

GAO

Report to the Ranking Minority
Member, Subcommittee on Agricultural
Research and General Legislation,
Committee on Agriculture, Nutrition,
and Forestry, U.S. Senate

December 1990

U.S. FOOD EXPORTS

Five Countries' Standards and Procedures for Testing Pesticide Residues



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**National Security and
International Affairs Division**

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The Honorable Pete Wilson
Ranking Minority Member
Subcommittee on Agricultural Research
and General Legislation
Committee on Agriculture,
Nutrition, and Forestry
United States Senate

Dear Senator Wilson:

As you requested, we have provided information on (1) the U.S. government's efforts to prevent or resolve trade disputes that may arise over pesticide use; (2) the specific procedures used by foreign governments in selected Pacific Rim countries and Australia to set tolerances and test for pesticides on U.S.-exported produce; and (3) the technical capabilities of these foreign governments to conduct pesticide testing.

As agreed with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from the date of this letter. At that time, we will send copies to interested parties and make copies available to others upon request.

Please contact me at (202) 275-4812 if you or your staff have any questions concerning this report. The major contributors to this report are listed in appendix I.

Sincerely yours,

Allan I. Mendelowitz, Director
International Trade, Energy, and Finance Issues

Executive Summary

Purpose

The controversy in 1989 over Alar, a growth regulator primarily used on apples, heightened public concern about the presence of pesticides and other chemicals on U.S. food. This controversy has also led to concerns overseas and to losses in U.S. agricultural exports.

The Ranking Minority Member, Subcommittee on Agricultural Research and General Legislation, Senate Committee on Agriculture, Nutrition, and Forestry, asked GAO to provide information on (1) U.S. government efforts to prevent or resolve trade disputes that may arise over pesticide use; (2) the specific procedures used by foreign governments in selected Pacific Rim countries and Australia to set tolerances and test for pesticides on U. S. exported produce; and (3) the technical capabilities of these foreign governments to conduct pesticide testing. To evaluate pesticide testing and technical capabilities, GAO visited Australia, Japan, South Korea, Taiwan, and Thailand.

Background

In June 1989 the news media in South Korea and Taiwan reported that Alar had been detected on U.S. grapefruit. As a result the market for U.S. grapefruit in both countries was adversely affected. The markets for other U.S. perishable commodities in several Pacific Rim countries were also threatened. Since the Alar incident, concern over the presence in food of other chemicals, primarily pesticides, has surfaced as well.

The Pesticide Monitoring Improvements Act of 1988 calls for foreign countries to identify pesticides used on food imported into the United States, but does not address the issue of pesticides used on U.S. exported food.

Results in Brief

The United States is attempting to respond to pesticide residue concerns through multilateral, bilateral, and administrative efforts. U.S. approaches to deal with pesticide concerns include taking a lead position on strengthening health-related standards in the current Uruguay Round of the General Agreement on Tariffs and Trade negotiations, forming ad hoc technical working groups with several countries, and creating an International Food Safety Task Force. However, governments in the five countries GAO visited have lacked information about which pesticides and other chemicals were being used on U.S. exported produce. Hence, the risk of exposure to a problem like the South Korean grapefruit scare remains.

The governments of Australia, Japan, South Korea, Taiwan, and Thailand have laws, regulations, and government agencies for ensuring the safety of the food supply. They have established import inspection and sampling procedures which include monitoring for pesticides. Each country was at a different stage of registering pesticides, establishing pesticide tolerances, and developing testing standards.

Government laboratories in the five countries GAO visited also had the necessary technical capabilities, including equipment and personnel, to conduct pesticide testing. However, a variety of standards were used in these countries, and the United States and these countries have not agreed on and have not used common standards and testing methods.

Principal Findings

U.S. Government Efforts to Address Pesticide Disputes

Multilaterally, the United States has taken a leading position in the General Agreement on Tariffs and Trade's negotiating groups on health-related measures that can serve as trade barriers. These negotiations are directed toward making sound scientific evidence and the United Nations' Codex Alimentarius Commission's standards central to resolving trade disputes over food safety.

Bilaterally, the United States and several countries, such as South Korea and Taiwan, have established certain ad hoc technical working groups to assist in setting standards and sharing information on pesticide tolerances, sampling, and testing methods.

Administratively, the U.S. Department of Agriculture has created an interagency International Food Safety Task Force in response to the 1989 South Korean grapefruit scare. The Foreign Agricultural Service chairs this group. The task force promulgates a single U.S. government position on and provides a quick technical response to disputes over food safety concerns. The Department also participates in food safety seminars to share information on international negotiations and on bilateral and administrative actions.

The governments in the five countries GAO visited had little information on the type and amount of pesticides and other chemicals used and tolerance levels actually allowed on specific U.S. exported produce. Regular information-sharing between the United States and its trading

partners would help reduce the likelihood of future disruptions of U.S. agricultural exports caused by foreign concerns over the use of pesticides and other chemicals.

Varying Standards and Procedures for Monitoring

The governments of the five countries GAO visited have set tolerances for a number of pesticides. As of May 1990, Australia had established tolerance levels for 395 pesticides, Japan for 25 pesticides, South Korea for 17 pesticides, Taiwan for 127 pesticides, and Thailand for 10 pesticides.

These countries have conducted pesticide testing less routinely than the United States. Australia and Thailand have not systematically conducted pesticide testing on imported produce. Japan has conducted tests on certain products when deemed necessary. And in South Korea and Taiwan, tests have been conducted on selected commodities to detect residues on those pesticides for which tolerance levels have been established.

In addition, Australia has deferred to Codex standards or applied a zero tolerance level in evaluating imported produce when established tolerances did not exist. Japan, Taiwan, and Thailand have allowed flexibility in such circumstances and generally have deferred to Codex standards or have accepted the standards of the exporting country when deciding whether to allow the commodity to enter the market. South Korea normally did not have such flexibility.

Testing Is Conducted at Capable Labs

Based on the Federal Drug Administration's laboratory standards, the five countries GAO visited had government laboratories with adequate pesticide testing equipment. The equipment included gas chromatographs for multiresidue testing and mass spectrometers for conducting pesticide residue confirmation tests. According to laboratory officials, the laboratories were generally well stocked with the solvents and chemicals needed to conduct accurate tests. However, in Thailand, the government was unable to use a U.S. Food and Drug Administration standard method to test for Alar on apples because the laboratory did not have the required solvents.

The laboratories employed trained personnel to conduct pesticide residue testing and analysis. Scientists and technicians GAO interviewed were familiar with international and U.S. recommended guidelines for pesticide testing. Laboratory technicians were aware of the procedures

for cleaning and handling equipment and samples and with other standard scientific practices to ensure the accuracy of the results.

However, the five countries have used a variety of testing methods which could contribute to variations in test results. For example, in Japan they were developing and using their own methods, while South Korea has used analytical methods similar to those used in the United States. Thus, technical capability alone has not eliminated the potential for obtaining conflicting test results.

Recommendations

To help reduce the likelihood and impact of future disruptions of U.S. agricultural exports caused by foreign concerns over pesticides, GAO recommends that the Secretary of Agriculture, in cooperation with other federal and state agencies

- develop mechanisms for routinely providing foreign trading partners with information on pesticides used on U.S. exported produce and
- establish ad hoc technical working groups with more U.S. trading partners to address technical problems related to agricultural trade, such as U.S. pesticide use patterns and tolerances and sampling and testing methods.

Agency Comments

As requested, GAO did not obtain official agency comments on this report. However, GAO discussed the information contained in a draft of this report with officials at the Environmental Protection Agency, the Food and Drug Administration, and the Departments of Agriculture and State. Their comments have been incorporated in the report where appropriate.

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Abbreviations

EPA	Environmental Protection Agency
FAS	Foreign Agricultural Service
FDA	Food and Drug Administration
GAO	General Accounting Office
GATT	General Agreement on Tariffs and Trade
USDA	U.S. Department of Agriculture

Introduction

In June 1989, the news media in South Korea and Taiwan reported that Alar, a growth regulator primarily used on apples, had been detected on U.S. grapefruit. Alar is primarily used on apples to prevent preharvest fruit drop, increase storage life, and promote red color. Evidence of Alar's carcinogenic activity in animals was discovered in 1977. As a result, the market for U.S. grapefruit sales in both countries dropped substantially. The market for several U.S. perishable commodities in other Pacific Rim countries was also threatened. Since the Alar incident, concern over the presence in food of other chemicals, primarily pesticides,¹ has emerged.

As it happened, reports of Alar detection on U.S. grapefruit resulted from misinterpreted test results. However, since the South Korean government was unaware that Alar is not used on citrus, it was not able to respond immediately to media claims of Alar discovery. Because the U.S. and South Korean governments were not able to quickly resolve the misunderstanding, several U.S. grapefruit shipments perished before reaching the market. According to our estimates, U.S. grapefruit sales to South Korea would have been \$2.4 million to \$10.6 million higher over the period July to December 1989 if the Alar incident not occurred.

Before the grapefruit scare, news media reports of Alar on U.S. apples led to consumer concerns in Taiwan and Thailand. These press reports also caused losses for importers of U.S. apples and threatened to affect cherries. For example, Taiwan importers reported a 40 percent drop in U.S. apple sales from February to July 1989.

The Pesticide Monitoring Improvements Act of 1988 requires the Department of Health and Human Services to enter into cooperative agreements with countries which are the major source of food imports to provide information on the pesticides used in the production, transportation, and storage of food products imported from production regions of such countries into the United States. However, the act does not address the issue of routinely providing U.S. trading partners information on pesticides being used in the production of U.S. exported food.

¹Pesticides are chemical or biological substances used to destroy or control weeds, insects, fungi, rodents, and bacteria.

Growth in Fruit and Vegetable Exports and Pesticide Use

U.S. fresh fruit and vegetable exports to the Pacific Rim countries and Australia increased by 82 percent from 1985 through 1989. In 1989, U.S. fresh fruit and vegetable exports amounted to 2,479,678 metric tons. Australia, Japan, South Korea, Taiwan, and Thailand—the five countries on which this report focuses—accounted for 31 percent of this volume.

In March 1990 we reported that worldwide pesticide sales had increased dramatically.² The report stated that from 1977 to 1987 the worldwide agricultural chemical market doubled in size to more than \$17 billion. It pointed out that developed countries, such as Japan and the United States, have been using greater amounts of pesticides, and developing countries have been importing progressively more pesticides.

Objectives, Scope, and Methodology

Senator Pete Wilson, Ranking Minority Member, Subcommittee on Agricultural Research and General Legislation, Senate Committee on Agriculture, Nutrition, and Forestry, asked us to provide information on (1) U.S. government efforts to prevent or resolve trade disputes that may arise over the presence of pesticides in U.S. exported produce; (2) the specific procedures used by foreign governments in selected Pacific Rim countries and Australia to set tolerances and test for pesticides on imported fruits and vegetables; and (3) the technical capabilities of these selected countries' governments to conduct pesticide testing.

To obtain information on U.S. government efforts to prevent or resolve trade disputes, we interviewed officials from the Environmental Protection Agency (EPA), the Food and Drug Administration (FDA), the Departments of Agriculture and State, and the state agriculture departments of California, Florida, and Oregon. In the private sector, we spoke with exporters, growers, and agricultural chemical producer associations. We also interviewed a liaison to the General Agreement on Tariffs and Trade (GATT) negotiations, committee members of the United Nations Codex Alimentarius Commission,³ and participants in the U.S.-South Korea ad hoc technical working group.

²Food Safety and Quality: Five Countries' Efforts to Meet U.S. Requirements on Imported Produce (GAO/RCED-90-55, Mar. 22, 1990).

³The Commission was established in 1962 to encourage fair international trade in food and promote consumer health and economic interest. It is an international organization made up of representatives from 135 countries, including the United States and four of the countries we visited—Australia, Japan, South Korea, and Thailand. Taiwan uses the Codex as a reference but is not a member.

To respond to the second objective, we visited five countries: Australia, Japan, South Korea, Taiwan, and Thailand. We selected these countries for the following reasons:

- South Korea, Japan, and Taiwan, by dollar value, imported 44 percent of their fresh fruits and vegetables from the United States in 1989;
- The five countries represent increasing markets for U.S. fresh fruits and vegetables; and
- The concerns that led to the Subcommittee's interest were first raised by the Pacific Rim countries.

For information on the five countries' specific procedures to set tolerances and test for pesticide residues, we met with government officials responsible for establishing pesticide standards, tolerances, and food safety; with importers of U.S. fresh fruits and vegetables; and with U.S. embassy officials. In three countries (South Korea, Taiwan, and Japan) we visited ports of entry, produce containment yards, and wholesale and retail markets to obtain information on sampling and other tests that are done before the food enters the market.

To obtain information on the countries' technical capabilities to conduct pesticide testing, we interviewed laboratory personnel and compared their laboratory conditions and practices with the Food and Drug Administration's laboratory standards for establishing quality controls and maintaining generally accepted laboratory practices.

As requested, we did not obtain official agency comments on this report. We discussed the information contained in a draft of this report with responsible EPA, FDA, U.S. Department of Agriculture (USDA), and Department of State officials. Their comments have been incorporated in the report where appropriate.

We conducted our work primarily between January and October 1990 in accordance with generally accepted government auditing standards.

U.S. Government Efforts to Address Trade Disputes Over Pesticide Use

The United States has undertaken multilateral, bilateral, and administrative efforts to reduce the adverse impact of disputes about food safety that may arise over the presence of pesticides on imported produce. However, the potential for disputes remains, because, for at least the five countries we visited, no mechanism has existed to routinely provide U.S. trading partners with information on pesticides being used on U.S. exported produce.

U.S. Efforts to Address Food Safety Disputes

Recognizing adverse effects that food safety barriers, including pesticide issues, can have on agricultural trade, the United States has taken a lead role at the multilateral Uruguay Round negotiations of the General Agreement on Tariffs and Trade to strengthen the rules on health-related regulations that affect agricultural trade. A major objective of the negotiations was to stiffen the procedures for dispute settlement and to require that countries base health-related regulations on sound scientific evidence.

The U.S. Foreign Agricultural Service (FAS) trade policy officials are proposing an information system that would provide the GATT member nations with advance notice of a country's intent to adopt or change health-related measures and allow a reasonable time for comment. This system would be similar to and facilitate the operation of the information system already in place under the GATT's Standards Code, an agreement covering both agricultural and industrial technical barriers to trade. The USDA's Technical Office and Office of Food Safety and Technical Services serves as a U.S. inquiry point for the Standards Code on agricultural measures. However, none of the five countries' governments has used the GATT Standards Code in an information-sharing system.

Also under negotiation is a proposal that encourages GATT cooperation with the United Nations' Codex Alimentarius Commission to facilitate the harmonization of sanitary standards. The proposal would increase the influence of the Codex because GATT dispute panels would look to the Codex standards for guidance when resolving food safety trade disputes.

Bilaterally, the FAS has established ad hoc technical working groups with several other countries, such as South Korea and Taiwan. The U.S. participants in these ad hoc working groups include representatives from USDA, EPA, FDA, and the Office of the U.S. Trade Representative. Their objective is to improve bilateral relations by addressing technical issues

related to agricultural trade (i.e., food safety concerns, pesticide residues, and so forth) and resolving disputes over differences in standards and testing procedures. They provide U.S. assistance in setting standards and sharing information on pesticide tolerances, sampling, and pesticide residue testing methods.

In South Korea, the technical ad hoc working group has been used as a forum to (1) discuss ways in which the two governments might work together to avoid future trade disputes; (2) share information on U.S. pesticide and tolerance levels; and (3) discuss provisions for certifying foreign laboratories for pretesting agricultural exports.

The United States has also taken administrative action designed to address food safety issues. In 1989, USDA established an International Food Safety Task Force in response to the Alar grapefruit scare. The Task Force includes technical representatives from USDA; FDA; the EPA; the Department of State; the Department of Justice's Bureau of Alcohol, Tobacco and Firearms; and the U.S. Trade Representative. It does not have a policy development orientation but rather it is designed to provide a quick, coordinated U.S. government technical response to food safety concerns as they arise to (1) prevent or resolve trade disruption and (2) limit U.S. exporters' and importers' losses, especially for perishable fresh fruits and vegetables, due to trade disputes.

In addition, USDA has actively participated in food safety seminars with state agriculture departments and industry representatives. These seminars discuss food safety issues and provide information on the current status of the international negotiations and bilateral and administrative actions related to food safety.

Potential for Trade Disputes Remains Due to Lack of Information on U.S. Pesticide Use

The governments in the five countries we visited had little information on the type and amount of pesticides used and tolerance levels actually allowed for specific U.S. exported produce. Australian officials stated that they had obtained some information on U.S. standards through an informal network of contacts in the U.S. government. None of the five countries' governments has used a formal information-sharing system.

Government officials in the countries we visited have obtained pesticide use and tolerance information from various sources, including international organizations, U.S. federal and state agencies, published sources, and data on residues found as a result of previous laboratory tests. However, these government officials stated that all of these sources

combined have provided little information on specific pesticide/commodity combinations used in the United States. Thus, the risk of a trade dispute over an incident such as the South Korean grapefruit scare remains.

According to U.S. and foreign government program officials, regular sharing of information on U.S. pesticide and other chemical usage would help relieve the potential for trade disputes over food safety. South Korean government officials told us that the Alar dispute might have been avoided if they had known what pesticides and other chemicals had been used on U.S. grapefruit. A South Korean official from the laboratory that initially conducted the Alar tests on U.S. grapefruit stated that the laboratory would have been in a better position to advise the South Korean consumer if it had prior knowledge of the chemicals used in the production of U.S. grapefruit and if it had known that Alar is not used on citrus in the United States.

In addition, Thailand government officials stated that they needed more information on U.S. pesticide testing methods. According to these government officials, the Thailand laboratory that tested U.S. apples for Alar was unable to use the FDA standard analytical method to test for Alar because it did not have the solvents necessary to conduct the appropriate confirmation test. The initial testing method used by the laboratory detected Alar residues that far exceeded the U.S. tolerance for apples. It was only after several communications between Thailand's Department of Medical Sciences and U.S. officials that the Thailand laboratory was able to obtain the necessary solvents and conduct the proper confirmation test. The test indicated that the Alar levels on the imported apples were below U.S. tolerances.

Conclusions

The five countries we visited had little information on the pesticides and other chemicals actually used on specific U.S. exported fruits and vegetables. Better information on pesticides and other chemicals used on U.S. exported produce could be obtained from improved information-sharing between the United States and its trading partners. Such information would help reduce the likelihood of future disruptions of U.S. agricultural exports caused by foreign concerns over pesticide and other chemical use on exported produce.

Recommendations

To help reduce the likelihood and impact of future disruptions of U.S. agricultural exports caused by foreign concerns over pesticides, we recommend that the Secretary of Agriculture

- develop mechanisms for routinely providing U.S. trading partners with information on pesticides used on U.S. exported produce. Such information should include U.S. pesticide use patterns, tolerances, and sampling and residue testing methods and
- establish ad hoc technical working groups with more U.S. trading partners to address technical problems related to agricultural trade, such as pesticide usage, and to resolve disputes over differences in standards and testing procedures.

Five Countries' Procedures to Monitor the Safety of Imported Produce

The governments in the five countries we visited have laws, regulations, and government agencies for ensuring the safety of the food supply. They have established import inspection and sampling procedures which include pesticide monitoring. However, government pesticide residue monitoring procedures have varied because each country was at a different stage in designing its food safety standards. In addition, although the government laboratories in the five countries had the necessary technical capabilities to conduct pesticide residue testing, the United States and these countries have not agreed on and have not used common standards and testing methods.

Pesticide Residue Monitoring Procedures and Standards Have Varied

The responsible agencies in the five countries have registered and set tolerances for a number of pesticides used on both imported and domestic produce. Each country has established import inspection procedures for all fruits and vegetables that include document and food safety inspections. However, the governments in the five countries have conducted pesticide residue testing less routinely than the United States, where sampling and testing is conducted on imported fruits and vegetables based on a national sampling plan. Neither Australia nor Thailand has systematically conducted pesticide residue testing on imported fruits and vegetables. Japan has conducted tests on certain products when deemed necessary. And in South Korea and Taiwan, pesticide residue testing has been conducted on selected imported commodities.

Each country we visited was at a different stage of registering pesticides, establishing tolerances and procedural standards, and developing testing methodologies for sampling and monitoring pesticide residues on food. The five countries have registered and set tolerances for pesticides, as shown in table 3.1.

Table 3.1: Five Countries' Pesticide Allowances

Country	Number of pesticides allowed
Australia	395
Japan	25
South Korea	17
Taiwan	127
Thailand	10

Australia, South Korea, Taiwan, and Thailand have used internationally recommended guidelines for pesticide residue testing, while Japan has been developing its own testing methods.

Australia

Australia has not used the pesticide residue limits of foreign countries when it has not established a residue limit for a particular pesticide. Rather, Australian officials said they would elect to use either the United Nations' Codex standards or, if no Codex standard existed, to adopt a tolerance level of zero.

In Australia, the federal and state governments have shared responsibility for regulating pesticide residues on food. The National Health and Medical Research Council has established pesticide residue limits while the Department of Primary Industries has conducted food safety inspections at the ports of entry. State governments have taken enforcement action against food importers that were cited for violating Australian food safety laws.

As of May 1990, the National Health and Medical Research Council had established residue tolerance levels for 395 pesticides.¹ According to Australian officials, the Council has attempted to set pesticide residue tolerance levels at the same level established by the Codex standards.

In July 1990, Australia implemented the Imported Food Inspection Program to inspect imported foods for various health hazards, including pesticide residues. Under this program, an Imported Food Risk Advisory Committee has categorized imported food into low-, medium-, and high-risk groups. The higher the risk, the more rigorous the inspection. The laboratory analysis under this program will be done by government laboratories.

The inspections under the Imported Food Inspection Program have concentrated on detecting microbiological and heavy metal hazards in various foods, including prawns, oysters, fish, and cheese. Australian officials stated that fruits and vegetables have not yet been targeted for inspection for excessive pesticide residues. They noted that concern over pesticides was growing in Australia, and the Risk Advisory Committee may in the future recommend pesticide testing for specific imported fruits and vegetables.

Japan

Japan has allowed imported produce to contain residues of chemicals that have no set tolerances if these residues were not over the tolerance level set by the exporting country. For example, U.S. exports to Japan

¹Australia's list of 395 regulated residues included pesticides, agricultural chemicals, feed additives, veterinary medicines, and noxious substances.

containing chemicals that did not have tolerances established in Japan could be accepted if they met EPA standards.

In Japan, three agencies—the Ministry of Agriculture, Forestry, and Fisheries; the Ministry of Health and Welfare; and the Environmental Agency—share responsibility for establishing pesticide regulations and tolerance levels for pesticide residues allowed on food. The Ministry of Agriculture, Forestry, and Fisheries also registers and approves all pesticides.

As of May 1990, Japan had set tolerance levels for 25 pesticides approved for use on 57 commodities. In Japan, setting pesticide residue tolerance levels has been an ongoing process in which experts have analyzed methodologies and evaluated the results of studies to determine whether more pesticides should be added to the current list. Japan was in the process of expanding the number of established tolerances to 27 or 28 pesticides.

In Japan, all imported fresh produce has been subjected to a document and phytosanitary inspection for specific diseases and pests. The Ministry of Agriculture, Forestry, and Fisheries has an agricultural chemical inspection station and plant quarantine testing laboratories at all ports of entry. These entities are responsible for conducting pesticide residue testing on commodities which are new to the Japanese market place or when a particular concern has been identified. Japan's testing procedures have required importers to select samples based on the number of cartons in a shipment. For example, if a shipment contained 1,200 cartons of grapefruit, the importer could randomly select 9 cartons and test 1 grapefruit from each carton. Ministry officials told us that the Ministry has tested approximately 4 percent of all imported food for pesticides.

The Ministry of Health and Welfare supervises the pesticide residue testing conducted at the local level on most imported and domestically grown agricultural products. Such testing is conducted by local laboratories in each Japanese municipality. The samples are gathered at the retail level for testing. The Ministry's main focus is research, conducted by local laboratories, on what pesticides are used on the produce. The research results are used to establish tolerances and methods for residue testing.

South Korea

South Korea has set tolerance levels and has been conducting pesticide residue testing for 17 pesticides used on the 28 agricultural products for which it has established tolerances. Quarantine inspectors collect random samples at ports of entry for the 28 commodities that are required to undergo analysis. Inspectors may also collect samples at the wholesale market where South Korea sells 50 percent of its fresh fruit imports.

South Korea has subjected other imported produce only to a phytosanitary inspection for the prevalence of specific diseases and pests and has allowed the produce to enter the market after passing inspection. South Korea may test such produce if it has originated from a country in which a contamination problem has occurred or if the produce has experienced prior problems during import inspection or after distribution.

In South Korea, the Ministry of Health and Social Affairs is responsible for establishing pesticide residue tolerances for imported and domestic produce. The Ministry of Agriculture, Forestry, and Fisheries handles the registration of all pesticides. The Ministry of Health and Social Affairs was in the process of establishing tolerances for 19 more pesticides. Fresh fruits and vegetables imported into South Korea were subjected to a document and phytosanitary inspection for specific diseases and pests, and selected products underwent a pesticide residue test. At ports of entry, quarantine inspection offices have conducted the document and phytosanitary inspections for diseases and pests. In cities and provinces, the Ministry of Health and Social Affairs has designated specific laboratories (such as the Institute of Health and Environment, the Korean Food Industry Association, and the National Institute of Health) to perform the pesticide residue tests.

Taiwan

The Taiwan government has allowed flexibility in cases where the exporting country has used either a nonregistered pesticide or a pesticide for which Taiwan has not established a tolerance level. According to Taiwan government officials, in such cases the Taiwan Advisory Committee for Food Safety, which is in the Health Department, can evaluate the pesticide to decide whether to accept the tolerance level set by the exporting country.

In Taiwan, the Department of Health establishes and manages food sanitation standards, including setting tolerance levels for pesticides that are used on domestic and imported produce. The Council of Agriculture registers and approves pesticides used in Taiwan.

The Department of Health has set tolerance levels for 127 pesticides which have been registered by the Council of Agriculture for use on imported fruits and vegetables.

Like South Korea, Taiwan also has inspected and tested imported fresh produce. The Bureau of Commodity Inspection and Quarantine is the Taiwan national agency responsible for conducting document and phytosanitary inspections for specific diseases and pests on imported commodities. The Bureau conducts pesticide residue testing at its own laboratories located in the capital, Taipei. The Taiwan Institute of Agricultural Chemicals and Toxic Substances Research has tested imported products for pesticide residues when requested by the government to address special concerns, such as occurred in the Alar grapefruit scare.

For the Department of Health's list of 127 pesticides which have established tolerances, the Taiwan government has set up a pesticide residue testing program to detect residues on selected produce. The Bureau decides which type of produce is to be selected based on the crop season, import statistics, and past experiences. In May 1990, the Bureau selected grapefruits and cherries for testing.

The Bureau has collected between 1 to 2 kilograms of a product from five shipments for pesticide residue testing about 5 times a month. The Bureau then has conducted tests at its laboratories. In cases where the Institute has conducted the tests, the samples were provided by Bureau inspectors.

Thailand

In Thailand, the Ministry of Public Health has been able to accept international standards or adopt the standards of the exporting countries when determining whether to allow imported foods into the country. The Ministry is responsible for establishing standards and testing for pesticide residues on domestic and imported foods. The Ministry has established tolerances for 10 pesticides, by crop group, and was considering expanding the list.

The Ministries of Public Health and Agriculture are responsible for conducting food safety inspections and pesticide residue tests on imported fresh fruits and vegetables. The government of Thailand has not systematically sampled imported produce for pesticide residues. Rather, such testing has generally been done when a problem has been suspected. For example, Thailand tested U.S. apples for Alar residues due to reports about concern over Alar in the United States.

Chapter 3
Five Countries' Procedures to Monitor the
Safety of Imported Produce

Each year, Thailand has prepared a master sampling plan for testing domestic food products. This plan has detailed how many food samples would be selected for testing.

Pesticide Residue Testing Is Conducted at Technically Capable Laboratories

Government laboratories in the five countries we visited appeared to have the necessary technical capabilities, including equipment and personnel, to conduct pesticide residue testing. We compared their laboratory practices with the FDA's laboratory standards for establishing quality controls and maintaining generally accepted laboratory practices.

According to FDA officials, technical capability is defined as having the proper equipment, maintaining adequately trained personnel and appropriate laboratory supplies, and using approved testing methods and procedures. These officials stated that having technical capability alone did not eliminate the potential for producing conflicting test results.

We observed that the laboratories we visited were equipped with pesticide residue testing equipment. The equipment used to detect and quantify pesticide levels in food included gas chromatographs for multiresidue testing, mass spectrometers, and high performance liquid chromatographs. The laboratories were stocked with the solvents and other chemicals needed to conduct accurate pesticide residue tests. However, in Thailand, the government was unable to use the FDA standard analytical method to test for Alar on apples because the laboratory did not have the required solvents. In each country, the laboratories we visited employed personnel with the technical education necessary to conduct pesticide analyses. According to the laboratory technicians, they were aware of procedures for cleaning and handling equipment and producing samples and using other standard scientific practices to ensure the accuracy of test results. The laboratory scientists and technicians we interviewed in the five countries were familiar with Codex- and FDA-recommended pesticide residue testing methods.

However, the five countries have applied a variety of analytical methods that could contribute to variations in test results. For example, the pesticide residue testing method used in South Korea and Taiwan to test for Alar on grapefruit was developed for apples. In addition, according to U.S. and foreign officials, the United States and these five countries have not reached agreement on which analytical methods to use for pesticide residue testing.

Australia

The Australian Government Analytical Laboratory in South Australia (one of five government laboratories) has specialized in conducting residue analysis. This laboratory has developed analytic methods based on, among other things, guidelines from the international Association of

Analytical Chemists. If the laboratory has not established a testing method for detecting a particular pesticide, laboratory scientists have used a generally recognized method, such as multiresidue testing.

The South Australian Laboratory was well equipped with pesticide residue testing equipment. Gas and high performance liquid chromatographs were used for pesticide residue testing and confirmation tests. A mass spectrometer located at the Sydney Laboratory was used to identify unknown pesticides. Test results were fed directly into an automated system and analyzed by computer programs and laboratory technicians.

The minimum educational requirement for laboratory technicians was a bachelor of science degree or equivalent. Laboratory technicians also received on-the-job and external training in pesticide residue testing. The South Australian Laboratory ensures quality control through setting education requirements, devising a written quality control manual, requiring routine calibration of equipment, and prescribing independent laboratory accreditation.

Japan

In Japan, the Ministry of Agriculture, Forestry, and Fisheries and the Tokyo Metropolitan Research Laboratory of Public Health have employed their own methods for conducting pesticide residue testing. Using internationally accepted analytical guidelines, Japan was in the process of developing its own testing methods as laboratories continue to conduct agricultural chemical research.

The equipment used by the inspection stations and the Tokyo Metropolitan Research Laboratory included the mass spectrometer, the gas chromatograph, and the high performance liquid chromatograph. The Japanese laboratories we visited contained new pesticide residue testing equipment which were linked with a computer for automated data processing to support research efforts.

Japanese law specifies the educational requirements for technical personnel. In accordance with Japanese law, the Ministry of Agriculture, Forestry, and Fisheries has required that its technicians have a bachelor's degree in such areas as medicine, science, veterinary, or pharmaceutical science.

South Korea

South Korea's National Institute of Health laboratory has applied multiresidue testing methods to detect pesticide residues. The South Korean laboratories were equipped with gas chromatographs and high performance liquid chromatographs. The laboratories also had a spectrophotometer for conducting confirmation of tests. According to South Korean officials, most technical personnel who had conducted pesticide residue tests had at least a master's degree in food chemistry or pharmaceutical science.

According to laboratory officials, when the technicians have prepared samples for pesticide residue tests, the grinders and blenders were thoroughly cleaned as required before sample preparation was begun. Other supplies, such as syringes, were also thoroughly cleaned. In addition, the technicians have followed standard scientific practices to ensure the accuracy of the results, such as conducting standard tests and determining recovery rates, before conducting the actual test.

Taiwan

In Taiwan, the Bureau of Commodity Inspection and Quarantine and the Institute of Agricultural Chemical and Toxic Substances Research laboratories used multiresidue testing methods, since specific testing methods did not exist for all pesticides. The Bureau laboratory also used other analytical methods to detect pesticide residues.

The Bureau and Institute laboratories were equipped with the required pesticide residue testing equipment—gas chromatographs, high performance liquid chromatographs, and mass spectrometers. Their laboratory personnel practiced quality controls to ensure that equipment and supplies were thoroughly cleaned before conducting pesticide residue tests. Other standard scientific practices were followed to ensure the accuracy of test results.

According to Taiwan officials, the minimum degree required for laboratory technicians employed by the Bureau was a bachelor of science degree in chemistry or pharmaceutical science. They stated that the Institute required that the technicians who prepare samples must have graduated from an agricultural vocational school and that those who operated the equipment and analyzed test results must have had at least a bachelor's degree in a science-related field.

Thailand

In Thailand, the Ministries of Public Health and Agriculture laboratories generally have applied the multiresidue testing method for pesticide residue analysis. Laboratory technicians were familiar with FDA testing methods. The laboratories had gas chromatographs, a liquid chromatograph, and a mass spectrometer to conduct pesticide residue tests.

According to Ministry officials, the laboratory technicians had bachelor's degrees in the general sciences and had received the necessary on-the-job laboratory training to conduct pesticide residue tests. The laboratory we visited had participated in quality assurance programs, including engaging in regular collaborative testing programs with other laboratories, to ensure the accuracy of its test results. The quality controls practiced by the laboratory technicians were in accordance with standard analytical guidelines for sample preparation and equipment cleaning.

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