Pesticide Monitoring Program

2009 Pesticide Report

U.S. Food and Drug Administration

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Foreword

This document is the 21st report summarizing the results of the U.S. Food and Drug Administration's (FDA) pesticide residue monitoring program. Eight of the twenty previous reports were published in the *Journal of the Association of Official Analytical Chemists and the Journal of AOAC International*; these presented results from fiscal years (FY) 1987 through 1994. Results from FY 1995 through FY 2008 were published on FDA's website at http://www.fda.gov/Food/FoodborneIllnessContaminants/Pesticides/default.htm. This report includes findings obtained during FY 2009 (October 1, 2008 through September 30, 2009) under regulatory monitoring along with selected Total Diet Study (TDS) findings.

In the early 1990s, FDA conducted comprehensive incidence and level monitoring studies of four major foods and published the results [1, 2]. Due to resource constraints, incidence and level monitoring for pesticide residues conducted by FDA's field laboratories, which was typically non-regulatory in nature, has been replaced in recent years by regulatory based "focused sampling." Incidence-and-level pesticide residue data are, however, provided by FDA's TDS program. The TDS program analyzes market baskets of about 300 foods four times per year.

This report includes findings obtained during FY 2009 (October 1, 2008 through September 30, 2009) under regulatory monitoring along with selected TDS findings. Results in this and earlier reports continue to demonstrate that levels of pesticide residues in the U.S. food supply are in compliance with EPA's permitted pesticide uses and tolerances.

FDA Monitoring Program

Three federal government agencies share responsibility for the regulation of pesticides. The U. S. Environmental Protection Agency (EPA) registers (*i.e.*, approves) the use of pesticides and establishes tolerances (the maximum amounts of residues that are permitted in or on a food) [3]. 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 is charged with enforcing tolerances in both imported foods and in domestic foods shipped in interstate commerce. FDA also acquires data on particular commodity and pesticide combinations by carrying out market basket surveys under the Total Diet Study. Since 1991, USDA's Agricultural Marketing Service (AMS) has carried out a pesticide residue testing program, called the Pesticide Data Program (PDP), directed at raw agricultural products and various processed foods through contracts with states to perform the sampling and analyses. FSIS and AMS report their pesticide residue data independently. Information about the PDP is available at http://www.ams.usda.gov/science/pdp/index.htm.

Regulatory Monitoring

FDA samples individual lots of domestically produced and imported foods and analyzes them for pesticide residues to enforce the tolerances established by EPA. Domestic samples are typically collected close to the point of production in the distribution system, i.e., growers, packers, and distributors. Import samples are collected at the point of entry into U.S. commerce. Emphasis is on the raw agricultural product, which is typically analyzed as the unwashed, whole (unpeeled), raw commodity. Processed foods are also included. If illegal residues are found at a level above an EPA tolerance or FDA enforcement level, or measurable levels of residues for which EPA has established no tolerance for a given food are found in domestic foods, the lot of food, as available, will be removed from commerce. FDA can also issue Warning Letters to the responsible growers and invoke other sanctions such as seizure or injunction to correct the cause of the violation. Imported shipments with illegal residues are refused entry into U.S. commerce. "Detention Without Physical Examination," or DWPE (previously called automatic detention), may be invoked for future imported lots of the commodity based on the finding of a single violative shipment. Congress has authorized FDA to refuse admission of regulated articles based on information, other than the results of examination of entries per se, that causes an article to appear to violate the Federal Food Drug and Cosmetic Act (FD&C Act). Entries of imported foods suspected of containing illegal pesticide residues from previous examination meet the criteria. DWPE can be applied to product from specific growers, manufacturers, or shippers, or to a geographic area or country if the problem is demonstrated to be sufficiently broad-based. FDA's Import Alerts, available at http://www.accessdata.fda.gov/cms_ia/ialist.html describe current DWPEs for pesticide 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 can have their product(s) removed from FDA DWPE by providing evidence establishing that the conditions that gave rise to the appearance of a violation have been resolved and that there is sufficient basis for the Agency to have confidence that future entries will be in compliance with the FD&C Act. A minimum of five consecutive non-violative commercial shipments, as demonstrated by providing FDA with acceptable reports of private laboratory analyses, can remove a grower’s, manufacturer’s, or shipper’s product from DWPE. Removal of a countrywide or geographic area DWPE 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(ies) in question.

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 recently generated state, USDA, and FDA analyses; available foreign pesticide usage data and regional intelligence on pesticide use; dietary significance of the food; volume of individual commodities of domestic food produced and entered into interstate commerce and of imported food offered for entry into the U.S.; the origin of imported food; and chemical characteristics and toxicity of the pesticide(s) used.

Analytical Methods and Pesticide Coverage

To analyze the large numbers of samples whose pesticide treatment history is usually unknown, FDA uses analytical methods capable of simultaneously determining a number of pesticide residues. These multi-residue methods (MRMs) can determine the majority of the approximately 400 pesticides with EPA tolerances, and many others that have no tolerances. The most commonly used MRMs can also detect many metabolites, impurities, and alteration products of pesticides [4].

Selective or single residue methods (SRMs) are also used to determine targeted pesticide residues in foods; a SRM determines one pesticide or a small number of selected pesticides and/or chemically related residues. SRMs are more resource intensive per residue and therefore employed more judiciously. A suspicion of a violation or a need to acquire residue data in select commodities will usually trigger use of these methods.

The lower limit of residue measurement in FDA's determination of a specific pesticide is usually well below tolerance levels. Tolerance levels generally range from 0.1 to 50 parts

per million (ppm). Residues present at 0.01 ppm and above are usually measurable; however, for individual pesticides, this limit may range from 0.005 to 1 ppm. Trace levels of pesticide residues are also reported. The term "trace" is used to indicate residues that are detected and positively identified at levels below the residue's limit of quantitation (LOQ) for the method employed.

FDA conducts ongoing research to update its pesticide 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. In recent years, newer extraction procedures and detection techniques have increasingly replaced older methods, allowing for a greater level of pesticide coverage.

FDA-State Cooperation

FDA field offices interact with their counterparts in many states to enhance the effectiveness of the Agency's pesticide monitoring program. Memoranda of Understanding and Partnership Agreements 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 also vary, stipulating how FDA and the state will jointly plan, share data, or divide the collecting, analyzing, and enforcing follow-up responsibilities for individual commodities or imported versus domestic products.

Animal Feeds

In addition to monitoring foods for human consumption, FDA also samples and analyzes domestic and imported animal feeds to detect pesticide residues. FDA's Center for Veterinary Medicine (CVM) directs this portion of the Agency's monitoring via its Feed Contaminants Compliance Program. Although animal feeds containing violative pesticide residues may present a potential hazard to a number of different categories of animals (e.g., laboratory animals, pets, wildlife, etc.), CVM's monitoring focuses on feeds for livestock and poultry animals that ultimately become or produce foods for human consumption.

International Activities

FDA pesticide residue monitoring activities are a part of the Agency's overall food safety programs. As such, they are subject to the responsibilities FDA has under international trade agreements to which the United States is signatory. The 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, as a part of the U.S. Government, 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 appropriate to the circumstances of the risk to human and animal 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, as part of the U.S. Government, is subject to obligations arising from several free trade agreements, the most notable of which is the North America Free Trade Agreement (NAFTA). These bilateral or multilateral free trade agreements contain provisions on sanitary measures that are consistent with the provisions of the WTO SPS Agreement. As with the WTO SPS Agreement, the sanitary provisions of these agreements include provisions relating to pesticide residues.

FDA maintains a number of arrangements with counterpart agencies in foreign governments. Such arrangements include Memoranda of Understanding (MOU), Confidentiality Agreements, and Exchanges of Letters. 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 also participates in meetings with counterpart food safety agencies of foreign governments. For example, FDA participates in the work of the quadrilateral discussions on food safety, comprising senior food safety officials from Australia, Canada, New Zealand, and the United States. FDA also carries out bilateral discussions on food safety with several countries, including Canada and Mexico; and meets regularly with the European Commission. Pesticide control programs and pesticide residue issues can be subjects for discussion at these meetings.

FDA participates in the work of international standards-setting organizations, particularly the work of the Codex Alimentarius Commission (Codex). Within Codex, FDA is an active participant in the work of the Codex Committee on Pesticide Residues.

Focused Sampling

FDA's pesticide monitoring program frequently includes what this report describes as "focused sampling." This approach is primarily regulatory in nature, with the necessary protocols followed to ensure enforcement action can be pursued if a violation is detected. Focused sampling is generally used to follow-up on suspected problem areas or to acquire residue data on select commodities not usually covered during regulatory monitoring. Focused sampling is carried out by short-term field assignments that require collection of specific commodities to be analyzed for pesticide residues using routine MRMs, or targeted residues of interest using SRMs.

Focused sampling differs from what was previously described in FDA's pesticide program as incidence and level monitoring. Incidence and level monitoring to obtain pesticide residue data was generally non-regulatory analyses of selected samples of commodities of interest, which at times was statistically based. Incidence and level monitoring typically required a follow-up collection and analysis of a regulatory sample to confirm a violation before an FDA enforcement action could ensue. However, due to resource constraints, incidence and level monitoring as done in the past by FDA has been replaced by focused sampling, except as considered below as part of FDA's TDS program.

FDA Total Diet Study

The TDS is distinct from regulatory monitoring in that it determines pesticide residues not in the raw commodity, but in foods that are prepared table-ready for consumption [5]. The sampled foods are washed, peeled, and/or cooked before analysis, simulating typical consumer handling.

TDS foods are sampled as "market baskets," with each market basket comprising samples of about 300 different foods that represent the average U.S. consumer's diet. Four regional market baskets are planned for each year and for each market basket, samples are collected in three different cities within the region. The three samples of each food are combined to form a single composite prior to analysis. In addition to being analyzed for pesticide residues, TDS foods are also selectively analyzed for toxic and nutrient elements, industrial chemicals, and other chemical contaminants. Additional information about the history and design of the TDS as well as analytical results can be found in several FDA publications [5,6,7,8,9,10,11] and on FDA's website (http://www.fda.gov/Food/FoodScienceResearch/TotalDietStudy/default.htm).

Another distinction from FDA's pesticide residue regulatory monitoring is that the TDS foods are analyzed using methods that are modified to permit enhanced measurement of residues, generally at levels up to 10–100 times more sensitive than regulatory monitoring procedures. TDS residue levels as low as 0.1 part per billion are routinely reported.

The TDS program is not regulatory in nature but considered incidence and level monitoring. However, when results are found that indicate a food contains a pesticide residue with no tolerance, or exceeds an existing tolerance or enforcement level, an investigation into the cause of the illegal residue typically ensues. The investigation will be conducted of the responsible manufacturer or grower for a domestic food. For foods of foreign origin, the investigation can involve the importer and foreign grower and manufacturer. The investigation may include subsequent regulatory sampling and analysis of the food or suspect ingredients.

FDA Pesticide Program Sampling Design

The goal of FDA's pesticide monitoring program is to carry out selective monitoring to achieve an adequate level of consumer protection. Most of the FDA samples are of the surveillance type; that is, there is no specific prior knowledge or evidence that a particular food shipment contains illegal residues. However, FDA's monitoring is not random because some bias is introduced primarily by emphasizing sampling of commodities and places of origin with a past history of violations, and to a lesser extent emphasizing larger-sized shipments.

For FY 2009, the import violation rate was 4.0 percent and the domestic violation rate was 1.4 percent. The FY 2009 violation rates are in-line with annual violation rates over the past dozen years which have ranged between 2.6–6.2 percent for imports and 0.7–2.4 percent for domestic foods.

In FY 1991, FDA contracted with the Research Triangle Institute (RTI) to design a statistical approach to conduct a residue study. The resulting report was entitled "Monitoring Pesticide Residues in Fresh Produce: A Probabilistic Approach." The report acknowledged that the program in 1991 (which was similar to FDA's current program except that sample totals were two to three times higher) was not a probability-based approach since it was not free of selection bias. A probabilistic approach described in the report would need to account for, among other elements, a high degree of consumption coverage (coverage of a significant portion of the commodity population), and seasonal and geographical representation. Also, to achieve a meaningful certainty level of confidence of about 95 percent, 800 data points, i.e., samples, of each import or domestic commodity would be necessary.

In FYs 1992 and 1994, FDA conducted "statistically-based" studies of four commodities [1, 2], adhering to as many of the tenets of the RTI report as was practical within available resources. The commodities tested were apples, pears, rice, and tomatoes. Domestically grown and imported products were separately tested. The conclusions of the studies corroborated the premise that when compared to a statistically based study, FDA's monitoring program provides a reasonably reliable estimate of pesticide residues in the U.S. food supply, especially when the data are viewed over many years, and that the levels of residues found are generally well below U.S. tolerances. However, because sampling levels and bias for particular imported or domestic commodities can vary significantly from year to year, FDA does not infer statistical significance to results within a fiscal year.

An important complement to FDA's pesticide program is its Total Diet Study Program previously discussed in this report. By its design, the TDS serves as an early warning system, capable of detecting many more pesticide residues and at much greater sensitivity when compared to FDA's regulatory program (FDA's regulatory program is designed to detect residues in violation of EPA tolerances).

Considering the above and coupled with available Agency resources, FDA has not attempted to develop a monitoring program that would be statistically based. FDA is willing to investigate whether such a program might be developed and implemented in a cost-effective manner. However, it is FDA's opinion that the current sampling levels, coupled with broad-based enforcement strategies for imports, are sufficient for FDA to achieve the program's main objective, i.e., adequate consumer protection by selective enforcement. As described previously, import enforcement strategies that are available to the Agency are DWPE for future entries of commodity/grower combinations that are found in violation of U.S pesticide tolerances, and country-wide DWPE of particular commodities if the violations are numerous and from multiple growers. Once a problem is identified, FDA can achieve broad enforcement by employing these strategies and detaining at their entry points the suspect imported foods. This procedure places the burden of demonstrating product compliance with U.S. residue tolerances on the importer before the entry can be released into domestic commerce.

Identification of Imports (Products or Countries) Requiring Special Attention or Additional Studies

Addressing products and countries that warrant special attention is best carried out by providing specific guidance (e.g., increased surveillance, focused sampling by means of field assignments) to the Agency field offices and laboratories under FDA's "Pesticides and Industrial Chemicals in Domestic and Imported Foods Compliance Program." FDA's sampling strategy of focusing on products that have a history of recurring violations will continue to be applied to future program coverage. Though specifics are provided in this report regarding import commodities and countries of origin that, based on FY 2009 data, may warrant special attention, FDA's sampling guidance provided to its field districts is typically based on multi-year data. FDA also utilizes available foreign pesticide usage data and data from USDA's PDP to develop sampling guidance. However, meaningful violative episodes that do occur are addressed in real-time as much as possible through use of the Import Alert system or enhanced sampling.

When attempting to compare FDA's import pesticide residue data against its domestic data, by product or by country, several factors should be considered:

- The import violation rate has typically been three to four times that of domestic foods. Based on FY 2009 data, the import sample violation rate was about three times that of domestic foods, 4.0 percent compared to 1.4 percent. It is not unexpected that many imported food products in this or previous reports have a violation rate exceeding that of their domestic counterparts, or for many foreign countries to have a violation rate exceeding that of the U.S.

- The data analysis by commodity in this report was compiled according to FDA product codes (i.e., distinct commodities). For FY 2009, 654 different import food commodities and 205 different domestic food commodities were tested.

- FDA's pesticide residue monitoring program should not be viewed as random or statistical, rather it is focused towards products and countries of origin that have a history of violations or are suspected of violations based on available intelligence.

Review by Commodity

Considering the above factors, the following criteria were applied to the FY 2009 data to select import commodities that may warrant special attention (this is the same criteria applied to the FY 2008 data and report):

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

Table 1 lists the import commodities that meet the criteria. The commodities are sorted by violation rate and include the total number of samples analyzed for FY 2009. Commodities reported under non-specific product codes (e.g., leaf and stem vegetables, not elsewhere classified) were excluded.

Table 1. Import Commodities That May Warrant Special Attention Based on FY 2009 Sampling Results

Commodity	Samples Analyzed (#)	Violation Rate (%)
Ginseng, herbal/botanical, not tea*	21	38
Spinach	34	18

*Commodity was on the FY 2008 table of import commodities warranting special attention.

Review by Country of Origin

Table 2 lists countries of origin with a minimum of 50 samples analyzed and a 7 percent or greater violation rate for FY 2009.

Table 2. Countries of Origin That May Warrant Special Attention Based on FY 2009 Sampling Results

Commodity	Samples Analyzed (#)	Violation Rate (%)
India	125	8.8
Peru	92	7.6

Note: Samples from Mexico continue to make up the greatest portion of FDA's import pesticide sampling. In FY 2009, 1928 samples from Mexico were analyzed. The violation rate for Mexican samples was 3.3 percent, somewhat below the 4.0 percent average for all import samples. Continued high coverage of Mexican foods is warranted due to the large volume of foods imported from Mexico. Additionally, 470 samples from China (mainland) were analyzed. The violation rate for samples from China was 5.5 percent. Continued high coverage of foods from China is also warranted based both on import volume and a higher than average violation rate (above the overall import violation rate).

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The database containing the FY 2009 data from which this report was derived is also available from FDA web at http://www.fda.gov/Food/FoodborneIllnessContaminants/Pesticides/default.htm. The 1996 through 2008 reports and databases are available on the same website. FDA pesticide monitoring data collected under the regulatory monitoring approach in 1992, 1993, 1994, and 1995 are available on personal computer diskettes and may be purchased from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161; (telephone 1-800-553-6847); or at http://www.ntis.gov. Order numbers are: 1992, PB94-500899; 1993, PB94-501681; 1994, PB95-503132; and 1995, PB96-503156.

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Results and Discussion

Regulatory Monitoring

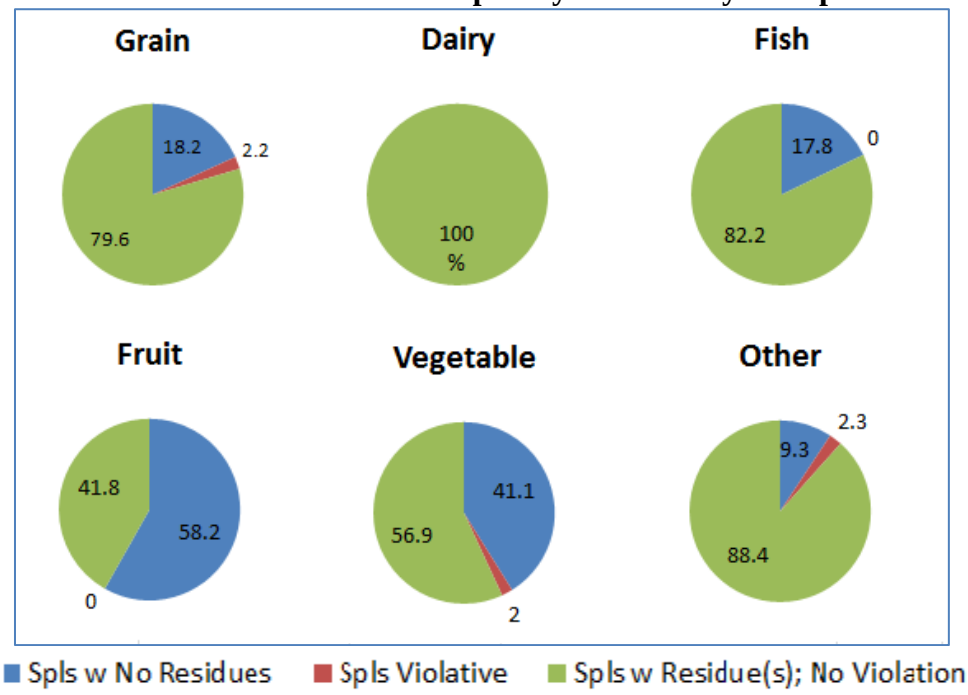
Discussion

Under regulatory monitoring, 5,581 samples were analyzed. Of these, 1,385 were domestic foods and 4,196 were imported foods.

Figure 1 shows the percentage of the domestic samples by commodity group with "No Residues Found," "Residues Found; No Violation," and "Violative" (a violative residue is defined in this report as a residue which exceeds an EPA tolerance or FDA enforcement level, or a residue at a level of regulatory significance for which no tolerance has been established in the sampled food.)

Domestic Sample Totals: Grains & Grain Products 93; Milk/Dairy/Eggs 3; Fish/Shellfish 73; Fruit 354; Vegetables 819; Other Foods 43.

Figure 1 - % Results of Domestic Samples by Commodity Group for FY 2009



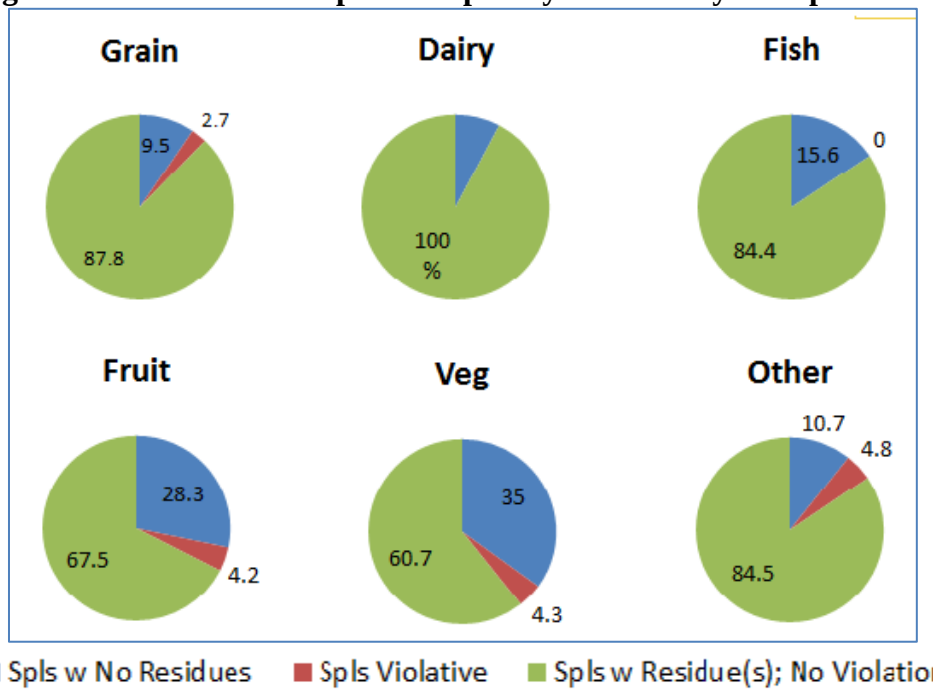
In FY 2009, 98.6 percent of all domestic foods analyzed by FDA were in compliance with EPA's established residue tolerances and FDA formal enforcement levels. The compliance rate for domestic foods for FYs 1996 to 2008 was between 97.6 percent and 99.3 percent. As in earlier years, fruits and vegetables accounted for the largest proportion of the domestic commodities analyzed in FY 2009, comprising 85 percent of the total number of domestic samples.

Appendix A contains more detailed data on domestic monitoring findings by commodity, including the total number of samples analyzed, the percent samples with no residues detected, and the percent of violative samples including the nature of the violation (over-tolerance vs. no-tolerance). Of the 1,385 domestic samples, 57.0 percent had no detectable residues and 1.4 percent had violative residues. In the largest commodity groups, fruits and vegetables, 41.8 percent and 56.9 percent of the samples, respectively, had no residues detected. No fruit samples and just 2.0 percent of the vegetable samples contained violative residues (figure 1). In the grains and grain products group, 79.6 percent of the samples had no residues detected, and 2.2 percent had violative residues. In the fish/shellfish/other aquatic products group, 82.2 percent had no detectable residues and there were no samples with violative residues. In the milk/dairy products/eggs group three samples were analyzed and all had no detectable residues. In the "Other" foods group that covers nuts, seeds, snack foods, and spices among other foods, 88.4 percent of the 43 samples analyzed had no detectable residues, and only one sample (2.3 %) was violative.

Findings by commodity group for the 4,196 import samples are shown in figure 2. Overall for all imported foods, 96.0 percent of the samples analyzed in FY 2009 were in compliance with EPA tolerances and FDA enforcement levels. This compares with a compliance rate for imported foods for FYs 1996 through 2008 of 94–98 percent. Fruits and vegetables accounted for 74 percent of import samples.

Import Sample Totals: Grains & Grain Products 188; Milk/Dairy/Eggs 26; Fish/Shellfish 243; Fruit 878; Vegetables 2,236; Other Foods 625.

Figure 2 - % Results of Import Samples by Commodity Group FY 2009



Appendix B contains detailed data on import samples. Of the 4,196 import samples analyzed, 68.5 percent had no residues detected, while 4.0 percent had violative residues. No residues were detected in 67.5 percent of imported fruit samples and 4.2 percent samples contained violative residues. Of the vegetable samples 60.7 percent of samples had no residues detected and 4.3 percent samples had violative residues. No residues were found in 92.3 percent of samples of the imported milk/dairy products/eggs group and no violations were detected. No residues were found in 84.4 percent of the imported fish/shellfish group and no violations were found in this food group. In the imported grains and grain products group, 87.8 percent had no detectable residues, and five samples (2.7 %) contained violative residues. In the "Other" foods group consisting largely of nuts, seeds, oils, honey, candy, spices, multiple food products, and dietary supplements, 84.5 percent of the samples analyzed had no residues detected, while 4.8 percent of the samples (mostly dietary supplements and spices) contained violative residues.

Pesticide monitoring data collected under FDA's regulatory monitoring approach in FY 2009 are available to the public as a computer database. This database summarizes FDA 2009 regulatory monitoring coverage and findings by country/commodity/pesticide combination. The database also includes monitoring data by individual sample from which the summary information was compiled. Information on how to obtain this database as well as those for 1992–2008 is provided in the acknowledgements section of this report.

Geographic Coverage

Domestic: A total of 1,385 domestic samples were collected in FY 2009 from 41 states 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 by State Origin

California	252	Michigan	34	Mississippi	12	Iowa	3
Florida	122	Wisconsin	30	Texas	11	North Carolina	3
Arizona	105	Ohio	28	Delaware	7	Hawaii	2
Minnesota	102	Colorado	25	Maine	6	Montana	2
New York	95	Indiana	25	New Jersey	6	Rhode Island	2
Washington	91	Missouri	24	Puerto Rico	5	Nebraska	1
Oregon	81	Maryland	23	North Dakota	5	Connecticut	1
Virginia	65	Pennsylvania	18	Guam	5	Alaska	1
Louisiana	59	Massachusetts	16	South Carolina	4	Vermont	1
Idaho	44	Georgia	13	South Dakota	4	Nevada	1
Illinois	36	Kansas	12	Kentucky	3		

No samples were collected from the District of Columbia, or from the states of Alabama, Arkansas, New Hampshire, New Mexico, Oklahoma, Tennessee, Utah, West Virginia, and Wyoming.

Imports: A total of 4,196 samples representing food shipments from 89 countries (excluding U.S. goods sampled in import status) were collected in FY 2009. Table 2 lists the number of samples collected from each country. Mexico, as in the past, was the source of the largest number of samples, reflecting the volume and diversity of commodities imported from that country, especially during the winter months. Table 2A lists the countries of origin that had less than ten samples collected in FY 2009.

Table 2. Import Samples Collected and Analyzed by Country of Origin

Mexico	1928	Dominican Republic	37	Colombia	15
China	470	Ecuador	36	El Salvador	15
Canada	412	Unspecified	35	Indonesia	13
India	125	South Korea	31	Israel	13
Guatemala	98	Italy	29	South Africa	12
Thailand	94	Costa Rica	26	Japan	12
Peru	92	Poland	24	Philippines	12
Chile	80	Belgium	22	Fiji	12
Turkey	69	Greece	20	Spain	11
Taiwan	53	Germany	20	Iran	11
Lebanon	48	Brazil	19	Syrian Arab Republic	10
Vietnam	48	Hong Kong SAR	18	Honduras	10
Argentina	39	Egypt	17		

Note: Unspecified samples consisted primarily of foods reported sampled in import status but of U.S origin, including U.S. goods returned (U.S. products originally exported and subsequently returned).

Table 2a. Fewer Than Ten Samples Were Collected and Analyzed From the Following Countries

Afghanistan	Ireland	Panama
Algeria	Jamaica	Portugal
Armenia	Jordan	Russia
Australia	Kazakhstan	Saudi Arabia
Bangladesh	Kenya	Serbia
Belize	Lithuania	Singapore
Bolivia	Malawi	Sri Lanka
Bosnia-Hercegovina	Malaysia	Switzerland
Bulgaria	Mongolia	Tanzania
Cameroon	Morocco	Togo
Dominica	Nepal	Tunisia
Falkland Islands	Netherlands	Ukraine
France	New Zealand	United Arab Emirates
Grenada	Nicaragua	United Kingdom
Guinea	Nigeria	Uruguay
Haiti	Norway	Vanuatu
Iceland	Pakistan	Venezuela

Domestic/Import Violation Rate Comparison for FY 2009

In FY 2009, 1385 domestic and 4,196 import samples were collected and analyzed. Pesticide residues were detected in 41.6 percent of the domestic samples and in 27.5 percent of the import samples. Violative residues were found in 1.4 percent of the domestic samples and 4.0 percent of the import samples. Among grains and grain products, the violation rate was 2.2 percent for domestic samples and 2.7 percent for imports. No violations were found in the milk/dairy products/eggs group or the fish/shellfish/other aquatic products/aquaculture seafood group for either domestic or import samples. No domestic fruit samples contained violative residues while 4.2 percent of imports did. For vegetables, 2.0 percent of domestic samples and 4.3 percent of import samples contained violative residues. In the category "Other" (mostly nuts, seeds, oils, honey, candy, spices, multiple food products, and dietary supplements), the violation rates for domestic and import samples were 2.3 percent and 4.8 percent, respectively. Imported dietary supplements, particularly ginseng, accounted for most of the samples with violative residues for the import "Other" foods group.

Of the 19 domestic violative samples, 17 were found to contain pesticide residues that have no published EPA tolerance or FDA enforcement level for the food commodity, i.e. "no-tolerance" violation. Three samples had pesticide residues that exceeded a tolerance/enforcement level, i.e. "over-tolerance" violation; one sample had both no-tolerance and over-tolerance violation. Of the 167 violative import samples, there were 159 no-tolerance and 14 exceeds tolerance violations; six commodities had both no-

tolerance and over-tolerance violations. FDA enforcement actions for products found in violation of EPA tolerances are described in the regulatory monitoring section of this report.

Pesticide Coverage

Table 3 lists the 462 pesticides that were detectable or found by the methods used in FY 2009; each of the 164 pesticides that were actually found is indicated by an asterisk (*). Residues not previously looked for or detected, are noted by a "ǂ".

Table 3. Pesticides Detectable and Found (*)

2,6-DIPN*ǂ	4-(dichloroacetyl)-1-oxa-4-azapiro 4.5 decane	Abamectinǂ
Acephate*	Acetamiprid*ǂ	Acetochlor
Acibenzolar-S-methyl	Acrinathrin	Alachlor
Alanycarbǂ	Aldicarb	Aldrin
Allethrin	Alpha cypermethrin	Ametryn*
Aminocarb	Amitraz	Anilazine
Aramite	Atrazine*	Azinphos ethyl
Azinphos-methyl*	Azoxystrobin*	Benalaxyl*ǂ
Bendiocarb	Benfluralin*	Benfuracarbǂ
Benodanil	Benomyl*	Benoxacor
Bensulide	Bentazon	Benzoximateǂ
Benzoylprop ethyl	BHC*	Bifenazate*
Bifenox	Bifenthrin*	Biphenyl*
Bitertanol	Boscalid*ǂ	Bromacil
Bromophos	Bromophos-ethyl	Bromopropylate*
Bromuconazole	Bufencarb*	Bulan
Bupirimate	Buprofezin*	Butachlor
Butafenacilǂ	Butocarboxim	Butoxycarboximǂ
Butralin	Butylate	Cadusafos
Captafol	Captan*	Carbaryl*
Carbendazim*	Carbetamide	Carbofuran*
Carbophenothion	Carbosulfan	Carboxin*
Chlorantraniliproleǂ	Chlorbenside	Chlorbromuron
Chlorbufam	Chlordane*	Chlordimeform
Chlorethoxyfos	Chlorfenapyr*	Chlorfenvinphos
Chlorfluazuronǂ	Chlorflurecol methyl	Chlormephos
Chlornitrofen	Chlorobenzilate	Chloroneb
Chloropropylate	Chlorothalonil*	Chlorotoluron
Chloroxuron	Chlorpropham*	Chlorpyrifos methyl*
Chlorpyrifos*	Chlorthiophos	Clethodimǂ
Clodinafop-propargyl	Clofentezine*ǂ	Clomazone
Cloquintocet-mexyl	Clothianidinǂ	CMNP
Compound K	Coumaphos	Crotoxyphos

Crufomate	Cyanazine	Cyanofenphos
Cyanophos	Cyazofamid‡	Cycloate*
Cycluron	Cyflufenamid‡	Cyfluthrin
Cyhalofop butyl ester*	Cymoxanil	Cypermethrin*
Cypermethrin, zeta	Cyprazine	Cyproconazole*
Cyprodinil*	Cyromazine‡	DCPA*
DDT*	DEF	Deltamethrin*
Demeton	Desmedipham‡	Desmetryn
Dialifor	Diallate	Diazinon*
Dichlobenil*	Dichlofenthion	Dichlofluanid
Dichlone	Dichlormid	Dichlorvos*
Diclobutrazol	Diclofop	Dicloran*
Dicofol*	Dicrotophos*	Dieldrin*
Diethatyl-ethyl	Diethofencarb‡	Difenoconazole*‡
Diflubenzuron*‡	Dilan	Dimethachlor*
Dimethametryn	Dimethoate*	Dimethomorph*‡
Dimoxystrobin‡	Dinitramine	Dinobuton
Dinotefuran‡	Dioxacarb*	Dioxathion
Diphenamid	Diphenylamine*	Disulfoton*
Diuron	Doramectin‡	Edifenphos
Emamectin benzoate‡	Endosulfan*	Endrin*
EPN	Epoxiconazole*	Eprinomectin‡
EPTC	Esfenvalerate*	Etaconazole
Ethaboxam‡	Ethalfluralin	Ethephon
Ethiofencarb	Ethiolate*	Ethion*
Ethiprole‡	Ethirimol‡	Ethofumesate
Ethoprop*	Ethoxyquin*	Etofenprox
Etoxazole	Etridiazole	Etrimfos
Famoxadone*‡	Famphur	Fenamidone*
Fenamiphos*	Fenarimol*	Fenazaquin*‡
Fenbuconazole*	Fenfuram	Fenhexamid*
Fenitrothion	Fenobucarb*	Fenoxycarb
Fenpropathrin*	Fenpropimorph	Fenpyroximate, e-‡
Fensulfothion	Fenthion	Fenuron
Fenvalerate*	Fipronil*	Flamprop-methyl
Flamprop-m-isopropyl	Flonicamid‡	Fluazifop butyl ester
Fluazinam	Flubendiamide‡	Fluchloralin
Flucythrinate	Fludioxonil*	Flufenoxuron‡
Fluometuron	Fluoxastrobin‡	Fluquinconazole‡
Fluridone*‡	Fluroxypyr meptyl*‡	Flusilazole*
Flutolanil*	Flutriafol‡	Fluvalinate*
Folpet*	Fonofos	Forchlorfenuron
Formetanate	Formothion	Fosthiazate
Fuberidazole	Furathiocarb‡	Furilazole
Gardona	Halofenozide‡	Heptachlor*

Heptenophos	Hexachlorobenzene*	Hexaconazole*
Hexaflumuron‡	Hexazinone	Hexythiazox*
Hydramethylnon*‡	IBP	Imazalil*
Imazamethabenz methyl	Imidacloprid*‡	Indoxacarb
Ipconazole‡	Iprodione*	Iprovalicarb‡
Isazofos	Isocarbamid*	Isofenphos
Isoprocarb*	Isopropalin	Isoprothiolane*
Isoproturon	Isoxaflutole	Ivermectin‡
Kresoxim-methyl	Lambda-cyhalothrin*	Lenacil
Leptophos	Lindane*	Linuron*
Lufenuron‡	Malathion*	Mandipropamid‡
Mecarbam	Mepanipyrim‡	Mephosfolan
Merphos	Metaflumizone*	Metalaxyl*
Metaldehyde*	Metazachlor	Metconazole‡
Methabenzthiazuron	Methamidophos*	Methidathion*
Methiocarb*	Methomyl*	Methoprotryne
Methoxychlor*	Methoxyfenozide‡	Metobromuron
Metolachlor	Metolcarb	Metribuzin*
Mevinphos*	Mexacarbate‡	MGK 264*
Mirex	Molinate	Monocrotophos*
Moxidectin‡	Myclobutanil*	Naled
Napropamide	Neburon	Nitenpyram‡
Nitralin	Nitrapyrin	Nitrofen
Nitrofluorfen	Nitrothal-isopropyl	Norea
Norflurazon	Novaluron*	Nuarimol
Octhilinone	Octyldiphenyl Phosphate*	Ofurace
Omethoate*	Ovex	Oxadiazon
Oxadixyl*	Oxamyl	Oxydemeton-methyl
Oxyfluorfen	Paclobutrazol	Parathion
Parathion methyl*	PCBs*	Pebulate
Penconazole*	Pencycuron‡	Pendimethalin*
Permethrin*	Perthane	Phenmedipham
Phenothrin	Phenthoate	Phenylphenol, o-*
Phorate*	Phosalone*	Phosmet*
Phosphamidon	Phoxim	Picoxystrobin‡
Piperonyl butoxide*	Piperophos	Pirimicarb*
Pirimiphos ethyl	Pirimiphos methyl*	Pretilachlor
Prochloraz*	Procyazine	Procymidone*
Profenofos*	Profluralin	Prolan
Promecarb	Prometon	Prometryn*
Pronamide*	Propachlor	Propamocarb*‡
Propanil*	Propargite*	Propazine
Propetamphos	Propham*	Propiconazole*
Propoxur	Prothiofos	Prothoate

Pymetrozine‡	Pyracarbolid	Pyraclostrobin*
Pyrazon	Pyrazophos	Pyrethrins
Pyridaben*	Pyridaphenthion	Pyrifenox
Pyrimethanil*	Pyriproxyfen*	Quinalphos*
Quinoxyfen*	Quintozene*	Quizalofop ethyl
Resmethrin*‡	Ronnel	Rotenone‡
Salithion	Schradan	Secbumeton
Sethoxydim	Siduron‡	Simazine*
Simetryne	Spinetoram‡	Spinosad*‡
Spirodiclofen*	Spiromesifen*‡	Spirotetramat‡
Spiroxamine‡	Strobane	Sulfallate
Sulfentrazone‡	Sulfotepp	Sulphenone
Sulprofos	TCNA	Tebuconazole*
Tebufenozide‡	Tebufenpyrad*‡	Tebupirimfos
Tebutam‡	Tebuthiuron	Tecnazene*
Teflubenzuron‡	Tefluthrin*	Temephos‡
TEPP	Terbacil	Terbufos
Terbumeton	Terbuthylazine	Terbutryn
Tetraconazole	Tetradifon*	Tetramethrin*‡
Tetrasul	Thiabendazole*	Thiacloprid
Thiamethoxam*	Thiazopyr	Thidiazuron‡
Thiobencarb	Thiometon	Thionazin
Thiophanate-methyl*‡	Tolclofos methyl‡	Tolylfluanid
Toxaphene	Tralkoxydim	Tralomethrin
Tranid	Tri(butoxyethyl) phosphate*	Triadimefon*
Triadimenol*	Tri-allate	Triazophos*
Trichlorfon	Tricyclazole*	Tridiphane
Trietazine	Trifloxystrobin*‡	Triflumizole*
Triflumuron‡	Trifluralin*	Triflusulfuron methyl ester
Trimethacarb	Triphenyl PO4	Tris(chloropropyl) phosphate*
Triticonazole‡	Vamidothion	Vernolate
Vinclozolin*	XMC	Zoxamide

Animal Feeds

In fiscal year 2009, a total of 328 animal feed samples (171 domestic and 157 import) were analyzed for pesticides by the FDA (table 4). Of the 171 domestic samples, 126 (73.7 %) contained no detectable residues, 43 (25.1 %) contained one or more detectable residues that did not exceed regulatory guidance, and 2 (1.2 %) contained a residue which exceeded regulatory guidance. Of the 157 import samples, 128 (81.5 %) contained no detectable pesticide residues, and 29 (18.5 %) contained one or more detectable residues that did not exceed regulatory guidance. None of the import samples analyzed for pesticides had levels in excess of regulatory guidance.

During FY 2009 two domestic samples were found to contain residues for which no tolerance was established for the commodity in 40 CFR 180. A surveillance sample of dehydrated alfalfa pellets from Kansas contained 0.099 ppm bifenthrin and a sample of swine feed from Washington state contained 0.056 ppm chlorpropham.

Table 4. Summary of the 328 Animal Feed Samples (171 Domestic and 157 Imported) Analyzed for Pesticides

Type of Feed	Samples Analyzed #	Samples With No Pesticide Residues #	Samples With No Pesticide Residues %	Samples Exceeding Regulatory Guidance #	Samples Exceeding Regulatory Guidance %
Whole/Ground Grains	102	91	89	0	0
Plant By-product	79	67	85	0	0
Mixed Feed Rations	104	59	57	1	1.0
Hay/Hay Products	10	8	80	1	10
Supplements/Misc.	24	21	88	0	0
Animal By-products	9	8	89	0	0
TOTAL	328	254	77	2	0.6

Of the 45 domestic samples with positive pesticide screen results, a total of 57 residues were detected (52 quantifiable, 5 trace); whereas among the import samples, 29 contained 42 residues (27 quantifiable, 15 trace). Ethoxyquin and malathion were the most frequently found and together accounted for 56 percent of all pesticide residues detected (table 5).

Table 5. Pesticides Most Commonly Reported in Samples of Animal Feeds

Pesticide	Total # of Samples	Quantifiable Samples	Range* (ppm)	Median* (ppm)
Ethoxyquin	31	31	0.044 – 86.0	1.52
Malathion	22	20	0.008 – 0.57	0.056
Biphenyl	5	0		
Chlorpyrifos methyl	4	4	0.017 – 0.075	0.029
Lambda cyhalothrin	4	2	0.030 – 0.076	0.053
Permethrin (cis+trans)	3	2	0.075	0.075
Piperonyl butoxide	3	3	0.001 – 0.703	0.636
Pirimiphos methyl	3	3	0.419 – 10.61	0.475
Bifenthrin	2	1	0.099	
Fenvalerate	2	0		
Tribuphos	2	2	0.52 – 0.54	0.53

**For samples containing quantifiable levels of pesticides. The other 18 contaminants not listed were each identified in a single sample.*

Focused Sampling

As previously described, FDA conducts "focused sampling" by means of short-term, regulatory-based field assignments. During FY 2009, FDA issued a pesticide-related field assignment "Sample Collection and Analysis of Imported Dietary Supplement and Botanical Products for Pesticides and Toxic Elements." The assignment began in January 2009 and collections and analyses continued into FY 2010. In FY 2009, FDA collected and analyzed samples of the following imported dietary supplement products: Astragalus membranaceous Bunge (Astragalus), Curcuma longa L. (common name turmeric), Lagerstroemia speciosa L. (Banaba extract), Morinda citrifolia L. (Noni), Senna Alexandria Mill. (Senna),), Vaccinium Myrtillus (Bilberry), and Witharin sommifera L. (Ashwagandha).

The imported supplement products to be collected were to be dried, ground or powdered plant products (i.e., root, leaves, whole plant), or packaged or bulk dietary supplements such as capsules and tablets.

Results:

- Astragalus membranaceous Bunge: Eleven samples all from China; no pesticide residues found.
- Curcuma longa L.: Three samples, two from China and one from Pakistan; no pesticide residues found in all samples.
- Lagerstroemia speciosa L.: Two samples from India; no pesticide residues found.
- Morinda citrifolia L.: Two samples from India; no pesticide residues found.

- Senna Alexandria Mill: Twelve samples, 10 from India, one each from Canada and Germany; no pesticide residues found in ten samples, one sample from India contained very low residues of biphenyl and diphenylamine, and the sample from Canada contained a trace level of DDT.
- Vaccinium Myrtillus: Three samples from China; no pesticide residues found
- Witharin sommifera L. (Ashwagandha): One sample from India; no pesticide residues found.

Total Diet Study

Of the more than 300 chemicals that can be detected by the analytical methods used in FDA's Total Diet Study, residues of 102 individual compounds were found in the foods analyzed in the four market baskets reported for FY 2009 (Market Baskets 08-4, 09-1, 09-2, and 09-3). The 102 individual compounds consisted of 82 parent pesticides and 20 related compounds (e.g., isomers, metabolites, degradation products) that are added to the parent pesticide for reporting and enforcement purposes.

Table 6 lists the most frequently found residues in the TDS foods other than infant and toddler foods (those found in 2% or more of the samples), the total number of findings, and the percent occurrence in the four market baskets analyzed in FY 2009 (916 total samples). The five most frequently observed chemicals were DDT, malathion, endosulfan, dieldrin, and chlorpyriphos-methyl. Four of these 5 pesticides are the same as those observed for the past several years; the incidence of chlorpyriphos methyl surpassed quintozene in FY 2009 as the fifth most commonly found pesticide. The levels of these and other residues listed in Table 6 were typically below regulatory limits.

Table 6. Pesticide Residues Occurring in Foods, Other Than in Infant Formula and Toddler Foods, Under the Total Diet Study in FY 2009 [1]

Pesticide[2]	Total No. of Findings	Occurrence, %	Range, ppm
DDT	201	22	0.0001-0.049
Malathion	108	12	0.0002-0.046
Endosulfan	89	10	0.0001-0.037
Dieldrin	83	9	0.0001-0.008
Chlorpyrifos methyl	79	9	0.0001-0.027
Chlorpyrifos	66	7	0.0001-0.086
Chlorpropham	63	7	0.0002-2.141
Carbaryl[3]	63	7	0.0001-0.117
Quintozene	54	6	0.0001-0.0204
Hexachlorobenzene	49	5	0.0001-0.0007
Permethrin	36	4	0.0003-3.590
Thiabendazole[4]	30	3	0.005-0.406
Phenylphenol, o-	30	3	0.002-0.733
Boscalid	23	3	0.0005-0.034
Pirimiphos methyl	20	2	0.0006-0.020
Cypermethrin	20	2	0.0005-0.297
Pyrimethanil	18	2	0.002-0.558
Methomyl[3]	18	2	0.0001-0.100
Piperonyl butoxide	15	2	0.002-0.079
Bifenthrin	14	2	0.0005-0.339
Lambda-cyhalothrin	14	2	0.001-0.014

[1] Based upon 4 market baskets consisting of 916 total items.
[2] Isomers, metabolites, and related compounds are included with the 'parent' pesticide
[3] Reflects overall incidence; however, only 82 selected foods per market basket (i.e. 328 items total) were analyzed for N-methylcarbamates.
[4] Reflects overall incidence; however, only 67 selected foods per market basket (i.e. 268 items total) were analyzed for Benzimidazole fungicides.

The TDS program also collects and analyzes infant and toddler foods. Table 7 provides the frequency of occurrence of the pesticide residues that were found in 2 percent or more of these samples in the four collections of infant and toddler foods (203 samples total) in FY 2009 and the range of levels found. The results for FY 2009 are very consistent with those from FY 2008 and similar to those from earlier years.

Table 7. Pesticide Residues Occurring in Infant and Toddler Foods Under the Total Diet Study in FY 2009 [1]

Pesticide[2]	Total No. of Findings	Occurence, %	Range, ppm
Carbaryl[3]	54	27	0.0001-0.077
Thiabendazole[4]	27	13	0.001-0.085
DDT	24	12	0.0001-0.003
Captan	22	11	0.020-0.161
Chlorpyrifos	19	9	0.0001-0.012
Ethylenethiourea[5]	17	8	0.002-0.028
Benomyl[d]	17	8	0.010-0.101
Chlorpropham	17	8	0.001-0.079
Endosulfan	14	7	0.0001-0.0061
Malathion	11	5	0.002-0.049
Lambda-cyhalothrin	10	5	0.001-0.005
Permethrin	9	4	0.0007-0.012
Dieldrin	7	3	0.0001-0.001
Chlorpyrifos methyl	7	3	0.0002-0.030
Biphenyl	5	2	0.001-0.009
Pyrimethanil	5	2	0.003-0.015
Phenylphenol, o-	5	2	0.004-0.024
Diphenylamine	5	2	0.008-0.023
Bifenthrin	5	2	0.0008-0.004
Boscalid	5	2	0.0007-0.003
Methamidophos	4	2	0.007-0.034
Fenvalerate	4	2	0.003-0.012
Piperonyl butoxide	4	2	0.015-0.029
Acephate	4	2	0.003-0.034
Quintozene	4	2	0.0001-0.0007
Oxamyl[3]	4	2	0.0001-0.0008
Quinclorac[6]	4	2	0.002-0.004
Dicloran	4	2	0.0004-0.004

[1] Based upon 4 market baskets consisting of 203 total items.
[2] Isomers, metabolites, and related compounds are included with the 'parent' pesticide.
[3] Reflects overall incidence; however, only 34 selected foods per market basket (i.e. 136 items total) were analyzed for N-methylcarbamates.
[4] Reflects overall incidence; however, only 34 selected foods per market basket (i.e. 136 items total) were analyzed for Benzimidazole fungicides.
[5] Reflects overall incidence; however, only 29 selected foods per market basket (i.e. 116 items total) were analyzed for Ethylenethiourea.
[6] Reflects overall incidence; however, only 6 selected foods per market basket (i.e. 24 items total) were analyzed for Chlorophenoxy acid herbicides.

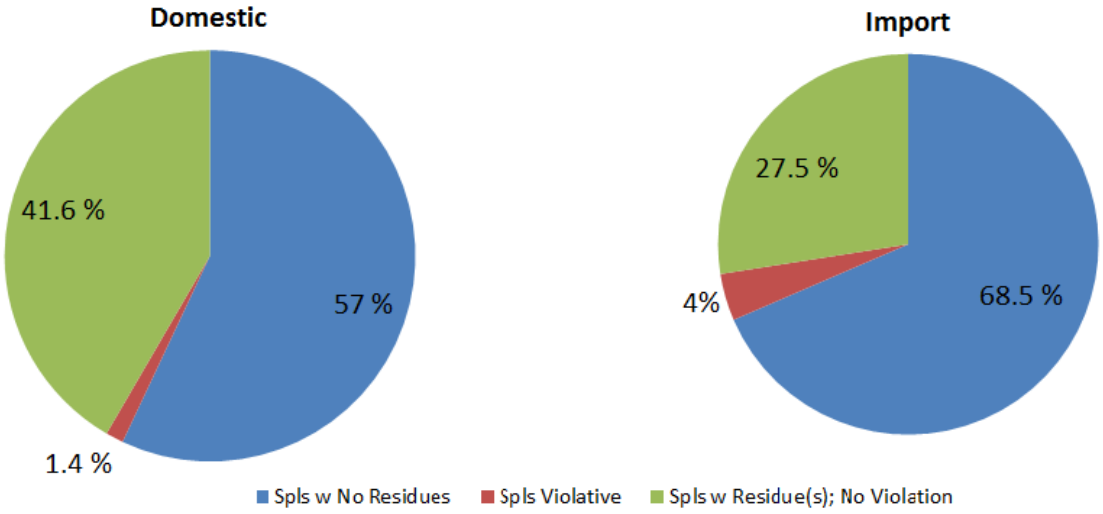
Summary

Regulatory Monitoring – FY 2009

A total of 5,581 samples of both domestically produced and imported food from 89 countries were analyzed for pesticide residues in FY 2009. No residues were found in 57.0 percent of domestic and 68.5 percent of import samples (figure 3) analyzed under FDA's regulatory monitoring approach in FY 2009. Only 1.4 percent of domestic and 4.0 percent of import samples had residue levels that were violative. The findings for FY 2009 demonstrate that pesticide residue levels in foods are generally well below EPA tolerances, corroborating results presented in earlier reports.

FDA also collected and analyzed 171 domestic and 157 imported animal feed samples for pesticides. No residues were found in 73.7 percent of the domestic feed samples and in 81.5 percent of the import feed samples. Two domestic feed samples and no imported feed samples had residue findings for which no EPA or FDA acceptable levels have been established.

Figure 3. Summary of Results of Domestic vs. Import Samples (Spls)



Total Diet Study

In FY 2009, the types of pesticide residues found and their frequency of occurrence in TDS were generally consistent with those given in previous FDA reports. The pesticide residue levels found were well below regulatory standards. Results of baby foods tested in FY 2009 (and earlier years) also provide evidence of only low levels of pesticide residues in these foods.

Appendices

A. Analysis of Domestic Samples by Commodity Group in 2009

Commodity Group	Samples Analyzed (#)	Without Residues (%)	Violative Samples And Types: Samples (%)	Over Tolerance (#)	No Tolerance (#)
Grains and Grain Products					
Barley & barley products	1	100	0	0	0
Corn & corn products	14	71	0	0	0
Oats & oat products	3	100	0	0	0
Rice & rice products	25	84	0	0	0
Wheat & wheat products	31	77	3.2	1	0
Soybeans and soybean grain products	1	100	0	0	0
Other grains & grain products	6	67	17	0	1
Macaroni & noodles	1	100	0	0	0
Breakfast cereals	2	100	0	0	0
Bakery products, crackers, etc.	9	78	0	0	0
Subtotal	**93**	**79.6**	**2.2**	**1**	**1**
Milk/Dairy Products/Eggs					
Cheese & cheese products	0	0	0	0	0
Eggs	1	100	0	0	0
Milk/cream & milk products	2	100	0	0	0
Subtotal	**3**	**100**	**0**	**0**	**0**
Fish/Shellfish/Other Aquatic Products					
Fish and Fish Products	40	85	0	0	0
Shellfish & Crustaceans	7	100	0	0	0
Aquaculture seafood	25	72	0	0	0
Other Aquatic Animals & Products	1	100	0	0	0
Subtotal	**73**	**82.2**	**0**	**0**	**0**
Fruits					
Blackberries	1	0	0	0	0
Blueberries	11	73	0	0	0
Cranberries	11	18	0	0	0
Grapes, raisins	15	40	0	0	0
Raspberries	10	20	0	0	0

Commodity Group	Samples Analyzed (#)	Without Residues (%)	Violative Samples And Types: Samples (%)	Over Tolerance (#)	No Tolerance (#)
Strawberries	24	13	0	0	0
Grapefruit	2	100	0	0	0
Lemons	4	0	0	0	0
Oranges	37	38	0	0	0
Other citrus fruit	2	0	0	0	0
Apples	93	44	0	0	0
Pears	9	22	0	0	0
Other pome fruit	0	0	0	0	0
Apricots	6	0	0	0	0
Avocadoes	11	100	0	0	0
Cherries	11	0	0	0	0
Nectarines	13	38	0	0	0
Peaches	35	40	0	0	0
Plums/prunes	7	43	0	0	0
Papaya	0	0	0	0	0
Pineapple	1	0	0	0	0
Other sub-tropical fruit	5	80	0	0	0
Cantaloupe	17	65	0	0	0
Watermelon	4	100	0	0	0
Other melons	5	40	0	0	0
Other fruits/fruit products	6	17	0	0	0
Apple juice	10	90	0	0	0
Citrus juice	0	0	0	0	0
Other fruit juices	3	100	0	0	0
Processed fruit (jellies, toppings, fillings)	1	100	0	0	0
Subtotal	**354**	**41.8**	**0**	**0**	**0**
Vegetables					
Corn	40	98	0	0	0
Bean sprouts	0	0	0	0	0
Peas (green/snow/sugar/sweet)	19	95	0	0	0
String beans (green/snap/pole/long)	34	56	3	0	1
Other beans & peas & products	27	74	4	0	1
Cucumbers	27	70	0	0	0
Eggplant	10	80	10	0	1
Okra	5	40	0	0	0
Peppers, hot	9	78	0	0	0
Peppers, sweet	22	68	0	0	0

Commodity Group	Samples Analyzed (#)	Without Residues (%)	Violative Samples And Types: Samples (%)	Over Tolerance (#)	No Tolerance (#)
Pumpkins	1	0	0	0	0
Squash	41	51	0	0	0
Tomatoes	41	73	0	0	0
Asparagus	3	100	0	0	0
Bok choy	2	0	0	0	0
Broccoli	12	75	0	0	0
Cabbage	29	79	0	0	0
Cauliflower	6	100	0	0	0
Celery	28	7	0	0	0
Collards	19	42	0	0	0
Endive	5	20	0	0	0
Kale	32	44	9	0	3
Lettuce, head	24	42	0	0	0
Lettuce, leaf	73	21	3	0	2
Mustard greens	7	57	0	0	0
Spinach	27	19	0	0	0
Swiss chard	11	36	18	0	2
Watercress	0	0	0	0	0
Other leaf & stem vegetables	53	40	6	1	3
Mushrooms and Truffles	16	94	0	0	0
Carrots	30	50	0	0	0
Onions/leeks/scallions/shallots	29	72	0	0	0
Parsnips	4	25	25	0	1
Potatoes	43	63	0	0	0
Radishes	8	75	13	0	1
Red beets	4	50	0	0	0
Sweet potatoes	24	58	0	0	0
Turnips	5	80	0	0	0
Other root & tuber vegetables	7	100	0	0	0
Other vegetables/vegetable products	42	74	2	1	0
Subtotal	**819**	**56.9**	**2.0**	**2**	**15**
Other					
Peanuts & peanut products	1	100	0	0	0
Almonds	9	100	0	0	0
Coconut	0	0	0	0	0
Other nuts	1	100	0	0	0

Commodity Group	Samples Analyzed (#)	Without Residues (%)	Violative Samples And Types: Samples (%)	Over Tolerance (#)	No Tolerance (#)
Refined oil	0	0	0	0	0
Edible seeds & seed products	1	100	0	0	0
Basil	3	67	33	0	1
Other spices	3	0	0	0	0
Water & ice	1	100	0	0	0
Beverages & beverage base	2	100	0	0	0
Honey	0	0	0	0	0
Confections	0	0	0	0	0
Miscellaneous foods	8	100	0	0	0
Feed/Animal Byproducts	14	93	0	0	0
Other products	0	0	0	0	0
Subtotal	**43**	**88.4**	**2.3**	**0**	**1**
Totals - All Domestic Samples	**1385**	**57.0**	**1.4**	**3**	**17**

B. Analysis of Import Samples by Commodity Group in 2009

Commodity Group	Samples Analyzed (#)	Without Residues (%)	Violative Samples And Types: Samples (%)	Over Tolerance (#)	No Tolerance (#)
Grains and Grain Products					
Barley & barley products	7	71	0	0	0
Corn & corn products	17	94	0	0	0
Oats & oat products	3	100	0	0	0
Rice & rice products	38	84	5.3	0	2
Wheat & wheat products	28	82	0	0	0
Soybeans & soybean products	10	90	10	0	1
Other grains & grain products	22	86	0	0	0
Macaroni & noodles	28	89	3.6	0	1
Bakery products, doughs, crackers	31	94	3.2	0	1
Breakfast cereals	3	100	0	0	0
Snack foods	1	100	0	0	0
Subtotal	**188**	**87.8**	**2.7**	**0**	**5**
Milk/Dairy Products/Eggs					
Cheese & cheese products	4	100	0	0	0
Eggs (includes duck & quail)	10	90	0	0	0
Milk/cream & milk products	12	92	0	0	0
Subtotal	**26**	**92.3**	**0**	**0**	**0**
Fish/Shellfish/Other Aquatic Products					
Fish and fish products	141	87	0	0	0
Shellfish & crustaceans	36	86	0	0	0
Aquaculture seafood	65	78	0	0	0
Other aquatic animals & products	1	100	0	0	0
Subtotal	**243**	**84.4**	**0**	**0**	**0**
Fruits					
Blackberries	42	62	0	0	0
Blueberries	26	65	0	0	0
Cranberries	12	67	8.3	0	1
Currants	2	0	0	0	0
Grapes, raisins	43	44	7	0	3
Raspberries	39	64	0	0	0
Strawberries	65	49	1.5	0	1
Other berries	10	60	20	0	2

Commodity Group	Samples Analyzed (#)	Without Residues (%)	Violative Samples And Types: Samples (%)	Violative Samples And Types: Over Tolerance (#)	Violative Samples And Types: No Tolerance (#)
Clementines	3	0	0	0	0
Grapefruit	0	0	0	0	0
Lemons	0	0	0	0	0
Limes	19	84	5.3	0	1
Oranges	6	50	0	0	0
Other citrus fruit	7	71	14	0	1
Apples	24	50	4.2	0	1
Pears	9	56	0	0	0
Prickle pear	7	86	14	0	1
Other pome/core fruit	0	0	0	0	0
Apricots	8	88	0	0	0
Avocadoes	19	95	0	0	1
Cherries	30	63	3.3	0	1
Dates	17	71	18	0	3
Nectarines	2	50	0	0	0
Olives	35	86	5.7	0	2
Peaches	10	90	0	0	0
Plums/Prunes	3	100	0	0	0
Other pit fruit	3	100	0	0	0
Ackees, lychees, longans	7	100	0	0	0
Bananas, plantains	29	76	0	0	0
Breadfruit, jackfruit	7	86	14	0	1
Figs	6	67	17	0	1
Guavas	6	67	0	0	0
Kiwi fruit	6	50	0	0	0
Mangoes	39	79	0	0	0
Papaya	84	54	10	0	9
Pineapple	25	56	4.0	0	1
Pepinos	1	0	100	0	1
Other sub-tropical fruit	16	75	0	0	0
Bitter melon	10	50	0	0	0
Cantaloupe	3	67	0	0	0
Honeydew	5	40	0	0	0
Watermelon	8	75	0	0	0
Other melons/vine fruit	6	50	17	0	1
Pomegranate	2	50	0	0	0
Mixed fruits	3	33	0	0	0

Commodity Group	Samples Analyzed (#)	Without Residues (%)	Violative Samples And Types: Samples (%)	Over Tolerance (#)	No Tolerance (#)
Berry juice	24	79	4.2	0	1
Citrus juice	9	89	0	0	0
Apple juice	22	82	0	0	0
Pear juice	10	100	0	0	0
Stone fruit juice	9	67	0	0	0
Subtropical juice/milk/nectar	27	96	0	0	0
Mixed fruit juice	4	75	0	0	0
Pomegranate juice	6	83	0	0	0
Other fruit juices	3	100	0	0	0
Berry fruit jams, jellies, preserves, syrups, toppings	8	50	0	0	0
Citrus fruit jams, jellies, preserves, syrups, toppings	2	100	0	0	0
Core fruit jams, jellies, preserves, syrups, toppings	9	78	0	0	0
Pit fruit jams, jellies, preserves, syrups, toppings	9	89	0	0	0
Subtropical/tropical fruit jams, jellies, preserves, syrups, toppings	8	100	0	0	0
Other fruit jams, jellies, preserves, syrups, toppings	3	100	0	0	0
Other fruits and fruit products	21	62	19	0	4
Subtotal	**878**	**67.5**	**4.2**	**0**	**37**
Vegetables					
Corn	26	92	0	0	0
Peas (green/snow/sweet)	66	73	6.1	0	4
Sugar snap peas	5	100	0	0	0
String beans (green/snap/pole)	106	45	3.8	0	4
Garbanzo beans	22	95	0	0	0
Kidney beans	12	100	0	0	0
Mung beans	18	89	0	0	0
Soybeans	20	90	0	0	0
Bean sprouts and seeds	6	83	0	0	0
Other beans & pea products	76	86	1.3	0	1
Peppers, hot	409	51	6.4	3	26
Peppers, pimiento	3	100	0	0	0
Peppers, sweet	147	35	4.8	1	7

Commodity Group	Samples Analyzed (#)	Without Residues (%)	Violative Samples And Types		
			Samples (%)	Over Tolerance (#)	No Tolerance (#)
Tomatoes/tomatillos	215	64	1.4	2	1
Eggplant	30	77	6.7	1	1
Okra	20	85	10	0	2
Other fruiting vegetables	0	0	0	0	0
Cucumbers	137	49	2.2	0	3
Pumpkins	2	100	0	0	0
Squash	118	43	5.9	0	8
Choyote	10	80	0	0	0
Other cucurbit vegetables	3	67	0	0	0
Artichokes	11	82	0	0	0
Asparagus	38	87	2.6	0	1
Bamboo shoots	5	80	0	0	0
Bok choy & Chinese cabbage	14	29	0	0	0
Broccoli	50	70	0	0	0
Brussels sprouts	32	47	3.1	1	0
Cabbage	14	86	0	0	0
Cauliflower	11	73	0	0	0
Celery	14	57	0	0	0
Cilantro	7	71	29	0	2
Collards	0	0	0	0	0
Kale	17	12	0	0	0
Lettuce, head	21	76	0	0	0
Lettuce, leaf	30	47	0	0	0
Mustard greens	4	50	0	0	0
Spinach	36	47	17	1	6
Endive	2	100	0	0	0
Swiss Chard	6	17	0	0	0
Watercress	0	0	0	0	0
Other leaf & stem vegetables	109	56	15	1	17
Carrots	36	75	2.8	0	1
Cassava	9	100	0	0	0
Garlic	5	80	0	0	0
Ginger	5	100	0	0	0
Leeks	12	67	0	0	0
Onions	17	88	0	0	0
Potatoes	28	54	7.1	1	1
Radishes	17	41	0	0	0

Commodity Group	Samples Analyzed (#)	Without Residues (%)	Violative Samples And Types: Samples (%)	Over Tolerance (#)	No Tolerance (#)
Red beets	7	86	0	0	0
Scallions & shallots	65	71	3.1	0	2
Sweet potatoes	7	100	0	0	0
Taro/dasheen	7	100	0	0	0
Turnips	5	100	0	0	0
Water chestnuts	7	100	0	0	0
Parsnips	0	0	0	0	0
Other root & tuber vegetables	21	81	4.8	1	1
Mushrooms/truffles/fungi	17	76	0	0	0
Vegetables, other, mixed	76	75	0	0	0
Vegetable juice/drinks	4	100	0	0	0
Vegetables with sauce	18	94	0	0	0
Vegetables, breaded	1	100	0	0	0
Subtotal	**2236**	**60.7**	**4.3**	**12**	**88**
Other					
Cashews	17	94	0	0	0
Coconut & coconut products	7	100	0	0	0
Peanuts & peanut product	13	100	0	0	1
Pecans	7	100	0	0	0
Pistachios	3	33	33	0	1
Almonds	5	60	0	0	0
Other nuts & nut products	12	100	0	0	0
Pumpkin seeds	8	75	13	1	0
Sesame seeds	3	100	0	0	0
Sesame paste (tahina)	2	100	0	0	0
Soybeans, edible	7	86	0	0	0
Sunflower seeds	4	100	0	0	0
Other edible seeds & seed products	14	79	0	0	0
Vegetable oil, crude	7	100	0	0	0
Vegetable oil, refined	17	100	0	0	0
Oil seed stock	0	0	0	0	0
Other vegetable oil products	0	0	0	0	0
Basil	3	67	33	0	1
Capsicums	12	42	17	0	2
Paprika	7	71	14	0	1
Spices, other	26	88	0	0	0

Commodity Group	Samples Analyzed (#)	Without Residues (%)	Violative Samples And Types: Samples (%)	Violative Samples And Types: Over Tolerance (#)	Violative Samples And Types: No Tolerance (#)
Pepper sauce	45	73	2.2	0	2
Water & ice	2	100	0	0	0
Beverage and beverage bases	33	94	0	0	0
Beer	0	0	0	0	0
Coffee	7	86	0	0	0
Tea	12	83	8.3	0	1
Coffee/tea substitutes	7	100	0	0	0
Astragalus, dietary supplement	11	100	0	0	0
Enchinacea, dietary supplement	2	50	0	0	0
Ginseng, dietary supplement/tea	4	50	50	0	2
Kava, dietary supplement/tea	2	100	0	0	0
Senna, dietary supplement/tea	1	100	0	0	0
Other botanical/herbal teas	30	80	13	0	4
Other botanical/herbal dietary supplements, not teas	139	78	8.6	1	13
Other dietary supplements, not botanicals/herbals or teas	31	87	3.2	0	1
Honey & honey products	23	100	0	0	0
Food sweeteners, not honey	29	97	0	0	0
Candy, confections, chocolate, cocoa products	17	94	0	0	0
Condiments & dressings	5	80	0	0	0
Flavorings and extracts	4	100	0	0	0
Multi-ingredient foods (dinners, sauces, specialties)	28	79	0	0	0
Baby foods/formula	1	100	0	0	0
Food additives/colors	1	100	0	0	0
Other food products	11	82	0	0	0
Feed/animal byproducts	6	83	0	0	0
Other nonfood items	0	0	0	0	0
Subtotal	**625**	**84.5**	**4.8**	**2**	**29**
Totals - All Import Samples	**4196**	**68.5**	**4.0**	**14**	**159**

[a] Whole food commodities include dried, paste, pulp, and puree forms, as well as foods similarly classified by EPA for residue tolerance enforcement, e.g., eggplant includes Chinese/Thai eggplant; radishes include daikon or Chinese/Oriental radishes.

Note: "Over-tolerance" violations include residue findings that exceeded tolerances for pesticides approved for use in establishments where food products are held, processed, or prepared.