggs commodity group, 1 egg sample was analyzed and contained no violative residues. For the import fish/shellfish/other aquatic products commodity group, 91.4% of the 35 samples analyzed had no detectable residues and 1 sample (2.9%) contained violative residues. For the import fruit commodity group, 37.5% of the 494 samples analyzed had no detectable residues and 52 samples (10.5%) contained violative residues. For the import vegetable commodity group samples, 45.7% of the 879 samples had no detectable residues and 107 samples (12.2%) had violative residues. In the commodity group of other import food products, 78.5% of the 172 samples analyzed had no residues detected and 12 samples (7.0%) had violative residues. The category of "Seeds and seed products" comprised the majority of violations in this commodity group, representing 7 (58.3%) of the 12 violations.

Figure 2. Results of Import Human Food Samples by Commodity Group

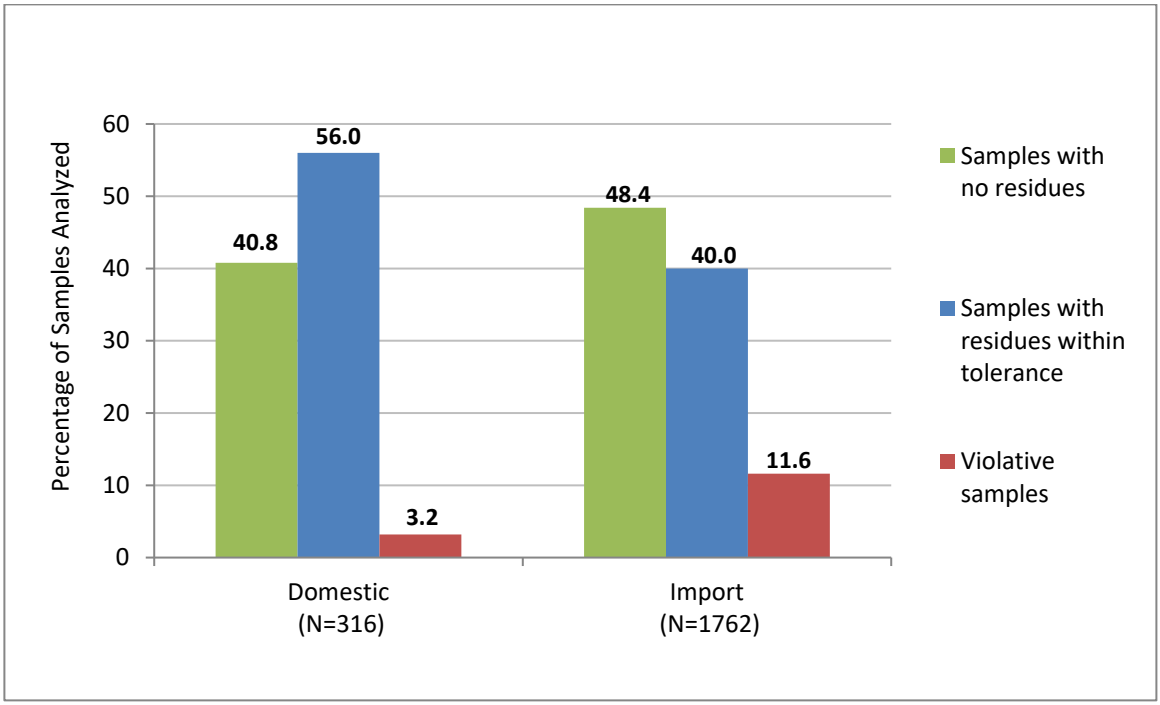


N = Number of samples analyzed for commodity group

Overall Results for Domestic and Import Human Food Samples

In total, 316 domestic and 1,762 import human food samples were collected and analyzed for the pesticides listed in Appendix A. No residues were found in 40.8% of domestic samples and 48.4% of import samples (Figure 3). Violative residues were found in 3.2% of the domestic samples and 11.6% of the import samples. The violation rates for both domestic and import samples in FY 2020 were consistent with recent years; between FY 2013-2019, the domestic violation rate ranged from 0.9-3.8% and the import violation rate ranged from 9.4 to 12.9%.

Figure 3. Summary of Results of Domestic and Import Human Food Samples



N = Number of samples analyzed for commodity group

For many commodity groups, the violation rate was higher for import samples. For example, 18.2% of import grain samples were violative; however, none of the domestic grain samples were violative. Similarly, 10.5% of the import fruit samples were violative compared with none of the domestic fruit samples, and 12.2% of import vegetable samples were violative, whereas 5.4% of domestic vegetable samples were violative. In the commodity group of other food products, the violation rate was 7.0% for import samples compared with 2.3% for domestic samples.

Of the 10 domestic violative samples, 7 contained pesticide chemical residues that have no EPA tolerance, i.e., no-tolerance violations, and 4 contained pesticide chemical residues that exceeded an EPA tolerance, i.e., over-tolerance violations. One sample had both no-tolerance and over-tolerance violations for different pesticides.

Of the 205 import violative samples, 182 had no-tolerance violations and 53 had over-tolerance violations; 30 samples had both no-tolerance and over-tolerance violations for different pesticides contained in the same sample.

Geographic Coverage

Domestic: A total of 316 domestic samples were collected from 35 states. Table 1 lists the number of domestic samples from each state and territory, in descending order. No domestic samples were collected from the states of Alaska, Arizona, Connecticut, Delaware, Hawaii, Maine, Mississippi, Montana, Nevada, New Hampshire, Rhode Island, Utah, Vermont, West Virginia, Wyoming, or the District of Columbia.

Table 1. Domestic Samples Collected and Analyzed per State

State	Samples (N)	State	Samples (N)
California	88	Tennessee	4
Florida	23	Iowa	4
Illinois	21	South Carolina	4
Kansas	18	North Carolina	4
Washington	15	Georgia	3
Minnesota	14	Indiana	2
Ohio	14	Arkansas	2
Colorado	11	Oregon	2
Michigan	11	Kentucky	2
Texas	10	Louisiana	2
North Dakota	9	Massachusetts	2
Nebraska	8	Maryland	2
Idaho	7	New Mexico	2
New York	7	Alabama	2
Pennsylvania	6	South Dakota	1
Missouri	5	Virginia	1
Wisconsin	5	Oklahoma	1
New Jersey	4		

Imports: A total of 1,762 import samples were collected representing food shipments from 79 countries/economies. Table 2 lists the number of samples and names of countries/economies from which ten or more samples were collected, in order of decreasing number of samples. Table 2a lists from left to right the countries/economies that had fewer than ten samples collected, in order of decreasing number of samples.

Table 2. Import Samples per Country/Economy of Origin for Which Ten or More Samples Were Collected and Analyzed

Country/Economy	Samples (N)	Country/Economy	Samples (N)
Mexico	582	Argentina	28
Canada	164	Costa Rica	26
China	130	Thailand	24
India	118	Honduras	20
Chile	74	Korea, Republic Of (South)	17
Peru	44	United Arab Emirates	15
Dominican Republic	41	Bulgaria	14
Italy	37	Spain	13
Turkey	36	Egypt	12
Guatemala	33	Taiwan	12
United States*	32	Brazil	11
Vietnam	31	Greece	11
Ecuador	30	South Africa	11
Pakistan	30		

*Indicates import samples collected while in interstate commerce.

Table 2a. Countries/Economies of Origin from Which Fewer Than Ten Samples Were Collected and Analyzed

Country/Economy		
Belgium	Syrian Arab Republic	Togo
France	Armenia	Vanuatu
Australia	Iraq	Cyprus
Philippines	Latvia	Ghana
Myanmar	Morocco	Jordan
Nicaragua	Romania	Kazakhstan
Afghanistan	Tunisia	Kosovo
Colombia	Albania	Lebanon
El Salvador	Bolivia	Malaysia
Algeria	Indonesia	New Zealand
Cameroon	Jamaica	Panama
Japan	Kenya	Russia
Germany	Moldova	Saudi Arabia
Israel	Mozambique	Sweden
Madagascar	Nigeria	United Kingdom
Netherlands	Portugal	Uruguay
Poland	Sri Lanka	West Bank
Serbia		

Pesticides Detected

In FY 2020, FDA pesticide methods could detect the 747 pesticides and industrial chemicals listed in Appendix A. Of these chemicals, residues of 185 different pesticides were detected in the samples analyzed. They are listed from left to right in Table 3 in order of frequency of detection along with the number of samples in which they were found. The number of pesticides in the analytical scope decreased slightly compared to FY 2019 (812 in FY 2019). Pesticides that are obsolete or detected rarely, as well as some industrial chemicals, were removed from the scope as part of FDA's commitment to continual improvement. No new pesticides were detected in FY 2020 that had not been detected previously by the FDA regulatory pesticide monitoring program.

Table 3. Pesticides Found in Human Foods in FY 2020 Listed in Order of Frequency

Pesticide (No. samples found)		
Azoxystrobin (146)	Imidacloprid (143)	Boscalid (124)
Fludioxonil (124)	Cypermethrin (98)	Thiamethoxam (92)
Pyraclostrobin (87)	Tebuconazole (85)	Carbendazim† (80)
Acetamiprid (77)	Chlorantraniliprole (76)	Pyrimethanil (71)
Chlorpyrifos (70)	Bifenthrin (69)	Cyprodinil (67)
Difenoconazole (67)	Thiabendazole (66)	Clothianidin (64)
Lambda-cyhalothrin (63)	Malathion (56)	Propamocarb (51)
Fluopyram (49)	Metalaxyl (46)	Propiconazole (41)
Methoxyfenozide (40)	Chlorothalonil (38)	Permethrin (38)
Piperonyl butoxide (38)	Buprofezin (35)	Thiacloprid (34)
Flonicamid (33)	Glyphosate (33)	Fenhexamid (32)
Linuron (32)	Myclobutanil (32)	Dimethomorph (31)
Dimethoate (28)	Spinetoram (28)	Thiophanate-methyl (28)
DCPA (27)	Chlorfenapyr (26)	Flupyradifurone (26)
Fluxapyroxad (25)	Tricyclazole (25)	Trifloxystrobin (25)
Spinosad (24)	Chlorpropham (23)	Dinotefuran (23)
Imazalil (23)	Mandipropamid (23)	Fenpropathrin (21)
Iprodione (21)	Methamidophos (21)	Methomyl (21)
Bifenazate (19)	Novaluron (19)	Spiromesifen (19)
Flubendiamide (18)	Spirotetramat (18)	Acephate (17)
Isoprothiolane (17)	Penthiopyrad (17)	Spirodiclofen (17)
Cyromazine (16)	Cyfluthrin (15)	Fluopicolide (15)
Flutriafol (14)	Captan (13)	Fenpyroximate, e- (13)
2,4-D (12)	Carbaryl (12)	Cyantraniliprole (12)
Fenamidone (12)	Indoxacarb (12)	Sulfoxaflor (12)
Ametoctradin (11)	Hexythiazox (11)	Oxamyl (11)
Deltamethrin (10)	Fenbuconazole (10)	Fipronil (10)

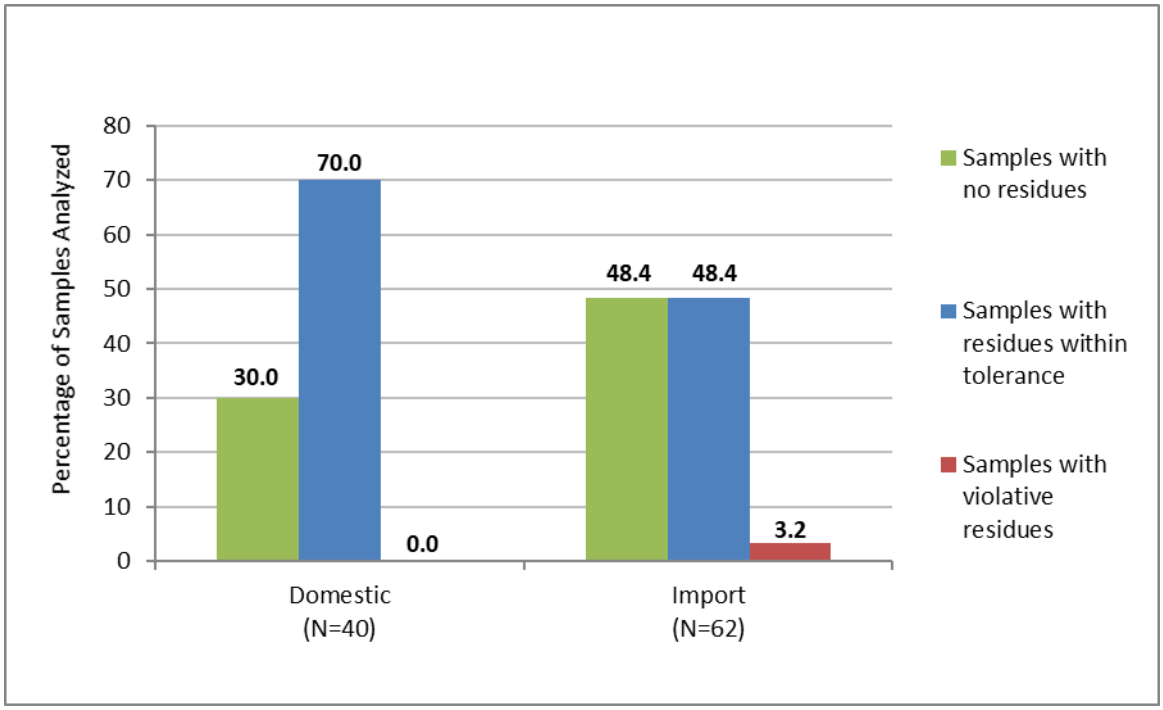
Pesticide (No. samples found)		
Prometryn (10)	Famoxadone (9)	Imazamox (9)
MGK 264 (9)	Pyriproxyfen (9)	Quinoxyfen (9)
Cyazofamid (8)	Cyflumetofen (8)	Diazinon (8)
Phosmet (8)	Propargite (8)	Abamectin (7)
Acequinocyl (7)	Haloxyfop (7)	Dichlorvos (6)
Etoxazole (6)	Pirimiphos methyl (6)	Cyflufenamid (5)
Dicloran (5)	Diflubenzuron (5)	Diphenylamine (5)
Etofenprox (5)	Fluoxastrobin (5)	Metrafenone (5)
Pyridaben (5)	Triazophos (5)	DDT (4)
Ethoxyquin (4)	Fenvalerate (4)	Methiocarb (4)
Monocrotophos (4)	Pendimethalin (4)	Procymidone (4)
Profenofos (4)	Pymetrozine (4)	Quinclorac (4)
Quintozene (4)	Tetraconazole (4)	Atrazine (3)
Carbofuran (3)	Cyproconazole (3)	Dodine (3)
Methoprene (3)	Prochloraz (3)	Tolfenpyrad (3)
BAM (2)	Clopyralid (2)	DEF (2)
Dichlobenil (2)	Dichlorprop (2)	Fenazaquin (2)
Fenobucarb (2)	Forchlorfenuron (2)	Isoprocarb (2)
Kresoxim-methyl (2)	MCPA (2)	Phenylphenol, o- (2)
Triflumizole (2)	Triflumuron (2)	Trifluralin (2)
2,6-DIPN (1)	Benalaxyl (1)	Benfuracarb (1)
Clofentezine (1)	Cymoxanil (1)	Diuron (1)
Emamectin benzoate (1)	Endosulfan (1)	Epoxiconazole (1)
Ethoprop (1)	Fenbutatin oxide (1)	Fenitrothion (1)
Fenoxycarb (1)	Fenpropimorph (1)	Fenpyrazamine (1)
Fluridone (1)	Fosthiazate (1)	Glufosinate (1)
Heptachlor (1)	Imazapyr (1)	Isocarbophos (1)
Lufenuron (1)	Mandestrobin (1)	Metolachlor (1)
Metominostrobin (1)	Oxathiapiprolin (1)	Oxyfluorfen (1)
Penconazole (1)	Phorate (1)	Phosalone (1)
Picoxystrobin (1)	Pirimicarb (1)	Pronamide (1)
Proquinazid (1)	Pyridalyl (1)	Pyriofenone (1)
Tebufenozide (1)	Tebufenpyrad (1)	Tecnazene (1)
Teflubenzuron (1)	Tetramethrin (1)	Thifluzamide (1)
Triadimenol (1)	Zoxamide (1)	

[†]Carbendazim is both a fungicide and a degradant of thiophanate methyl; it was reported under the category of thiophanate methyl in the 2015 and 2016 pesticide residue monitoring reports.

Regulatory Monitoring of Animal Foods

In FY 2020, FDA analyzed 102 animal food samples for pesticides. Figure 4 summarizes the number of samples analyzed and residue findings in domestic and import samples.

Figure 4. Summary of Results of Domestic and Import Animal Food Samples



N = Number of samples analyzed for commodity group

Of the 102 animal food samples, 40 samples were domestic and 62 samples were imports. No residues were found in 12 (30.0%) of the 40 domestic samples, and none of the samples were violative. Of the 62 import samples, 30 (48.4%) contained no residues and 2 samples (3.2%) were violative. Both violations for FY 2020 were no-tolerance violations.

The violation rate of 0% for domestic animal foods in FY 2020 is below violation rates for FY 2013-2019, i.e., 0.8-3.8%. The violation rate of 3.2% for import animal foods is consistent with FY 2013-2019; i.e., 3.1-5.6%.

Table 4 summarizes residue findings for eight different animal food categories.

Table 4. Summary of Animal Foods by Commodity Type

Commodity Type	Samples Analyzed N	Without Residues N (%)†	Violative Samples N (%)†
Totals – All Samples	**102**	**42 (41.2)**	**2 (2)**
Whole and Ground Grains/Seeds	48	28 (58.3)	0 (0)
Mixed Livestock Food Rations	12	2 (16.7)	0 (0)
Medicated Livestock Food Rations	5	0 (0)	0 (0)
Plant Products/Byproducts	29	11 (37.9)	1 (3.4)
Hay and Silage	1	0 (0)	0 (0)
Animal Byproducts	1	1 (100)	0 (0)
Pet Food/Treats	5	0 (0)	1 (20)
Other Animal Food Ingredients	1	0 (0)	0 (0)

†Percentage of the number of samples analyzed per commodity type.

Commodities commonly used to feed livestock that produce food for human consumption—i.e., Whole and Ground Grains/Seeds, Mixed Livestock Food Rations, Medicated Livestock Food Rations, Plant Products/Byproducts, and Hay and Silage—comprised the majority (93.1%) of the samples analyzed. Of these 95 samples, 1 (1.1%) was found violative.

Geographic Coverage

Domestic: A total of 40 domestic samples were collected from 19 states. Table 5 lists the number of domestic samples from each state in descending order. No domestic samples were collected from the states of Alaska, Arizona, Arkansas, Connecticut, Delaware, Florida, Georgia, Hawaii, Indiana, Kentucky, Louisiana, Maine, Massachusetts, Michigan, Mississippi, Nevada, New Jersey, New Mexico, New York, North Dakota, Oklahoma, Oregon, Rhode Island, South Carolina, South Dakota, Tennessee, Utah, Vermont, Virginia, West Virginia, Wyoming, or the District of Columbia.

Table 5. Domestic Animal Food Samples Collected and Analyzed per State

State/Territory	Samples (N)	State/Territory	Samples (N)
California	6	Ohio	2
Kansas	4	Alabama	1
Minnesota	3	Maryland	1
Texas	3	New Hampshire	1
Pennsylvania	3	Illinois	1
Nebraska	3	Iowa	1
Idaho	2	Colorado	1
Missouri	2	Washington	1
Wisconsin	2	Montana	1
North Carolina	2		

Imports: A total of 62 import samples were collected representing animal food samples from 11 countries. Table 6 lists the number of samples and names of the countries of origin in order of decreasing number of samples.

Table 6. Import Animal Food Samples Collected and Analyzed per Country of Origin

Country	Samples (N)
Canada	46
Belgium	3
India	3
Mexico	2
Poland	2
Brazil	1
Bulgaria	1
Chile	1
Honduras	1
Norway	1
United States*	1

* Indicates import samples collected while in interstate commerce

Pesticides Detected

In FY 2020, residues of 92 different pesticides were found in the 102 animal food samples analyzed. They are listed from left to right in Table 7 in decreasing order of detection along with the number of samples in which they were found.

All animal foods were analyzed for 747 different pesticides and industrial chemicals using the FDA pesticide MRMs (Appendix A). Two violations were observed in the 102 samples, both no-tolerance violations: 2,4-D (1) and difenoconazole (1).

The glyphosate SRM was used to test 27 animal food samples (9 domestic and 18 import) for glyphosate and glufosinate. Glyphosate was detected in 17 samples, (8 domestic and 9 import) but none were violative. The acid herbicides SRM was used to test 54 samples (26 domestic and 28 import) for the presence of acid herbicides. The majority of the 54 samples (87.0%) had no acid herbicide residues, 7 had detectable levels, and one sample was violative.

Overall, glyphosate was detected in the greatest number of samples (17), although there were no violations. Piperonyl butoxide, a synergist used in combination with pyrethrins for control of insects, was found in 16 samples (15.7%), none of which were violative. Ethoxyquin, while registered as a pesticide for use on pears, has specific uses as a preservative in animal foods.[6] In FY 2020, ethoxyquin was found in 13 samples (12.7%), all well below the level of 150 ppm approved for food additive use. Malathion was found in 12 samples (11.8%), none of which were violative.

During FY 2020, sample numbers were significantly less than prior years due to the COVID-19 pandemic. Despite this reduction in the number of samples, the number of violations was similar to past years.

Table 7. Pesticides Found in Animal Foods in FY 2020 Listed in Order of Frequency

Pesticide (No. Samples Detected)		
Glyphosate (17)	Piperonyl butoxide (16)	Ethoxyquin (13)
Malathion (12)	2,4-D (3)	Bifenthrin (3)
Chlorpropham (3)	Clopyralid (3)	DEF (3)
Methoprene (3)	Acetamiprid (2)	Atrazine (2)
Azoxystrobin (2)	Boscalid (2)	Chlorpyrifos (2)
DDT (2)	Difenoconazole (2)	Imazamox (2)
Imidacloprid (2)	Metalaxyl (2)	Methoxyfenozide (2)
Acetochlor (1)	Benfluralin (1)	Benzovindiflupyr (1)
Bifenazate (1)	Carbendazim (1)	Chlorantraniliprole (1)
Cypermethrin (1)	Cyprodinil (1)	Diafenthiuron (1)
Epoxiconazole (1)	Fenbutatin oxide (1)	Fenpropidin (1)
Fenpyroximate, e- (1)	Fluopicolide (1)	Fluopyram (1)
Flutriafol (1)	Fluxapyroxad (1)	Indoxacarb (1)
Iprodione (1)	Linuron (1)	Metconazole (1)
Metribuzin (1)	Oxyfluorfen (1)	Pendimethalin (1)
Pirimiphos methyl (1)	Propamocarb (1)	Propiconazole (1)
Pyraclostrobin (1)	Pyrimethanil (1)	Pyriproxyfen (1)
Saflufenacil (1)	Spinosad (1)	Tebuconazole (1)
Tetraconazole (1)	Thidiazuron (1)	Thiophanate-methyl (1)
Trifloxystrobin (1)	Trifluralin (1)	BHC (1)
Bromoxynil (1)	Captan (1)	Carbofuran (1)
Chlordane (1)	Cyproconazole (1)	Cyprodinil (1)
Dichlorvos (1)	Dicloran (1)	Dicrotophos (1)
Dimethomorph (1)	Dinotefuran (1)	Epoxiconazole (1)
Fenamidone (1)	Fenbuconazole (1)	Fluopicolide (1)
Flupyradifurone (1)	Fluridone (1)	Flutolanil (1)
Imazalil (1)	Imazamox (1)	Indoxacarb (1)
Lambda-cyhalothrin (1)	Methomyl (1)	Oxamyl (1)
Penthiopyrad (1)	Phenylphenol, o- (1)	Phosmet (1)
Propargite (1)	Propoxycarbazone (1)	Quinclorac (1)
Resmethrin (1)	Tolfenpyrad (1)	

Focused Sampling

No focused sampling assignments were conducted in FY 2020 due to Covid-19 pandemic-related resource constraints.

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 information such as reports from other agencies and pesticide usage data. Historically, the violation rate for import foods is higher than for domestic foods; results from FY 2020 continue that trend.[7] The violation rate for import foods (11.6%) was over 3 times higher than the rate for domestic foods (3.2%). The majority of the violations for import commodities are no-tolerance violations, with approximately 78% of the violative residues < 0.1 ppm. Examination of the FY 2020 pesticide data from the analysis of imported human foods indicates that the commodities listed in Table 8 may warrant increased sampling of import products in the future.

The following criteria were applied to the FY 2020 data to select import 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 import commodities analyzed in FY 2020 that meet the above criteria. The commodities are listed 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 sometimes have been consolidated; however, in Table 8, those same commodities might be extracted and reported separately. For example, Appendix C indicates FDA analyzed 133 import rice and rice products in FY 2020. Table 8 indicates that rice is flagged for special attention, but only lists 131 samples. The other 2 rice samples from Appendix C have been excluded from Table 8 because they are processed products, e.g., rice flour.

Table 8. Import Commodities That May Warrant Special Attention

Commodity[†]	Samples Analyzed (N)	Violation Rate (%)
Blackeye peas	7	42.9
Celery*	20	10.0
Corn, vegetable	24	12.5
Dates*	22	27.3
Dragon fruit*	13	53.9
Ginger root	13	23.1
Jackfruit	15	26.7
Lime	21	19.1
Mango	35	11.4
Mushrooms and fungi*	42	16.7
Olives	12	33.3
Onions, leeks, scallions, shallots	51	23.5
Peas*	44	13.6
Pepper, hot*	64	21.9
Pepper, sweet*	42	19.1
Radish*	25	24.0
Rice*	131	22.9
String beans*	31	19.4
Taro, Dasheen*	30	20.0
Tomatoes	31	12.9

[†]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 C.

*Commodity was on the FY 2019 table of import commodities warranting special attention.

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Appendices

Appendix A lists the 747 pesticides and industrial chemicals analyzed using FDA methods in FY 2020. The MRM method is used to analyze the majority of pesticides (716), and two SRMs were used to analyze (1) glyphosate, glufosinate, and their degradation products (glyphosate SRM) and (2) 27 selected acid herbicides (acid herbicides SRM). In addition to these chemicals, FDA analytical procedures detect other metabolites and isomers associated with the pesticides listed in Appendix A.

All residue findings for human foods are summarized in Appendices B (domestic) and C (import). In FY 2020, 87 different domestic human food commodities and 299 different import human food commodities were tested. In both appendices, all commodities have been assigned to the same six commodity groups:

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

Commodities are further categorized within each commodity group. For example, the subcategories for domestic commodities listed under the "Grains and Grain Products" commodity group in Appendix B include:

Barley and barley products
Corn and corn products
Oats and oat products
Rice and rice products
Soybeans and soybean products
Wheat and wheat products
Other grains and grain products

Each of these subcategories includes commodities derived from a single agricultural commodity. For example, the subcategory "Wheat and wheat products" includes commodities composed exclusively, or almost exclusively, from wheat, such as whole wheat grain, milled wheat, wheat flour, enriched wheat flour, wheat germ, wheat malt, wheat bran, and wheat gluten.

The subcategories within each commodity group may differ between the appendices for domestic and import commodities. This is because the numbers and kinds of individual commodities available are different for domestic and import commodities. For example, under the "Fruit" commodity group, 40 subcategories are listed for the import samples in Appendix C, but only 12 subcategories are listed for the domestic samples in Appendix B. The additional import "Fruit" subcategories are mostly for fruits not available domestically.

Appendix A. Pesticides and Industrial Chemicals Analyzed by FDA Pesticide Methods in FY 2020

Pesticides		
2,4,5-T methyl ester	2,4-D[1]	2,4-D methyl ester
2,4-DB[1]	2,4-DB methyl ester	2,6-DIPN
3-(hydroxymethylphosphinyl) propanoic acid[2]	3,4-Dichloroaniline[3]	4-CPA[1]
Abamectin	Acephate	Acequinocyl
Acetamiprid	Acetochlor	Acibenzolar-S-methyl
Acifluorfen[1]	Acifluorfen methyl ester	Aclonifen
Acrinathrin	Akton	Alachlor
Aldicarb	Aldrin	Allethrin
Allidochlor	Ametoctradin	Ametryn
Amicarbazone	Amidithion	Amidoflumet
Aminocarb	Aminopyralid[1]	Amisulbrom
Amitraz	Ancymidol	Anilazine
Anilofos	Aramite	Aspon
Atraton	Atrazine	Azaconazole
Azamethiphos	Azinphos ethyl	Azinphos-methyl
Aziprotryne	Azoxystrobin	BAM[4]
Barban	Beflubutamid	Benalaxyl
Benazolin	Bendiocarb	Benfluralin
Benfuracarb	Benfuresate	Benodanil
Benoxacor	Bentazon	Benthiavalicarb-isopropyl
Benzovindiflupyr	Benzoximate	Benzoylprop ethyl
BHC	Bicyclopyrone	Bifenazate
Bifenox	Bifenthrin	Binapacryl
Biphenyl	Bistrifluron	Bitertanol
Bithionol	Bixafen	Boscalid
Bromacil	Bromfenvinphos ethyl	Bromfenvinphos methyl
Bromobutide	Bromocyclen	Bromophos
Bromophos-ethyl	Bromopropylate	Bromoxynil[1]
Bromoxynil octanoate	Bromuconazole	Bufencarb
Bupirimate	Buprofezin	Butachlor
Butafenacil	Butamifos	Butralin
Butylate	Cadusafos	Cafenstrole
Captafol	Captan	Carbaryl
Carbendazim[5]	Carbetamide	Carbofuran
Carbophenothion	Carbosulfan	Carboxin

Pesticides		
Carfentrazone ethyl ester	Carpropamid	Chlorantraniliprole
Chlorbenside	Chlorbicyclen	Chlorbromuron
Chlorbufam	Chlordane	Chlordecone
Chlordimeform	Chlorethoxyfos	Chlorfenapyr
Chlorfenethol	Chlorfenvinphos	Chlorfenvinphos methyl
Chlorfluazuron	Chlorimuron-ethyl	Chlormephos
Chlornitrofen	Chlorobenzilate	Chloroneb
Chloropropylate	Chlorothalonil	Chlorotoluron
Chloroxuron	Chlorpropham	Chlorpyrifos
Chlorpyrifos methyl	Chlorthiamid	Chlorthiophos
Chlozolinate	Chromafenozide	Cinidon-ethyl
Clethodim	Clodinafop-propargyl	Cloethocarb
Clofentezine	Clomazone	Clopyralid[1]
Cloquintocet-mexyl	Clothianidin	Coumaphos
Crimidine	Crotoxyphos	Crufomate
Cumyluron	Cyanazine	Cyanofenphos
Cyanophos	Cyantraniliprole	Cyazofamid
Cyclafuramid	Cycloate	Cycloxydime
Cycluron	Cyenopyrafen	Cyflufenamid
Cyflumetofen	Cyfluthrin	Cyhalofop butyl ester
Cymiazole	Cymoxanil	Cypermethrin
Cyphenothrin	Cyprazine	Cyproconazole
Cyprodinil	Cyprofuram	Cyromazine
Cythioate	Dazomet	DCPA
DDT	DEET	DEF
Deltamethrin	Demephion	Demeton
Desmedipham	Desmetryn	Diafenthiuron
Dialifor	Diallate	Diamidafos
Diazinon	Dicamba[1]	Dicapthon
Dichlobenil	Dichlofenthion	Dichlofluanid
Dichlormid	Dichlorophen	Dichlorprop[1]
Dichlorvos	Diclobutrazol	Diclocymet
Diclofop[1]	Diclofop-methyl	Diclomezine
Dicloran	Dicofol	Dicrotophos
Dicryl	Dicyclanil	Dieldrin
Diethatyl-ethyl	Diethofencarb	Difenoconazole
Difenoxuron	Diflovidazin	Diflubenzuron
Diflufenican	Diflufenzopyr[1]	Diflumetorim
Dimefluthrin	Dimefox	Dimepiperate

Pesticides		
Dimethachlone	Dimethachlor	Dimethametryn
Dimethenamid	Dimethipin	Dimethirimol
Dimethoate	Dimethomorph	Dimetilan
Dimoxystrobin	Diniconazole	Dinitramine
Dinobuton	Dinocap	Dinoseb
Dinoseb acetate	Dinotefuran	Dinoterb acetate
Diofenolan	Diothyl	Dioxacarb
Dioxathion	Diphenamid	Diphenylamine
Dipropetryn	Disulfoton	Ditalimfos
Dithianon	Dithiopyr	Diuron
Dodemorph	Dodine	Drazoxolon
Edifenphos	Emamectin benzoate	Empenthrin
Endosulfan	Endrin	EPN
Epoxiconazole	EPTC	Esfenvalerate
Esprocarb	Etaconazole	Ethaboxam
Ethalfluralin	Ethiofencarb	Ethiolate
Ethion	Ethiprole	Ethirimol
Ethofumesate	Ethoprop	Ethoxyquin
Ethychlozate	Etobenzanid	Etofenprox
Etoxazole	Etridiazole	Etrimfos
Famoxadone	Famphur	Fenamidone
Fenamiphos	Fenarimol	Fenazaflor
Fenazaquin	Fenbuconazole	Fenbutatin oxide
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	Flamprop-isopropyl	Flamprop-methyl
Flonicamid	Fluacrypyrim	Fluazifop butyl ester
Fluazifop-p-butyl	Fluazolate	Fluazuron
Flubendiamide	Flubenzimine	Fluchloralin
Flucycloxuron	Flucythrinate	Fludioxonil
Fluensulfone	Flufenacet	Flufenoxuron
Flufenpyr ethyl	Flufiprole	Flumetralin
Flumetsulam	Flumiclorac-pentyl	Flumioxazin
Flumorph	Fluometuron	Fluopicolide

Pesticides		
Fluopyram	Fluoranthene	Fluorene
Fluorochloridone	Fluorodifen	Fluoroimide
Fluotrimazole	Fluoxastrobin	Flupyradifurone
Fluquinconazole	Fluridone	Fluroxypyr[1]
Flurprimidol	Flurtamone	Flusilazole
Fluthiacet-methyl	Flutolanil	Flutriafol
Fluvalinate	Fluxapyroxad	Folpet
Fomesafen	Fonofos	Forchlorfenuron
Formetanate	Formothion	Fosthiazate
Fosthietan	Fuberidazole	Furalaxyl
Furametpyr	Furathiocarb	Furilazole
Furmecyclox	Gardona	Glufosinate[5]
Glyphosate[5]	Halauxifen-methyl	Halfenprox
Halofenozide	Haloxyfop[1]	Haloxyfop-methyl
Heptachlor	Heptenophos	Hexachlorobutadiene
Hexachlorophene	Hexaconazole	Hexaflumuron
Hexazinone	Hexythiazox	Hydramethylnon
Hydroprene	IBP	Imazalil
Imazamethabenz[1]	Imazamethabenz methyl ester	Imazamox[1]
Imazapic[1]	Imazapyr[1]	Imazaquin[1]
Imazasulfuron	Imazethapyr[1]	Imibenconazole
Imidacloprid	Imiprothrin	Indanofan
Indaziflam	Indoxacarb	Ioxynil
Ipconazole	Ipfencarbazone	Iprodione
Iprovalicarb	Isazofos	Isobenzan
Isocarbamid	Isocarbophos	Isodrin
Isofenphos	Isofetamid	Isomethiozin
Isoprocarb	Isopropalin	Isoprothiolane
Isoproturon	Isopyrazam	Isotianil
Isoxadifen-ethyl	Isoxaflutole	Isoxathion
Ivermectin	Jodfenphos	Karbutilate
Kinoprene	Kresoxim-methyl	Lactofen
Lambda-cyhalothrin	Lenacil	Leptophos
Lindane	Linuron	Lufenuron
Malathion	Mandestrobin	Mandipropamid
MCPA[1]	MCPA methyl ester	MCPB[1]
Mecarbam	Mecoprop[1]	Mefenacet
Mefenpyr-diethyl	Mefluidide	Mepanipyrim
Meperfluthrin	Mephosfolan	Mepronil

Pesticides		
Meptyldinocap	Metaflumizone	Metalaxyl
Metaldehyde	Metamifop	Metamitron
Metazachlor	Metconazole	Methabenzthiazuron (MBTZ)
Methacrifos	Methamidophos	Methfuroxam
Methidathion	Methiocarb	Methomyl
Methoprene	Methoprotryne	Methoxychlor
Methoxyfenozide	Metobromuron	Metofluthrin
Metolachlor	Metolcarb	Metominostrobin
Metoxuron	Metrafenone	Metribuzin
Metsulfuron methyl	Mevinphos	Mexacarbate
MGK 264	MGK-326	Mirex
Molinate	Momfluorothrin	Monalide
Monocrotophos	Moxidectin	Myclobutanil
N-acetylglufosinate[5]	Naftalofos	Naled
Naphthalene	Naphthaleneacetamide	Naproanilide
Napropamide	Naptalam	Nicotine
Nitenpyram	Nitralin	Nitrapyrin
Nitrofen	Nitrothal-isopropyl	Norea
Norflurazon	Novaluron	Noviflumuron
Nuarimol	Octhilinone	Ofurace
Orbencarb	Orysastrobin	Oryzalin
Oxadiazon	Oxadixyl	Oxamyl
Oxathiapiprolin	Oxpoconazole	Oxydemeton-methyl
Oxydeprofos	Oxyfluorfen	Oxythioquinox
Paclobutrazol	Parathion	Parathion methyl
PCBs	Pebulate	Penconazole
Pencycuron	Pendimethalin	Penflufen
Pentachlorophenol[1]	Pentanochlor	Penthiopyrad
Pentoxazone	Permethrin	Perthane
Pethoxamid	Phenkapton	Phenmedipham
Phenothiazine	Phenothrin	Phenthoate
Phenylphenol, o-	Phorate	Phosalone
Phosfolan	Phosmet	Phosphamidon
Phoxim	Phthalide	Picloram[1]
Picolinafen	Picoxystrobin	Pindone
Pinoxaden	Piperalin	Piperonyl butoxide
Piperophos	Pirimicarb	Pirimiphos ethyl
Pirimiphos methyl	Plifenate	Prallethrin
Pretilachlor	Probenazole	Prochloraz

Pesticides		
Procymidone	Prodiamine	Profenofos
Profluralin	Profoxydim	Prohydrojasmon
Promecarb	Prometon	Prometryn
Pronamide	Propachlor	Propamocarb
Propanil	Propaphos	Propaquizafop
Propargite	Propazine	Propetamphos
Propham	Propiconazole	Propisochlor
Propoxur	Propoxycarbazone	Proquinazid
Prosulfocarb	Prothioconazole	Prothiofos
Prothoate	Prynachlor	Pydiflumetofen
Pymetrozine	Pyracarbolid	Pyraclofos
Pyraclostrobin	Pyraflufen ethyl	Pyrazophos
Pyrazoxyfen	Pyrene	Pyrethrins
Pyribencarb	Pyributicarb	Pyridaben
Pyridalyl	Pyridaphenthion	Pyridate
Pyridinitril	Pyrifenox	Pyrifluquinazon
Pyriftalid	Pyrimethanil	Pyrimidifen
Pyriminobac-methyl	Pyriofenone	Pyriproxyfen
Pyroquilon	Pyroxasulfone	Quinalphos
Quinclorac[1]	Quinoclamine	Quinoxyfen
Quintozene	Quizalofop[1]	Quizalofop ethyl ester
Rabenzazole	Resmethrin	Ronnel
Rotenone	Saflufenacil	Salithion
Schradan	Sebuthylazine	Secbumeton
Sedaxane	Sethoxydim	Siduron
Silafluofen	Silthiofam	Simazine
Simeconazole	Simetryne	Spinetoram
Spinosad	Spirodiclofen	Spiromesifen
Spirotetramat	Spiroxamine	Sulfentrazone
Sulfluramid	Sulfotepp	Sulfoxaflor
Sulprofos	Swep	TCMTB
Tebuconazole	Tebufenozide	Tebufenpyrad
Tebupirimfos	Tebutam	Tebuthiuron
Tecnazene	Teflubenzuron	Tefluthrin
Temephos	TEPP	Tepraloxydim
Terbacil	Terbufos	Terbumeton
Terbuthylazine	Terbutryn	Tetraconazole
Tetradifon	Tetramethrin	Tetrasul
Thenylchor	Thiabendazole	Thiacloprid

Pesticides		
Thiamethoxam	Thiazopyr	Thidiazuron
Thifluzamide	Thiobencarb	Thiocyclam
Thiodicarb	Thiofanox	Thiometon
Thionazin	Thiophanate-methyl	Thioquinox
Tiadinil	Tioxazafen	Tolclofos methyl
Tolfenpyrad	Tolpyralate	Tolyfluanid
Tralkoxydim	Transfluthrin	Triadimefon
Triadimenol	Tri-allate	Triamiphos
Triapenthenol	Triazamate	Triazophos
Triazoxide	Tributoxy PO_4	Trichlamide
Trichlorfon	Trichloronat	Triclopyr[1]
Triclosan	Tricyclazole	Tridemorph
Tridiphane	Trietazine	Trifenmorph
Trifloxystrobin	Triflumizole	Triflumuron
Trifluralin	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	Valifenalate	Vamidothion
Vernolate	Vinclozolin	Zoxamide

[1]Acid herbicide included within the scope of the acid herbicides SRM.

[2]Glyphosate, glufosinate, and their degradants 3-(hydroxymethylphosphinyl)-propanoic acid and N-acetylglufosinate are within the scope of the glyphosate SRM.

[3]3,4-Dichloroaniline is a metabolite of multiple pesticides.

[4]BAM is a degradant of both fluopicolide and dichlobenil.

[5]Carbendazim is both a fungicide and a degradant of thiophanate methyl; it was reported under the category of thiophanate methyl in the 2015 and 2016 pesticide residue monitoring reports.

Appendix B. Analysis of Domestic Human Foods by Commodity Group in FY 2020

Commodity Group	Samples Analyzed (N)	Without Residues N (%)†	Violative Samples* N (%)†	Over Tolerance Violations (N)	No Tolerance Violations (N)
Totals - All Domestic Samples	**316**	**129 (40.8)**	**10 (3.2)**	**4**	**7**
Grains and Grain Products					
Corn and corn products	4	2 (50.0)	0	0	0
Oats and oat products	5	3 (60.0)	0	0	0
Rice and rice products	1	0	0	0	0
Soybeans and soybean products	3	1 (33.3)	0	0	0
Wheat and wheat products	4	1 (25.0)	0	0	0
Other grains and grain products	2	2 (100)	0	0	0
Group Subtotal	**19**	**9 (47.4)**	**0**	**0**	**0**
Milk/Dairy Products/Eggs	**0**	**0**	**0**	**0**	**0**
Fish/Shellfish/Other Aquatic Products	**0**	**0**	**0**	**0**	**0**
Fruits					
Apple fruit/juice	16	2 (12.5)	0	0	0
Apricot fruit/juice	1	0	0	0	0
Avocadoes	4	3 (75.0)	0	0	0
Cherry fruit/juice	5	0	0	0	0
Cranberry fruit/juice	5	4 (80.0)	0	0	0
Grapes fruit/juice, raisins	14	1 (7.1)	0	0	0
Orange fruit/juice	11	0	0	0	0
Peach fruit/juice	1	0	0	0	0
Pear fruit/juice	8	1 (12.5)	0	0	0
Raspberry fruit/juice	3	0	0	0	0
Strawberry fruit/juice	4	1 (25.0)	0	0	0
Other fruits/juices	14	8 (57.1)	0	0	0
Group Subtotal	**86**	**20 (23.3)**	**0**	**0**	**0**
Vegetables					
Asparagus	1	1 (100)	0	0	0
Broccoli	4	0	0	0	0
Cabbage	4	4 (100)	0	0	0
Carrots	8	2 (25.0)	0	0	0
Cauliflower	3	3 (100)	0	0	0
Celery	11	1 (9.1)	0	0	0

Commodity Group	Samples Analyzed (N)	Without Residues N (%)†	Violative Samples* N (%)†	Over Tolerance Violations (N)	No Tolerance Violations (N)
Cilantro	6	0	1 (16.7)	1	0
Corn	1	1 (100)	0	0	0
Cucumbers	1	0	0	0	0
Endive	3	0	1 (33.3)	0	1
Kale	5	1 (20.0)	0	0	0
Lettuce, head	4	3 (75.0)	0	0	0
Lettuce, leaf	3	1 (33.3)	0	0	0
Mushrooms and truffles	4	2 (50.0)	0	0	0
Onions/leeks/scallions/shallots	7	5 (71.4)	0	0	0
Peas (green/snow/sugar/sweet)	7	5 (71.4)	0	0	0
Peppers, hot	3	0	0	0	0
Peppers, sweet	2	1 (50.0)	0	0	0
Potatoes	10	1 (10.0)	0	0	0
Pumpkins	10	7 (70.0)	0	0	0
Radishes	2	2 (100)	0	0	0
Red beets	1	0	1 (100)	1	1
Spinach	4	0	0	0	0
Squash	5	2 (40.0)	0	0	0
String beans (green/snap/pole/long)	3	2 (66.7)	0	0	0
Sweet potatoes	8	3 (37.5)	0	0	0
Swiss chard	2	0	1 (50.0)	0	1
Tomatoes	6	2 (33.3)	0	0	0
Other bean and pea products	29	17 (58.6)	1 (3.4)	1	0
Other leaf and stem vegetables	7	1 (14.3)	2 (28.6)	1	1
Other root and tuber vegetables	3	0	2 (66.7)	0	2
Group Subtotal	**167**	**67 (40.1)**	**9 (5.4)**	**4**	**6**
Other Food Products					
Edible seeds and seed products	11	8 (72.7)	1 (9.1)	0	1
Refined oil	23	15 (65.2)	0	0	0
Other nuts and nut products	10	10 (100)	0	0	0
Group Subtotal	**44**	**33 (75.0)**	**1 (2.3)**	**0**	**1**

†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.

Appendix C. Analysis of Import Human Foods by Commodity Group in FY 2020

Commodity Group	Samples Analyzed (N)	Without Residues N (%)†	Violative Samples* N (%)†	Over Tolerance Violations (N)	No Tolerance Violations (N)
Totals - All Import Samples	**1,762**	**853 (48.4)**	**205 (11.6)**	**53**	**182**
Grains and Grain Products					
Barley and barley products	2	1 (50.0)	0	0	0
Breakfast cereals	3	2 (66.7)	0	0	0
Corn and corn products	4	3 (75.0)	0	0	0
Macaroni and noodles	11	7 (63.6)	1 (9.1)	0	1
Oats and oat products	5	4 (80.0)	0	0	0
Rice and rice products	133	67 (50.4)	30 (22.6)	10	29
Soybeans and soybean products	2	2 (100)	0	0	0
Wheat and wheat products	12	6 (50.0)	1 (8.3)	0	1
Other grains and grain products	9	6 (66.7)	1 (11.1)	1	0
Group Subtotal	**181**	**98 (54.1)**	**33 (18.2)**	**11**	**31**
Milk/Dairy Products/Eggs					
Eggs	1	1 (100)	0	0	0
Group Subtotal	**1**	**1 (100)**	**0**	**0**	**0**
Fish/Shellfish/Other Aquatic Products					
Aquaculture seafood	19	17 (89.5)	0	0	0
Fish and fish products	11	10 (90.9)	1 (9.1)	0	1
Shellfish and crustaceans	5	5 (100)	0	0	0
Group Subtotal	**35**	**32 (91.4)**	**1 (2.9)**	**0**	**1**
Fruits					
Ackees, lychees, longans	1	1 (100)	0	0	0
Apple fruit/juice	27	9 (33.3)	1 (3.7)	0	1
Apricot fruit/juice	17	9 (52.9)	0	0	0
Avocado fruit/juice	19	11 (57.9)	1 (5.3)	0	1
Bananas, plantains	6	2 (33.3)	0	0	0
Bitter melon	1	1 (100)	0	0	0
Blackberry fruit/juice	8	4 (50.0)	0	0	0
Blueberry fruit/juice	9	1 (11.1)	0	0	0
Breadfruit, jackfruit	15	10 (66.7)	4 (26.7)	0	4
Cherry fruit/juice	21	6 (28.6)	1 (4.8)	0	1
Cranberry fruit/juice	8	6 (75.0)	0	0	0

Commodity Group	Samples Analyzed (N)	Without Residues N (%)†	Violative Samples* N (%)†	Over Tolerance Violations (N)	No Tolerance Violations (N)
Currant fruit/juice	4	3 (75.0)	0	0	0
Date fruit/juice	22	14 (63.6)	6 (27.3)	1	6
Dragon fruit/juice	13	4 (30.8)	7 (53.8)	2	7
Fig fruit/juice	3	2 (66.7)	0	0	0
Grapes fruit/juice, raisins	22	8 (36.4)	2 (9.1)	1	1
Guava fruit/juice	4	0	2 (50.0)	0	2
Honeydew melon	1	0	0	0	0
Kiwi fruit/juice	9	5 (55.6)	0	0	0
Lemon fruit/juice	5	1 (20.0)	1 (20.0)	0	1
Lime fruit/juice	21	4 (19.0)	4 (19.0)	0	4
Mango fruit/juice	35	24 (68.6)	4 (11.4)	1	4
Nectarine fruit/juice	17	0	0	0	0
Olives	12	8 (66.7)	4 (33.3)	1	4
Orange fruit/juice	12	9 (75.0)	0	0	0
Papaya fruit/juice	24	2 (8.3)	1 (4.2)	0	1
Peach fruit/juice	13	0	1 (7.7)	0	1
Pear fruit/juice	25	5 (20.0)	0	0	0
Pineapple fruit/juice	18	5 (27.8)	2 (11.1)	0	2
Plum fruit/juice, prunes	16	5 (31.2)	1 (6.2)	0	1
Pomegranate fruit/juice	3	2 (66.7)	0	0	0
Prickly pear fruit/juice	1	0	1 (100)	0	1
Raspberry fruit/juice	21	1 (4.8)	2 (9.5)	0	2
Strawberry fruit/juice	36	10 (27.8)	3 (8.3)	0	3
Watermelon fruit/juice	1	1 (100)	0	0	0
Other berry fruit/juice	10	6 (60.0)	1 (10.0)	0	1
Other sub-tropical fruit/juice	6	3 (50.0)	2 (33.3)	1	2
Other fruits/juices	3	0	0	0	0
Fruit jams, jellies, preserves, syrups, toppings	5	3 (60.0)	1 (20.0)	0	1
Group Subtotal	**494**	**185 (37.5)**	**52 (10.5)**	**7**	**51**
Vegetables					
Artichokes	1	1 (100)	0	0	0
Asparagus	13	12 (92.3)	0	0	0
Bok choy and Chinese cabbage	15	1 (6.7)	3 (20.0)	0	3
Broccoli	7	6 (85.7)	0	0	0
Brussels sprouts	2	1 (50.0)	0	0	0
Cabbage	19	9 (47.4)	0	0	0

Commodity Group	Samples Analyzed (N)	Without Residues N (%)†	Violative Samples* N (%)†	Over Tolerance Violations (N)	No Tolerance Violations (N)
Carrots	26	15 (57.7)	1 (3.8)	0	1
Cassava	5	4 (80.0)	1 (20.0)	0	1
Cauliflower	20	17 (85.0)	0	0	0
Celery	20	4 (20.0)	2 (10.0)	0	2
Choyote	6	3 (50.0)	2 (33.3)	0	2
Cilantro	21	5 (23.8)	2 (9.5)	0	2
Collards	4	0	0	0	0
Corn	24	17 (70.8)	3 (12.5)	3	0
Cucumbers	26	4 (15.4)	1 (3.8)	0	1
Eggplant	10	3 (30.0)	1 (10.0)	0	1
Endive	4	2 (50.0)	0	0	0
Garbanzo beans	16	10 (62.5)	1 (6.2)	0	1
Garlic	1	1 (100)	0	0	0
Ginger	13	9 (69.2)	3 (23.1)	0	3
Kale	16	3 (18.8)	1 (6.2)	0	1
Kidney beans	4	3 (75.0)	0	0	0
Lettuce, head	8	5 (62.5)	0	0	0
Lettuce, leaf	7	2 (28.6)	1 (14.3)	0	1
Mung beans	24	16 (66.7)	1 (4.2)	1	0
Mushrooms/truffles/fungi	42	32 (76.2)	7 (16.7)	1	7
Mustard greens	1	0	1 (100)	1	1
Okra	16	8 (50.0)	2 (12.5)	1	1
Onions/leeks/scallions/shallots	51	25 (49.0)	12 (23.5)	3	11
Peas (green/snow/sugar/sweet)	44	19 (43.2)	6 (13.6)	1	5
Peppers, hot	64	10 (15.6)	14 (21.9)	4	11
Peppers, sweet	42	3 (7.1)	8 (19.0)	1	7
Potatoes	20	4 (20.0)	0	0	0
Pumpkins	1	1 (100)	0	0	0
Radishes	25	11 (44.0)	6 (24.0)	4	6
Red beets	1	0	1 (100)	0	1
Soybeans	6	4 (66.7)	1 (16.7)	1	0
Spinach	24	5 (20.8)	0	0	0
Squash	11	5 (45.5)	0	0	0
String beans (green/snap/pole/long)	31	9 (29.0)	6 (19.4)	5	3
Sweet potatoes	9	9 (100)	0	0	0
Taro/dasheen	30	24 (80.0)	6 (20.0)	0	6

Commodity Group	Samples Analyzed (N)	Without Residues N (%)†	Violative Samples* N (%)†	Over Tolerance Violations (N)	No Tolerance Violations (N)
Tomatoes/tomatillos	54	17 (31.5)	6 (11.1)	3	4
Vegetables, other, or mixed	16	12 (75.0)	0	0	0
Other bean/pea vegetables/products	50	31 (62.0)	5 (10.0)	4	2
Other leaf and stem vegetables	20	13 (65.0)	3 (15.0)	2	3
Other root and tuber vegetables	9	7 (77.8)	0	0	0
Group Subtotal	**879**	**402 (45.7)**	**107 (12.2)**	**35**	**87**
Other Food Products					
Beverages and beverage bases	2	1 (50.0)	0	0	0
Coconut and coconut products	4	4 (100)	0	0	0
Honey and honey products	15	14 (93.3)	0	0	0
Multi-ingredient foods (dinners, sauces, specialties)	2	2 (100)	0	0	0
Nuts, almonds	2	1 (50.0)	0	0	0
Nuts, cashews	3	3 (100)	0	0	0
Nuts, other and nut products	9	5 (55.6)	0	0	0
Nuts, peanuts and peanut products	1	0	0	0	0
Nuts, pecans	11	9 (81.8)	0	0	0
Oil, olive	40	36 (90.0)	3 (7.5)	0	3
Oil, vegetable	10	8 (80.0)	1 (10.0)	0	1
Seeds, edible and seed products	68	49 (72.1)	7 (10.3)	0	7
Spices	4	2 (50.0)	1 (25.0)	0	1
Other food products	1	1 (100)	0	0	0
Group Subtotal	**172**	**135 (78.5)**	**12 (7.0)**	**0**	**12**

†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.