

Chapter 2

Federal Pesticide Residues in Food Monitoring Programs

Contents

	<i>Page</i>
The Legal Basis for Federal Pesticide Monitoring in Foods	7
Federal Monitoring Programs	8
Environmental Protection Agency	8
Food and Drug Administration of the	
U.S. Department of Health and Human Services	9
The Food Safety and Inspection Service of the	
U.S. Department of Agriculture	12
Other Pesticide Residues in Food Monitoring Programs	15
Chapter 2 References	16

Figures

<i>Figure</i>	<i>Page</i>
2-1. FDA Pesticide in Food Monitoring Program in 1987	11
2-2 Number of Food Monitoring Samples Analyzed for pesticide Residues in 10 States in 1987	15

Table

<i>Table</i>	<i>Page</i>
2-I. Numbers of Compounds Determined or Identified by Primary FDA Multiresidue Methods.	9

Chapter 2

Federal Pesticide Residues in Food Monitoring Programs

THE LEGAL BASIS FOR FEDERAL PESTICIDE MONITORING IN FOODS

Comprehensive Federal food laws are a 20th-century phenomenon, although the States regulated food quality before 1900. The 1906 publication of Upton Sinclair's novel *The Jungle* sparked a consumer reaction against the adulteration and misbranding of food, which resulted in the passage of the Federal Meat Inspection Act (FMIA) of 1906 and the Pure Food and Drugs Act (F&D Act) of 1906 (5). Both statutes have been significantly amended, although they retain their original purposes today. The F&D Act of 1906 was revised into the Federal Food, Drug, and Cosmetic Act (FFDCA) in 1938. The origin of Federal regulation of pesticide use can be traced to this same general period with the Federal Insecticide Act (FIA) of 1910. The FIA was replaced by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) of 1947, which as amended, remains the basis for regulating the use of pesticides today.

Currently, Federal jurisdiction over pesticide residues in food is divided among four bodies—the Environmental Protection Agency (EPA), the Food and Drug Administration (FDA) of the U.S. Department of Health and Human Services, and the Food Safety and Inspection Service (FSIS) and Agricultural Marketing Service (AMS) of the U.S. Department of Agriculture (USDA). Their authority for this work comes primarily from five laws: FIFRA, FFDCA, FMIA, the Poultry Products Inspection Act, and the Egg Products Inspection Act.

EPA, under FIFRA, must register a pesticide before the pesticide can be distributed or sold in the United States (7 U.S.C. Section 136 et seq., 1982 & Supp. IV 1986). The registration includes the specific commodities the pesticide can be used on. In registering a pesticide, EPA balances the risks and benefits associated with

the use of that pesticide while ensuring that its use will not cause an unreasonable risk to humans or the environment. ¹

If the pesticide is to be used on food or feed commodities or if its use will lead to residues on these products, EPA, under FFDCA, establishes the legal maximum level of the pesticide residue (including residues of significant metabolizes or degradation products) allowed in each specific food or feed (FFDCA; 21 U.S.C. Sections 346A, 1982 & Supp. IV 1986). These levels are known as tolerances. A tolerance, or an exemption from a tolerance, must be granted before such a pesticide is registered. Tolerances cannot be legally exceeded and residues of pesticides are prohibited on foods for which no tolerance has been established or exempted. Commodities that violate these prohibitions are subject to seizure by FDA, USDA, or a State enforcement agency (33).

FDA, under FFDCA, has responsibility for enforcing tolerances established by EPA in food (except meat and poultry) and animal feed moving in interstate commerce and for enforcing prohibition of a pesticide residue in food or feed for which no tolerance has been set or exemption given (21 U.S.C. Sections 331-337, 1982 & Supp. IV 1986).²

¹The registration requirements for pesticides are set forth in Section 3 of FIFRA and are defined more fully in EPA regulations (40 C.F.R. Sections 158 and 162 1987).

²In some cases, a specific residue may be present on a commodity for which no tolerance exists because of the environmental persistence of the pesticide rather than its direct application on the commodity. If in this type of case FDA considers low levels of such a residue to pose little risk to human health, FDA used to informally set regulatory residue levels called "action levels" at which FDA would take regulatory action and below which the food was not found to be violative (21 CFR Sec-

(continued on next page)

FSIS of USDA is responsible for enforcing tolerances in meat and poultry under authority of the Federal Meat Inspection Act (21 U.S.C. Sections 601-695, 1982& Supp. IV 1986)

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tions 109 and 509, 1987; FDA Compliance Policy Guides, 1986). The informal process by which these action levels have been set has been vacated by the Federal Appeals Court in the District of Columbia *Consumer Nutrition Institute v. Young*, 818 F.2d 943 (D.C. Cir. 1987). EPA and FDA are currently determining how to address these cases.

and the Poultry Products Inspection Act (21 U.S.C. Sections 451-470, 1982& Supp. IV 1986). AMS of USDA is responsible for pesticide residue monitoring of raw egg products (dried, frozen, or liquid eggs) and tolerance enforcement at establishments having official USDA egg products inspection service under authority of the Egg Products Inspection Act (21 U.S.C. 1031-1056). Under this act, FDA has jurisdiction over these products outside such establishments.

FEDERAL MONITORING PROGRAMS

Environmental Protection Agency (EPA)

EPA has no direct responsibility for enforcing pesticide tolerances in food; therefore, its monitoring of pesticide residues in food is minimal. EPA's primary responsibilities concerning pesticide residues in food, as noted earlier, are registering the pesticides and establishing pesticide tolerances for food and feed. EPA's pesticide monitoring work is geared primarily toward regulating pesticide levels in the environment (e. g., water, air, and soil) and ensuring that pesticides are being used in accordance with their registration. However, EPA conducts some monitoring for pesticide residues in food as part of its monitoring of pesticides in the environment. Agricultural commodities are occasionally analyzed by EPA as a means of identifying pesticide misuse or pesticide drift from point of application or, if necessary, of obtaining additional residue data for a pesticide under Special Review to determine if a pesticide's registration should be canceled, denied, or reclassified because of adverse effects (32).

The tolerance-setting process is the basis for FDA and USDA regulation of pesticide residues in food. As part of the tolerance-setting process, EPA requires the submission of, among other things, the following: 1) residue chemistry data, e.g., what residues occur and how much of each is present; 2) toxicity data; and 3) an analytical method to detect the pesticide

and its toxic metabolizes in the foods for which a tolerance is to be set. The first two sets of data are used by EPA to determine the likely level of dietary exposure to the pesticide, level of dietary exposure acceptable for human health, and the tolerance level in each food (33).³ (For a detailed description of the tolerance-setting process, see ref. 24.)

Limitations of the tolerance-setting process may affect the capabilities of FDA and USDA to monitor for pesticide residues in food. For example, if incomplete metabolism studies were used in setting tolerances, then all the possible metabolizes and breakdown products of the pesticide are not known and methods for their analysis may not be available or required (33). A second important limitation (discussed in chapter 7) is the regulatory usefulness of the methods submitted to EPA as part of the tolerance setting process.

³The majority of tolerances are established for pesticides on raw agricultural commodities and set to protect the public health while considering the benefits of the pesticide use. A small number of tolerances are set for processed foods. Under FFDC, if a pesticide concentrates during food processing and therefore occurs in a higher concentration in the processed food than in the raw agricultural commodity, the decision to establish a tolerance must be only risk-based, without the consideration of potential benefits. An additional rule, applying only to processed foods, is that if a pesticide that concentrates during processing also causes cancer in humans or animals, then no tolerance can be granted for the processed food. For pesticides that do not concentrate, the tolerance for the raw agricultural commodity suffices for processed foods. For further details on this distinction see ref. 25.

Food and Drug Administration (FDA)
of the U.S. Department of Health
and Human Services

FDA enforces pesticide residue tolerances established for a wide variety of raw agricultural food and feed, and for processed products. Commodities sampled do not include meat and poultry, which are the province of USDA. To fulfill its regulatory responsibilities, FDA established a pesticide monitoring program that is designed to identify and quantify pesticide residues in food and animal feed. The two main objectives of this program are: 1) to monitor domestic and imported food and feed commodities for pesticide residues in support of regulatory actions against illegal residues, and 2) to gather information on the incidence and levels of pesticide residues in the food supply (28).

The potential coverage of the FDA's pesticide monitoring program includes approximately 316 pesticides for which tolerances have been established; pesticides whose registrations have been canceled but persist in the environment; pesticides previously exempted from the establishment of tolerance levels but for which safety concerns have subsequently arisen; pesticides with experimental use permits or pending tolerances; pesticides used only in foreign countries; and metabolizes, other breakdown products, and impurities of pesticide products (28).

Given that the monitoring of all pesticide/commodity combinations for all of these pesticides would far exceed the resources of the FDA, a selective monitoring approach has been adopted (28). The two primary factors used to determine which pesticide/commodity combinations will be monitored are: 1) analytical method capabilities, that is, largely the capabilities of multiresidue methods; and 2) priorities of monitoring in terms of the likelihood of pesticide application to certain commodities and the potential health risk to the consumer from consumption of a particular pesticide/commodity combination (28). The risk assessment is made primarily on the basis of the FDA Surveillance Index (SI).⁴ Table 2-1 shows how much pesticide coverage is provided by the five major multiresidue methods (i.e., methods that can detect more than one pesticide during an analysis of a single sample) routinely used by FDA to monitor pesticide residues in food.

⁴At the recommendation of an FDA study group (10), a five-level risk classification was developed on the basis of available toxicological data and potential human dietary exposure. The categories established are as follows: Class I, pesticides posing high health hazards; Class II, pesticides posing a possible high risk; Class III, pesticides posing a moderate hazard; Class IV, pesticides posing a low hazard; and Class V, pesticides posing very little potential hazard (29). A complete description of the process of assigning a pesticide to one of these classes is presented in Reed (29). The Surveillance Index is not yet complete. Two hundred and five pesticides have been ranked thus far.

Table 2.1.—Numbers of Compounds Determined or Identified by Primary FDA Multiresidue Methods^a

Type of compounds	Total entered in data base	Total ^b for all 5 methods	Number of compounds determined or identified				
			PAM I sec. no.				
			21	1.1/231.1 ^c	212.1/232/1	^e 232.3	^e 232.4/242/1
Pesticides with tolerances	316	163	68	85	55	140	20
Pesticides with temporary or pending tolerances	74	10	4	3	4	9	4
Pesticides with no EPA tolerance	56	25	17	21	7	10	0
Metabolizes, impurities, alteration products, and other pesticide-associated chemicals	297	92	20	32	31	61	8

^aAs of May 1988.

^bThis number is not cumulative because several methods may detect the same pesticide.

^cGas chromatographic method for nonpolar (primarily organochlorine and organophosphorus) pesticides in fatty foods.

^dGas chromatographic method for nonpolar (primarily organochlorine and organophosphorus) pesticides in nonfatty foods.

^eGas chromatographic method for organophosphorus pesticides and metabolizes

^fGas chromatographic method for polar and nonpolar pesticides, using a variety of selective detectors.

^gLiquid chromatographic method primarily for N-methyl carbamate pesticides.

^hOnly certain of the chemicals in these four pesticide-related groups necessarily occur as residues or are of toxicological concern.

SOURCE: D. Reed, P. Lombardo, J. Wessel, et al., "The FDA Pesticides Monitoring Program," *Journal of the Association of Official Analytical Chemists* 70(3) 593, 1987
The 1987 table was updated for OTA by the Center for Food Safety and Applied Nutrition of the Food and Drug Administration in May 1988.

The two major components of the FDA pesticide monitoring program are: 1) general commodity monitoring, and 2) the Total Diet Study.

General Commodity Monitoring

General commodity monitoring is designed to enable the enforcement of tolerances established by EPA and determine the incidence and levels of residues in domestic and imported raw agricultural commodities, processed foods, and animal feed (28). More specifically, the objectives of this program are to: 1) determine on a geographical basis pesticide residue levels of individual food commodities, 2) survey on a nationwide basis pesticide residue levels of selected food commodities, 3) monitor imported food commodities and deny entry to those with illegal pesticide residues, and 4) identify pesticide residues occurring in excessive levels as a basis for compliance followup and enforcement action.

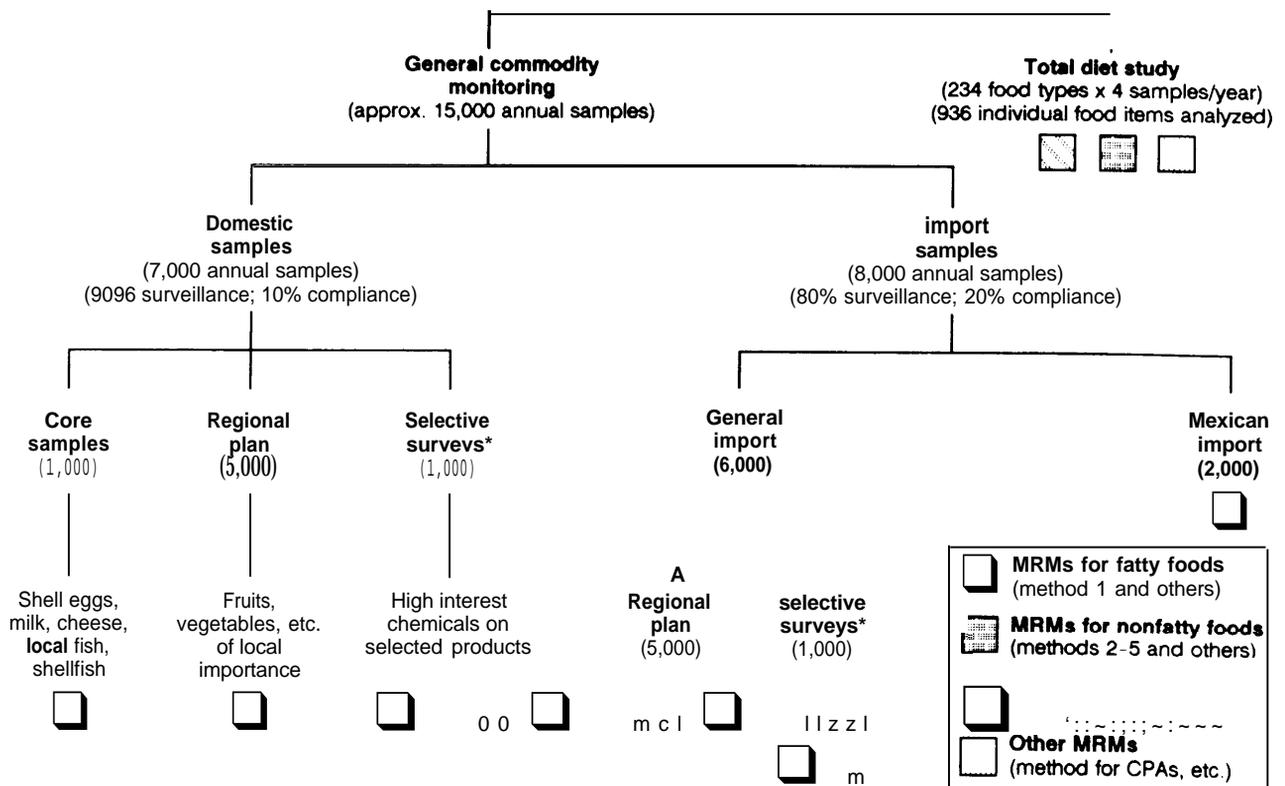
Approximately 15,000 commodity samples were analyzed in 1987 for pesticide residues by 16 FDA laboratories under the general commodity monitoring program. About 47 percent of samples were from domestic sources and 53 percent were imported commodities (22; figure 2-1). Emphasis on imported commodities has increased in the past few years. The majority of samples are collected at random for monitoring purposes and are known as surveillance samples. The remainder, known as compliance samples, are collected after a violation has been found or there is evidence of a likely violation (28). Imports receive more compliance sampling because less information is available on foreign growing areas, pesticide use, and agricultural practices than for domestic commodities (16). FDA's ability to prevent violative food from reaching the consumer is constrained by the amount of time needed for sample transport and analyses. As such, food sometimes is able to reach the market before results of analyses are available (34). FDA can detain imported commodities until compliance analyses are completed but cannot detain domestic commodities (34).

The percentage of samples that violate EPA tolerances is known as the violation rate. FDA believes that violation rates cannot be extrapolated to give the correct level of violations in the general food supply because the biased nature of FDA sampling (both compliance and surveillance sampling) would lead to the calculation of an overly high level of violations (17, 20). First, compliance samples will have a higher violation rate than the general food supply and the surveillance samples because compliance sampling is done only when a violation is suspected. Second, surveillance samples are not conducted in a totally random fashion. Surveillance sampling is biased toward pesticide/commodity combinations with past residue problems and also contains a greater percentage of fruits and vegetables than exists in the general food supply (17).

For all food samples analyzed by FDA in 1987, the violation rate for surveillance samples was 2.5 percent (1.5 percent for domestic samples and 3.4 percent for imports). The violation rate for compliance samples analyzed that year was 11.7 percent (12.1 percent for domestic samples and 11.6 percent for imports) (17). Additional data on violation rates have been compiled by FDA's Los Angeles laboratory based on 5 years (1982-1986) of its analysis of almost 20,000 samples (93 percent of which were surveillance samples and 67 percent were imports). The majority of these samples were fruits and vegetables. The violation rate for surveillance samples was 2.76 percent (3 percent for domestic samples and 2.6 percent for imports). The violation rate for compliance samples was 17.8 percent (19.7 percent for domestic samples and 17.5 percent for imports) (16). Seventy-five percent of the violations stemmed from pesticide residues on commodities that did not have a tolerance established for the pesticide (20).

The Center for Food Safety and Applied Nutrition (CFSAN) is responsible for much of the direction of the FDA monitoring program, primarily through the development of its annual series of compliance program guidance manuals.

Figure 2-1.—FDA Pesticide in Food Monitoring Program in 1987



Note that all numbers of **samples** are **approximate**. Codes for analytical methods refer to those most often used for analysis of the samples in any category. Abbreviations: MRM = multi residue method; CPA = chlorophenoxy acid. Definitions: **compliance samples** samples collected from shipments for which there was prior evidence or suspicion of illegal pesticide residues (i.e., **subjective samples**); **surveillance samples** samples collected from shipments for which there was no prior evidence or suspicion of illegal pesticide residues (i.e., **objective samples**). *A combination of special emphasis surveys and headquarters-initiated surveys.

SOURCE: McMahon and J. Burke, "Expanding and Tracking the Capabilities of pesticide Multi residue Methodology Used in the Food and Drug Administration's Pesticide Monitoring Programs," *Journal of the Association of Official Analytical Chemists* 70(6):1073, 1987. The 1987 table was updated for OTA by the Center for Food Safety and Applied Nutrition of the Food and Drug Administration in May 1988.

Four types of sampling plans make up general commodity monitoring: core samples, special emphasis surveys, headquarters-initiated surveys, and regional sampling plans (see figure 2-1, which combines special emphasis surveys and headquarters-initiated surveys into selective surveys).

Core samples, which must be analyzed by each district, are identified by CFSAN. Core samples are of commodities susceptible to environmental contamination and likely to bioaccumulate fat-soluble pesticides (e.g., fish, milk, dairy products, shell eggs, and feed) (28).

Special emphasis surveys permit each district to sample two domestic pesticide/commodity combinations and two imported pesticide/commodity/country-of-origin combinations. CFSAN develops the list of combinations for selection by districts, and districts may propose additional combinations subject to CFSAN approval. These surveys focus on those pesticides neither adequately measured nor regularly analyzed by the five multiresidue methods routinely used. These pesticides may be selected for monitoring because of EPA requests, FDA investigatory reports, a high SI classification for a pesticide, or past violation problems (28).

Headquarters-initiated assignments (or special surveys) are those in which CFSAN instructs a district to analyze a specific commodity.

Finally, regional sampling plans (for domestic and imported food) allow each region to determine what products it plans to sample based on its knowledge of local crops, pesticide use, and coordination with State programs. In 1988, FDA required each region for the first time to write up these plans and submit them to headquarters (19).

Ultimately, the number of samples collected and analyzed for pesticide residues in a district is determined by the available resources provided by FDA headquarters for pesticide monitoring in that district. FDA laboratories, in addition to monitoring foods for pesticide residues, also monitor foods for sanitation and microbiological contamination. Monitoring nonfood products such as medical devices and drugs are their responsibility as well. Pesticide monitoring must compete for resources with these other significant public health functions, and sampling plans are sometimes derailed by emergency situations (e. g., a product tampering incident).

The Total Diet Study

Since the early 1960s, FDA has monitored dietary intake of pesticides in a "market basket" of selected food items (including meat and poultry) that are purchased at the retail level and then prepared ready-to-eat prior to analysis. CFSAN determines the commodities to be sampled, and the analysis is carried out by the FDA Total Diet laboratory in Kansas City, MO. Two hundred thirty-four foods selected to represent the diet of the U.S. population are collected in retail markets four times annually, once from each of four designated geographical areas of the United States (northeast, south, north central, and west) (22, 27, 28). A single collection consists of identical foods from retail stores in three cities within each geographical area (27). Samples are sent to the Total Diet Laboratory,

where the three samples of each food are combined to form a single sample and analyzed using multiresidue methods (27).

The results of the Total Diet Study (TDS) are used to estimate dietary intake of selected pesticides by various U.S. age-sex groups (27). The design of the TDS provides an estimate of public exposure to those pesticide residues detected by the analytical methods used in the study. FDA uses data from the TDS to make judgments about the public health risk presented by pesticide exposure through food (27). In 1987, the TDS detected 53 pesticide residues out of 253 pesticides detectable by the analytical methods used. The residues were compared with acceptable daily intakes calculated by the World Health Organization and none were found to exceed 1 percent of those acceptable levels (18).

The TDS, however, uses only multiresidue methods to detect pesticide residues in food. Therefore, the TDS only provides a partial estimate of total human exposure to pesticide residues in the diet because some pesticides cannot be detected by multiresidue methods.

The Food Safety and Inspection Service (FSIS) of the U.S. Department of Agriculture

The USDA pesticide residue in food monitoring program is part of its National Residue Program (NRP), which addresses residues of pesticides, animal drugs, and environmental contaminants in meat, poultry, and raw egg products. NRP was initiated by the USDA in 1967 and has grown substantially in terms of the numbers of samples analyzed. Overall, approximately 50,000 samples are analyzed annually for about 100 compounds (12, 13, 23). In 1987, the NRP analyzed some 15,260 samples for pesticide residues, and almost 60 percent of these were imported products (15).

The decision of what pesticide to analyze is based on a ranking of the pesticide (based on the pesticide's toxicity and level of human exposure), the capability of testing for the pesticide using a multiresidue method, and past



Photo credit: Food and Drug Administration

Samples are collected and shipped to laboratories for analysis. Above, an FDA inspector samples imported fruit entering the United States from Mexico at Nogales, AZ.

residue problems with the pesticide (12). Monitoring decisions are based on a list of approximately 227 ranked pesticides and metabolites that FSIS considers of potential concern (12). Similar to the SI developed by FDA, FSIS established the Compound Evaluation System (CES) in 1985 to improve its ranking of pesticides and bolster support of its monitoring program and analytical methods development work. Pesticide residues are assigned a letter rank for their toxicity (A-D) and a number rank for the degree of human exposure to them (1-4) with A-1 as the highest ranking. Currently, 39 pesticides have been ranked under the CES (30). An advisory board of scientists from EPA, FDA, and USDA was also established in 1985 to help keep pace with new information on compounds of concern (12).

pesticide residue analysis is accomplished by using multiresidue methods.⁵ Normally, a sample is analyzed using one of four multiresidue methods (for chlorinated hydrocarbons, chlo-

⁵FSIS requires that its analytical methods be "practical," which it defines as: a) requiring no more than 2 to 4 hours of analytical time per sample (batches of samples may take longer), b) requiring no instrumentation not customarily available in a laboratory devoted to trace drug or environmental analyses, c) having a minimum proficiency level at or below the established tolerance, d) having a quality assurance plan, and e) having undergone an interlaboratory validation study (12).

rinated organophosphates, organophosphates, and carbamates), which together can detect approximately 40 pesticides (1,15).⁶ FSIS has identified 10 highly ranked pesticides it would like to monitor routinely but cannot using its multiresidue methods (15). In addition, a number of other highly ranked pesticides exist that cannot be detected by multiresidue methods but that FSIS considers less likely to appear in meat (15). FSIS has three laboratories performing pesticide residue analysis and has contracts with 57 non-Federal laboratories that are accredited by FSIS to conduct pesticide analyses as well as analyses of other compounds such as PCBs. These laboratories are accredited only for the pesticide analysis of chlorinated hydrocarbons and they must use an FSIS approved method. FSIS runs a quality assurance program for these laboratories using check samples and onsite reviews (9).

The four components of the National Residue Program are monitoring, surveillance, exploratory projects, and prevention, which are administered by the FSIS (31). Violation rates for the pesticides analyzed in meat products are low. In 1986, no violations were found for the 16 organophosphates tested for in either the monitoring or surveillance programs. For the 13 chlorinated hydrocarbon pesticides tested for in 1986, 9 violations out of 3,498 monitoring samples (a 0.26 percent violation rate) and 18 violations out of 1,071 surveillance samples (a 1.7 percent violation rate) were found (11). Testing for carbamates began in 1987 and results have not yet been compiled. FSIS believes that monitoring data can be used to provide a good indication of violation rates in the general meat supply because monitoring sampling is random (14). However, monitoring data would first have to be adjusted for the difference between the number of samples taken from each animal group and the relative production of each animal to get a proper indication (6). Surveillance data are too biased to be used the same way (14).

⁶FSIS also analyzes for eight compounds fed directly to animals as larvicides or to kill insects in animal dung. In 1987, 2,914 samples were analyzed for these products (15).

The monitoring program involves random sampling of meat and poultry tissue during routine inspection at slaughter of domestic animals (FSIS personnel are located at processing plants) and of imported products at the port of entry. These samples account for approximately 80 percent (based on 1985 figures) of the total number of samples analyzed (11, 12). The random sampling scheme used in this program is designed statistically to provide 95 percent assurance of detection over the course of a year with a violation rate of 1 percent or more in the national population (12). Monitoring samples are analyzed by the three FSIS laboratories and several of the FSIS accredited laboratories. In most cases, the FSIS monitoring program does not prevent violative products from reaching the consumer because analytical results are not normally available until after the product has reached the marketplace and become difficult to trace (12). Monitoring provides information on the occurrence of residue violation and helps to identify those producers who maybe selected for surveillance sampling because of violations.

The surveillance program focuses on the investigation and control of movement of meat and poultry products that are suspected of contamination. Unlike the random sampling conducted under the monitoring program, the sampling conducted under the surveillance program is directed specifically to those meat or poultry carcasses that have been implicated as sources of residues either by the monitoring program, by investigation, or by a prior history of violation by the supplier (31). Carcasses are held until the analysis is complete. Violative meat is condemned and the producer is prohibited from marketing animals until further samples show no illegal residues (26). Analysis of surveillance samples takes precedence over monitoring samples (12). Analysis may be done either by the three FSIS laboratories or else the producer, in order to increase the speed of analysis, may choose to send a meat sample to one of the 57 FSIS accredited laboratories

for analysis for chlorinated hydrocarbons. The producer pays for the analysis, and the results go first to the FSIS inspector. Unless there has been a serious contamination event, only a few hundred surveillance samples are analyzed annually for pesticides by the accredited laboratories (2).

Exploratory projects are surveys used to determine if a pesticide not currently detected should be included in the monitoring program. New methods that have not been validated by FSIS maybe used in these surveys to detect the pesticides and to evaluate the value of the method (9).

To complement its regulatory work at the slaughterhouse, FSIS has a prevention program based on producer testing and education. Memoranda of Understanding (MOU) are signed with producers who then pay for testing feed, feed additives, litter, and some animals for chlorinated hydrocarbons. About 7 FSIS accredited laboratories perform approximately 2,000 analyses a month and provide FSIS with access to the results (15). Currently, 11 companies (5 beef and 6 poultry producers) take part in this program (3). FSIS has also collaborated with the USDA Cooperative Extension Service to produce educational materials for and provide counseling to producers on how to avoid chemical contamination of animals.

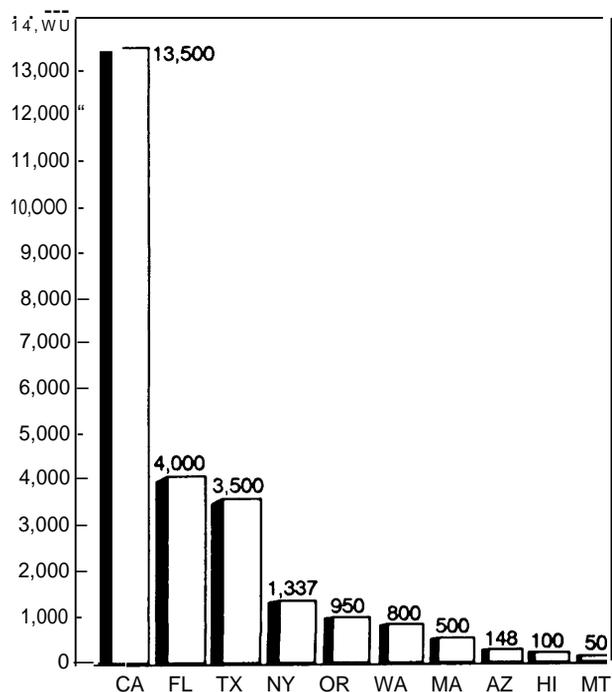
The AMS carries out a small regulatory program for pesticide residues in raw egg products. At its laboratory in Gastonia, NC, approximately 400 to 500 samples are analyzed annually from the approximately 90 domestic, egg-breaking and drying factories and imports using a multiresidue method that can identify 50 pesticides (21). If violations are found in domestic egg products, AMS may analyze raw eggs to find which producer is the source of the violative eggs. Both in 1986 and 1987, AMS found no violations among its monitoring and surveillance samples (21).

OTHER PESTICIDE RESIDUES IN FOOD MONITORING PROGRAMS

Although outside the scope of this report, State and private programs carry out a significant amount of monitoring for pesticide residues in food. Data provided by FDA to the General Accounting Office (GAO) showed that 38 States had such monitoring programs (34). State programs vary widely in the number of samples processed and in the program purpose. For example, Montana's and Florida's programs focus on the most likely cases of overtolerance, e.g., if there has been a major pest outbreak that could lead to overuse of a pesticide; Massachusetts has directed its program to dietary risks (4). Figure 2-2 provides a survey of 10 State pro-

⁷For more information about State programs, see Cusick and Wells, 1988 in appendix B.

Figure 2-2.—Number of Food Monitoring Samples Analyzed for Pesticide Residues in 10 States in 1987



SOURCE: California Department of Food and Agriculture, Pesticide Enforcement Branch. Survey done for OTA, 1988.

grams and the number of monitoring samples analyzed for pesticide residues. State programs rely primarily on multiresidue methods,

The extent of private sector testing is more difficult to determine. A considerable amount of monitoring by food processors is taking place but remains proprietary information, in part because of fears of the possible negative connotations associated with such testing (7). An example of this work is the National Food Processors Association, which estimates it analyzes approximately 3,000 food samples a year for pesticide residues for its members (8). Federal agencies are interested in using private monitoring data, partly to help set their own monitoring priorities, and EPA has an ongoing project to collect the results of private monitoring,



Photo credit: California Department of Food and Agriculture

When a widespread pesticide/commodity problem occurs, the California Department of Food and Agriculture may send one of its three mobile laboratories to assist with monitoring.

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*These references are contained in Appendix B.

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