# FOOD SAFETY AND INSPECTION SERVICE

# 1999 NATIONAL RESIDUE PROGRAM

## PREFACE

Welcome to the 1999 "Blue Book." This book presents the 1999 Food Safety and Inspection Service (FSIS) National Residue Program (NRP). [For those reading this electronically, this document has been commonly known as the "Blue Book" because the covers of the printed versions are blue.]

This text presents a comprehensive explanation of the process used to plan the NRP for 1999. Recently, the NRP was modified to move towards a system of residue evaluation more consistent with modern risk assessment principles. The methodologies employed in the planning of the 1999 NRP, as described in this document, reflect these changes. Following the explanation of the planning process, this text provides a detailed description of the completed Domestic Monitoring Plan and Special Projects and Import Residue Plan for the 1999 FSIS NRP.

In addition to a description of the annual NRP, the Blue Book has traditionally included two very useful tables: a list of all established tolerances and action levels for drugs, pesticides and environmental contaminants in food animal tissues, and a list of all FSIS Official Methods for these compounds. Because of their continued utility, these tables have been updated and appear as the last two sections of this document.

The staff of the Emerging Issues Branch, Chemistry and Toxicology Division, Office of Public Health and Science, FSIS, hope that you will find this *1999 National Residue Program* to be every bit as useful and informative as it has been in past years. We would like to thank all of our predecessors for providing us with tables and information that they developed and that we continue to use.

## CONTACTS AND COMMENTS

Two interagency committees, the Surveillance Advisory Team and the Residue Prioritization Committee, developed the 1999 FSIS NRP. The Emerging Issues Branch, Chemistry and Toxicology Division, Office of Public Health and Science, FSIS, USDA, coordinated this effort and is responsible for the publication of this material. Questions about the FSIS NRP should be directed to the USDA-FSIS Chemistry and Toxicology Division, 6912 Franklin Court Suite, 1400 Independence Avenue, S.W., Washington, D.C. 20250-3700, phone (202) 501-7319, fax (202) 501-7639.

## ACKNOWLEDGEMENTS

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# 1999 FSIS NATIONAL RESIDUE PROGRAM

## TABLE OF CONTENTS


| | | |
|---|---|---|
| | Preface/Contacts and Comments/Acknowledgements | |
| **Section 1.** | The FSIS National Residue Program | 1-1 |
| **Section 2**. | Components of the FSIS National Residue Program | 2-1 |
| **Section 3.** | Planning the 1999 FSIS National Residue Program: Introduction | 3-1 |
| **Section 4.** | Planning the 1999 FSIS Domestic Monitoring Plan and Special Projects: Veterinary Drugs | 4-1 |
| **Section 5.** | Planning the 1999 FSIS Import Residue Plan: Veterinary Drugs | 5-1 |
| **Section 6.** | Planning the 1999 FSIS Domestic Monitoring Plan and Special Projects: Pesticides | 6-1 |
| **Section 7.** | Planning the 1999 FSIS NRP Import Residue: Pesticides | 7-1 |
| **Section 8.** | Planning the 1999 FSIS Domestic Monitoring Plan and Special Projects, and Import Residue Plan: Environmental Contaminants | 8-1 |
| **Section 9.** | The 1999 FSIS NRP-Domestic Monitoring Plan and Special Projects, and Import Residue Plan | 9-1 |
| **Appendix I.** | U.S. Residue Limits for Compounds in Meat and Poultry | AI-1 |
| **Appendix II.** | FSIS Laboratory Residue Analytical Capability | AII-1 |

# SECTION 1
# THE FSIS NATIONAL RESIDUE PROGRAM

# SECTION 1. THE FSIS NATIONAL RESIDUE PROGRAM

The regulatory system that enforces the U.S. food safety laws has been evolving since 1906. This system helps to protect the public from foodborne hazards and has enabled the food produced in the U.S. to be among the safest in the world. Nevertheless, maintaining the wholesomeness and safety of the food supply requires continued vigilance and the flexibility to adapt to changing conditions.

On July 25, 1996, the U. S. Department of Agriculture published the *Final Rule on Pathogen Reduction; Hazard Analysis and Critical Control Point (HACCP) Systems*. The principal focus of this rule, which complements existing food safety laws and regulations, is to reduce both the pathogenic organisms on meat and poultry products and the incidence of foodborne illness associated with these products. The presence in food of chemical residues above permitted levels causes the food to be adulterated under the Federal Food, Drug, and Cosmetic Act (FFDCA). Under the Federal Meat Inspection Act (FMIA), the Poultry Products Inspection Act (PPIA), and the Egg Products Inspection Act (EPIA), slaughter and production establishments bear responsibility for ensuring that their product is not adulterated when it enters commerce. Part 417 of the HACCP rule requires meat and poultry establishments to develop and implement a system of preventive measures designed to ensure the safety of their products. In developing their HACCP plans, slaughter establishments must address all chemical, physical, and biological hazards that are reasonably likely to occur in the animals that enter their plants. Section 417.2 requires that slaughter establishments conduct a hazard analysis to determine the food safety hazards reasonably likely to occur before, during, and after entry into the establishment. The preamble of the rule describes the potential hazards that plants need to consider during a hazard analysis. These hazards include chemical residues resulting from use of or exposure to animal drugs, pesticides and environmental contaminants. The rule also provides a new framework for the modernization of the meat and poultry inspection system.

Evidence exists that human illnesses such as allergic reactions, hypersensitivity, and toxicity have resulted from drug residues in animal tissues. Similarly, violative levels of pesticide residues are known to have adverse health effects. Expanding scientific evidence demonstrates that antimicrobial-resistant bacteria may result from both subtherapeutic and therapeutic use of antimicrobial drugs in food animals, and that these antimicrobial-resistant bacteria may subsequently be transmitted from animals to humans through the food chain.[1] A vigilant chemical residue prevention program is essential to fostering the prudent use of drugs and pesticides in animals that enter the human food supply. The requirement that slaughter establishments implement HACCP systems is a significant step in this evolutionary process.

HACCP implementation does not remove or diminish the regulatory authority of FSIS. FSIS inspectors will continue to condemn animals for cause, and FSIS will continue to cooperate with the Food and Drug Administration (FDA) and/or the Environmental Protection Agency (EPA) as a part of follow-ups to residue violations. Any tissue containing a residue that exceeds its

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[1]Emergence of Multidrug-Resistant *Salmonella enterica* Serotype *Typhimurim* DT104 Infections in the United States: M. K. Glynn, et al, *The New England Journal of Medicine*: May 7, **1998**,Volume 338, Number 19.

specified tolerance or action level, or that contains a residue that has been banned from use in food animals, is considered to be in violation of FFDCA.

When violative residues are detected in food-producing animals submitted for slaughter, FSIS notifies the producer and any parties involved in offering these animals for sale. These parties are subject to follow-up enforcement testing until compliance is demonstrated. Product found to contain violative levels of residues is considered adulterated and is subject to condemnation. If the product has been distributed into commerce, it may be subject to market recall. In addition, FDA and cooperating state agencies may make on-site visits to these firms. Typically, an educational visit by the state is the first step in attempting to correct a residue problem. If the problem is not corrected, subsequent visits, made by FDA, could result in enforcement action, including prosecution.

FSIS enforces the tolerances and action levels set by FDA and EPA. FDA has statutory authority for setting tolerances and/or action levels for veterinary drugs under the FFDCA, as codified under 21 CFR Part 556 and 109. EPA has statutory authority for setting tolerances and/or action levels for pesticides under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) and FFDCA, as modified by FQPA; codified under 40 CFR. Chemical hazards also may be associated with substances that occur in meat, poultry, and egg products as a result of environmental contamination. EPA reviews exposure and toxicology data and may make recommendations to FDA and FSIS on the appropriate action levels for canceled pesticides and other environmental contaminants present in the environment.

The cornerstone of FSIS residue prevention activities is the FSIS National Residue Program (NRP), a multi-component analytical testing program for residues in domestic and imported meat, poultry, and egg products.[2] The NRP provides a variety of sampling plans to verify that slaughter establishments are fulfilling their responsibilities under HACCP for preventing violative residues and develops national data for chemical residues to support risk assessment, enforcement and educational activities. The range of chemical compounds considered for inclusion in the various NRP testing programs is comprehensive in scope. It includes approved and unapproved pharmaceutical drugs and pesticides known or suspected to be present in food animals in the U.S. and in countries exporting products to the U.S. It also includes any other xenobiotic or naturally occurring compounds that may appear in meat, poultry and egg products and that may pose a potential human health hazard.

The prevention of illegal chemical residues in the food supply is an integral aspect of maintaining a high level of food safety. High consumer expectations necessitate that the U.S. thoroughly document the safety of our meat, poultry, and egg products. In addition, issues related to chemical residues in food may hinder the export of U.S. food products.

The NRP is designed to provide: (1) a structured process for identifying and evaluating compounds of concern by production class; (2) the capability to analyze for compounds of concern; (3) appropriate regulatory follow-up of reports of violative tissue residues; and (4) collection, statistical analysis, and reporting of the results of these activities.

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[2]The production classes for which FSIS has regulatory authority are: horses, bulls, beef cows, dairy cows, heifers, steers, bob veal calves, formula-fed veal, non-formula-fed veal, heavy calves, sheep, lambs, goats, market hogs (including roaster pigs), boars/stags, sows, young chickens, mature chickens, young turkeys, mature turkeys, ducks, geese, rabbits, and egg products (liquified eggs and dried eggs).

The goals of the NRP are as follows:

- Enforce Federal laws and regulations;
- Maintain consumer confidence by ensuring that meat, poultry, and egg products are not adulterated;
- Act as a deterrent against the slaughter of adulterated animals and the processing of adulterated eggs; and
- Assess and communicate human exposure to chemical residues.
- Provide verification of residue control in HACCP systems.

# SECTION 2
# COMPONENTS OF THE FSIS NATIONAL RESIDUE PROGRAM

# SECTION 2. COMPONENTS OF THE FSIS NATIONAL RESIDUE PROGRAM

## DOMESTIC RESIDUE SAMPLING PROGRAM

Components of the Food Safety and Inspection Service (FSIS) National Residue Program (NRP) for domestic products include Monitoring, Special Projects, Surveillance, Enforcement Testing, and the Contamination Response System. These are described below.

- **Monitoring** involves the sampling of specified animal populations to provide information about the occurrence of residue violations on an annual, national basis. Monitoring information is obtained through a statistically based random selection of specimens from animals that appeared normal and healthy at time of slaughter, and that have passed inspection. Generally, production classes are sampled at one of four levels (460 samples/year, 300 samples/year, 230 samples/year, or 90 samples/year). The probability of detecting a violation varies positively with the number of samples analyzed and the true violation rate of the production class being tested. The results are also used to identify producers or other entities marketing animals with violative concentrations of residues. When such producers subsequently offer animals for slaughter, the animals may be subjected to enforcement testing until compliance is demonstrated. The carcass is not retained after the sample is taken.

- **Special Projects** are information-gathering studies that do not meet the criteria for inclusion in the Monitoring Plan. When sampling will not be conducted over a full 12-month period, or when there is a lack of precise slaughter volume data on the production classes to be sampled, the information that is obtained will not meet the data standards of the Monitoring Plan. Thus the Special Project designation is used. This designation is also used when it is not possible to define a "violation rate" for a compound, because the violative level has not been defined. Many chemicals, such as trace metals, industrial chemicals, and mycotoxins, may be inadvertently present in animals. Their presence in edible tissues, and the resulting need for limits to protect public health, have not been established. FSIS may conduct studies to develop information on the frequency and concentration at which such residues occur. A subset of Special Projects is **Surveillance** testing. Surveillance is designed to distinguish components of livestock, poultry and egg products in which residue problems exist, to measure the extent of problems, and to evaluate the impact of actions taken to reduce the occurrence of residues in the food animal population. As with the Monitoring Plan, Special Project samples (except for certain types of Surveillance samples) are taken from animals that appeared normal and healthy at the time of slaughter, and that have passed inspection.

- **Enforcement Sampling/Inspector-Generated Sampling** consists of the analysis of specimens obtained from individual animals or lots that appear suspicious based on herd history or ante-mortem and/or post-mortem inspection. Testing is performed to detect individual animals with violative concentrations of residues. This testing is emphasized in problem (high prevalence) populations and used as a tool to prevent residues from entering the food supply. Testing frequently results from decisions by program employees based on regional guidelines or direct observations. It is also used to follow up on producers and others who have marketed animals with violative concentrations of residues. A total of 235,495 enforcement samples was analyzed in 1996.

***In-plant Tests***

In-plant tests are a key part of the NRP. They provide a rapid screening method to detect the presence of residues at the plant level.

**SOS**, for Sulfa-On-Site, was implemented in April 1988 to test swine urine for sulfonamide residues. SOS is used in many of the largest swine slaughtering facilities. Laboratory confirmation of violations is required.

**CAST**, for Calf Antibiotic and Sulfonamide Test, is used to test bob veal calves (under 150 pounds and less than three weeks old). Prior to 1996, CAST did not require laboratory confirmation of the result; any violation found with CAST resulted in immediate condemnation of the calf. Beginning in 1996, any zone of inhibition measuring greater than 18 mm is sent to the laboratory for confirmation.

**STOP**, for Swab Test on Premises, was implemented in 1979 to detect the presence of antibiotic residues in kidney tissue. Originally developed for testing dairy cows, STOP is now used for a number of production classes. Laboratory confirmation is required before the animal carcass is condemned. Certain STOP-positive samples are tested for both antibiotics and sulfonamides; the sulfonamide violations are reported with the STOP antibiotic violations.

Confirmed STOP-positive sample specimens with sulfonamide residues that have no established limits are considered violative in those production classes for which these compounds are not approved for use.

**FAST,** for Fast Antimicrobial Screen Test, quickly detects both antibiotic and sulfonamide drug residues in kidneys and livers and has proved to be a suitable replacement for CAST and STOP. Though FAST is capable of detecting sulfonamides, this test is significantly less sensitive that the SOS test. FAST was implemented in pilot plants in 1995. The use of FAST has been extended to approximately 50 of the largest cow and bob veal slaughtering plants in 1996.

- **Contamination Response System (CRS)** is a management system to identify potential residue crises involving pesticides or other environmental contaminants, and any veterinary drugs whose occurrence requires extremely rapid response. The CRS is most commonly initiated when a residue level greater than or equal to 80% of the tolerance is detected by one of the other components of the NRP (unless otherwise defined by FSIS on an individual compound basis).

When a potential or known residue crisis is identified under the NRP, a CRS case is activated. CRS utilizes the resources of all relevant FSIS, Food and Drug Administration (FDA), Environmental Protection Agency (EPA), Animal and Plant Health Inspection Service (APHIS), and Agricultural Marketing Service (AMS) units to resolve pesticide and drug problems promptly.

# IMPORT RESIDUE SAMPLING PROGRAM

The Federal Meat Inspection Act (FMIA), Poultry Products Inspection Act (PPIA), and Egg Products Inspection Act (EPIA) require foreign countries that export meat, poultry, or egg product to the U.S. to establish and maintain inspection systems that are equivalent to those of the U.S. Countries must undergo a rigorous review process before they can become eligible to export meat, poultry and egg product to the U.S. Once a country is determined to be eligible, the foreign inspection system is responsible for certifying individual establishments to FSIS. FSIS periodically reviews the inspection program of the country to ensure it remains equivalent to the U.S. system. Reinspection of product at the U.S. port-of-entry, is an additional check on the effectiveness of the foreign country's inspection system.

The principle underlying FSIS import activities is a "*systems approach*," which focuses on whether the foreign country's overall inspection system is equivalent to the U.S. system. FSIS does audit foreign systems to verify that the exporting country's sanitary measures achieve the U.S. inspection system's appropriate level of protection.

Residue control is a major feature of an inspection system that must be judged equivalent to the U.S. system before a country becomes eligible to export to the U.S. Foreign countries exporting to the U.S. are required to have residue control standards that lead to equivalent protection from food hazards as those of the U.S. These may include the following:

- Random sampling of animals at slaughter.
- Use of approved testing methods.
- Testing appropriate target tissues, even though such tissue may not be exported to the U.S.
- Testing for compounds identified as potential contaminants of meat exported to the U.S.
- Random sampling of eggs presented for processing

After a foreign country is determined to have an equivalent system of meat, poultry, and egg inspection and is eligible to export product to the U.S., FSIS relies on the country's national inspection authorities to certify that establishments meet all applicable standards and are authorized to export to the U.S. FSIS audits the foreign inspection system at least annually, depending on a country's performance history, including previous plant reviews and product reinspection at the port of entry. If a country does not continue to operate an inspection system equivalent to the U.S. system, including the 1996 *Final Rule on Pathogen Reduction; Hazard Analysis and Critical Control Point (HACCP) Systems*, it is removed from the official list of countries eligible to export to the U.S. published in the Federal Register.

As a further check on the effectiveness of the foreign inspection system, FSIS randomly samples meat, poultry, and egg products for reinspection at the port of entry to the U.S. Reinspection is directed by the Automated Import Information System (AIIS), which stores reinspection results from all port of entry samples for each country and for each plant. Reinspection of products is performance-based, which means that better performing foreign establishments are subject to less frequent reinspection by FSIS inspectors at official import establishments. All shipments are reinspected for transport damage, labeling, proper certification, general condition, and accurate count. The AIIS assigns a variety of types of sample inspection, which may include analysis for chemical residues. Residue analyses is not limited to those compounds included in the domestic residue program. FSIS can initiate a special sampling plan when there is a need to monitor a country for residues of a specific compound, based on detection of violative residues at port of entry, or other information concerning risk to human health. Decisions about product acceptability are based on U.S. tolerances or action levels.

Products that pass reinspection are stamped with the mark of inspection and allowed to enter U.S. commerce. If they do not meet U.S. requirements, they are stamped "U.S. Refused Entry" and must be returned to the exporting country, destroyed, or converted to animal food. In addition, the frequency of reinspection is increased for all shipments of all like product from the violative foreign establishment, until a record of compliance is reestablished.

For egg products, the first ten shipments from individual foreign establishments are subjected to 100% reinspection, to establish a history of compliance for each product category. This rate is reduced to a random selection of one reinspection out of eight shipments, which will continue as long as the product is in compliance.

# SECTION 3
# PLANNING THE 1999 FSIS NATIONAL RESIDUE PROGRAM: INTRODUCTION

# SECTION 3. PLANNING THE 1999 FSIS NATIONAL RESIDUE PROGRAM: INTRODUCTION

## BACKGROUND

The Food Safety and Inspection Service (FSIS) has focused special attention on the planning of the Monitoring Plan and Special Projects for domestic products, and upon its residue testing program for imported products, since these are the Agency's principal source of information on the occurrence of residues in meat, poultry, and egg products. The remainder of this document will explain how FSIS designed the 1999 FSIS National Residue Program (NRP) Domestic Monitoring Plan and Special Projects, and Import Residue Plan, and will provide a complete listing of the residues and production classes that are sampled under these programs.

**The Domestic Monitoring Plan and Special Projects and the Import Residue Plan are public health-based residue sampling plans whose design is founded upon ideas and techniques from the field of risk assessment.** It must be emphasized, however, that the results of this design process do not represent absolute estimations of risk. It was not possible for FSIS to undertake a formal risk assessment of each of the thousands of possible combinations of residues and production classes.

The design of the Monitoring Plan and Special Projects consists of four distinct phases. Phases I and II are the same for domestic and imported products, but there are some differences in Phases III and IV.

In Phase I, a comprehensive list of residues of concern in meat and poultry is generated. These residues are then ranked according to the relative public health concern presented by their potential presence in meat, poultry, and egg products. This ranking is accomplished using scoring rules that are linked to quantitative measures of hazard-relevant attributes. Only public health related criteria are used to generate and rank the list of candidate residues in Phase I. Thus the output of Phase I reflects only the relative public health concern associated with each residue, and is unaffected by any other considerations, such as laboratory resources or method availability. Criteria that must be considered in the design of a residue Monitoring Plan, yet which are not related to public health concern, are applied subsequently, in Phases II and IV. This division was made for two reasons. First, FSIS wished to know what residues were of public health concern, regardless of method or resource availability, so that, where analytical methods were not available, the Phase I ranking could be used to prioritize future FSIS method acquisition, method extension, and method development needs. Second, by starting with a list of compounds whose ranking is based purely upon relative public health concern, and by not applying other considerations (e.g., limitations on laboratory resources) until subsequent defined points within the design of the program, outside parties can more clearly understand why each residue was either selected or rejected.

In Phase II, by combing the compound rankings generated in Phase I with information on method availability and throughput, the compounds to be included in the NRP are selected. Clearly, if the FSIS laboratories do not have a method available for a compound, that compound cannot be included in the NRP. Alternately, a method may be available, but be significantly more time-consuming and inefficient than methods for other compounds. And given a choice of analyzing

for one highly ranked compound/compound class using an inefficient method, or of analyzing for two lower-ranked compounds/compound classes using more efficient methods, FSIS may choose the latter. As stated above, where FSIS cannot include a highly ranked compound in its NRP because of methodological constraints, FSIS will target such compounds for future method acquisition, extension, or development work.

In Phase III, all production classes (for domestic products) or product classes (for imported products) in which each compound or compound class may be of concern are identified. The domestic residue program ensures product safety by testing raw product immediately following slaughter. Since veterinary drug and pesticide residues are introduced into animals during production (rather than processing), FSIS ensures the safety of domestic products by testing for these residues immediately following slaughter.[1] And since compound usage varies according to animal production class, the residue testing for the domestic program is subdivided along these lines. The production classes for which FSIS has regulatory authority include livestock, poultry, and egg products, and are listed in Table 4.6. By contrast, it is not possible to restrict testing of imported products to raw tissue, and to subdivide testing by production class. Residue testing cannot be restricted to raw tissue because some countries export processed products only. And residue testing cannot be subdivided by production class because, while countries are required to identify the animal species used in each product, they are not required to identify the production class. For example, there is no way to know if the source of a sample of ground beef was dairy cattle or beef cattle. Therefore, to obtain complete coverage of imported products, it is necessary to test both fresh and imported commodities, and to subdivide testing by animal species. The product classes tested in the import residue program are listed in Table 5.7.

In Phase IV, for domestic products, laboratory residue sampling resources were allocated among the compound/production class (C/PC) pairings identified in Phase III. For the major compound classes within the NRP, the ranking scores for each compound class are multiplied by the relative consumption figures for each production class to generate priority scores, for each of the various C/PC pairs, that parallel a public health risk assessment formula. While these priority scores do not represent estimates of risk in the absolute sense, they do provide a ranking that is consistent with the relative risk resulting from the consumption of each C/PC pair.

The priority scores were combined with historical violation rate information for each individual C/PC pair, and information on laboratory sampling capacity to select, for each pairing, from among four different sampling options: very high regulatory concern (460 analyses/year); high regulatory concern (300 analyses/year); moderate regulatory concern (230 samples/year); low regulatory concern (90 samples/year). Statistically, if the true violation rate is 1%, the probabilities of detecting at least one violation with these sampling levels are 99%, 95%, 90%, and 60% (85% at a 2% violation rate), respectively.

For imported products, in Phase IV, the risk-based ranking of the various compound/product class pairs were combined with laboratory resource information to determine residue-sampling allocations for the 1999 FSIS Import Residue Plan. Where resources were available, the ranked scores were used as a tool to select among four different sampling options for each compound/product class pair: very high regulatory concern (460 analyses/year); high regulatory

[1]An exception to this occurs with eggs, since the Food Safety and Inspection Service (FSIS) has regulatory authority for egg *products*, only, and thus conducts its residue testing upon processed, rather than fresh, eggs. Egg products consist of dried, frozen and liquid eggs. Regulatory authority for fresh eggs rests with the Food and Drug Administration (FDA).

concern (300 analyses/year); moderate regulatory concern (230 samples/year); low regulatory concern (90 samples/year). The number of samples assigned to each country was based upon the relative percent of the product class imported from each country. Each country was assigned a minimum of eight samples.

If a product class represents less than one percent (by weight) of total combined U.S. imports of meat, poultry and egg product, then the total number of samples analyzed for any compound or compound class is eight times the number of countries from which the product is imported. For example, fresh goat is imported from only two countries, and the amount imported represents 0.3% of total imports. Therefore, 16 samples of fresh goat meat would be taken for each analysis (eight from each country).

# GENERATING COMPREHENSIVE LISTS OF CANDIDATE RESIDUES OF CONCERN IN MEAT, POULTRY, AND EGG PRODUCTS

Because thousands of chemicals are used worldwide and new compounds are introduced regularly, the expertise of multiple agencies is required to compile a comprehensive list of all the potential chemicals hazardous to public health that might be associated with meat, poultry, and egg products. This list should include all approved and unapproved drugs that have been known to be used or misused, and all pesticides and environmental contaminants that may be of public health concern for the domestic and import market. To adequately reflect differing risk sources, the compounds analyzed under the residue programs for domestic and imported products may not be entirely the same.

Each spring, FSIS holds meetings of the Surveillance Advisory Team (SAT) to discuss compounds of potential public health concern. SAT members include the Environmental Protection Agency (EPA), the Food and Drug Administration (FDA), the Centers for Disease Control (CDC), and several United States Department of Agriculture (USDA) agencies. The Chemistry and Toxicology Division, Office of Public Health and Science, FSIS coordinates this annual meeting.

FSIS seeks to allocate its resources in the most effective manner to ensure the safety of the U.S. food supply. Testing each animal submitted for slaughter in the U.S. for all classes of chemicals, including pesticides, animal or human drugs, and environmental contaminants, is not reasonable or practical. Once the SAT has identified the compounds of concern, the interagency Residue Prioritization Committee (RPC), meets to allocate FSIS sampling resources to the C/PC and compound/production class pairs that are of greatest public health concern. The RPC develops a statistically based residue Monitoring Plan that provides defined levels of assurance (depending upon the number of samples analyzed) of detecting residue violations in meat poultry, and egg products.

# FORMAL GROUPS THAT SUPPORT THE IDENTIFICATION OF COMPOUNDS OF PUBLIC HEALTH CONCERN

## SURVEILLANCE ADVISORY TEAM (SAT)

### PURPOSE

The SAT participants identify:

- The "universe" of compounds,
- Specific residues of public health concern,
- Analytical residue method development needs
- Emerging issues for chemical hazards

### CHAIR

- Director, Chemistry and Toxicology Division, Office of Public Health and Science (OPHS), FSIS, USDA

### PARTICIPANTS

- Health Effects Division, Office of Pesticides, Prevention, and Toxic Substances, EPA

- Center for Food Safety and Applied Nutrition, FDA, Department of Health and Human Services (HHS)
- Center for Veterinary Medicine, FDA, HHS
- Centers for Disease Control and Prevention, HHS

- Animal and Plant Health Inspection Service, USDA
- Science and Technology, Agricultural Marketing Service, USDA
- Agricultural Research Service, USDA

- Chemistry and Toxicology Division, OPHS, FSIS, USDA
- Microbiology Division, OPHS, FSIS, USDA
- Epidemiology and Risk Assessment Division, OPHS, FSIS, USDA
- Scientific Research Oversight Staff, OPHS, FSIS, USDA
- Food Hazard Surveillance Division, OPHS, FSIS, USDA
- Emergency Response Division, OPHS, FSIS, USDA
- Field Service Laboratories, OPHS, FSIS, USDA
- Technical Service Center, Office of Field Operations (OFO), FSIS, USDA
- Federal-State Relations Staff, OFO, FSIS, USDA
- Animal Production Food Safety Program, Office of Policy, Program Development and Evaluation (OPPDE), FSIS, USDA
- Domestic Policy Development and Evaluation Division, OPPDE, FSIS, USDA
- International Policy Division, OPPDE, FSIS, USDA
- Inspection Systems Development Division, OPPDE, FSIS, USDA

## B. RESIDUE PRIORITIZATION COMMITTEE (RPC)

### PURPOSE

The RPC evaluates the compounds identified by the SAT, ranks them *according to their relative public health concern*, and works with the FSIS Field Service Laboratories to finalize the domestic Monitoring Plan and Special Projects and the Import Residue Plan

### CHAIR

- Emerging Issues Branch, Chemistry and Toxicology Division, OPHS, FSIS, USDA

### PARTICIPANTS

- Health Effects Division, Office of Pesticides, Prevention, and Toxic Substances, EPA

- Center for Food Safety and Applied Nutrition, FDA, HHS
- Center for Veterinary Medicine, FDA, HHS
- Centers for Disease Control and Prevention, HHS

- Chemistry and Toxicology Division, OPHS, FSIS, USDA
- Epidemiology and Risk Assessment Division, OPHS, FSIS, USDA
- Domestic Policy Development and Evaluation Division, OPPDE, FSIS, USDA

# SECTION 4
# PLANNING THE 1999 FSIS DOMESTIC MONITORING PLAN AND SPECIAL PROJECTS: VETERINARY DRUGS

# SECTION 4. PLANNING THE 1999 FSIS DOMESTIC MONITORING PLAN AND SPECIAL PROJECTS: VETERINARY DRUGS

## PHASE I - GENERATING AND RANKING LIST OF CANDIDATE COMPOUNDS

### LIST OF CANDIDATE COMPOUNDS

The candidate veterinary drugs of concern selected by members of the Surveillance Advisory Team (SAT) are presented below. Since the Food Safety and Inspection Service (FSIS) wishes to prioritize which *analyses* should be conducted, compounds that are, or are likely to be, detected by the same analytical methodology have been grouped together:

--*Antibiotics:*
those antibiotics quantitated by the FSIS Bioassay and associated follow-up methodologies[1]
[tetracycline, oxytetracycline, chlortetracycline, beta-lactams (penicillins and cephalosporins; not differentiated within this category), gentamicin, spectinomycin/streptomycin (not differentiated), erythromycin, tilmicosin, tylosin, neomycin, flavomycin, bacitracin, hygromycin, novobiocin, lincomycin*, pirlimycin*, clindamycin*, spiramycin*, oleandomycin*] *identification by mass spectrometry; not quantitated
aminoglycosides (incl. spectinomycin, streptomycin, and apramycin)
bambermycins
ceftiofur
chloramphenicol
florfenicol
fluoroquinolones (incl. enrofloxacin, sarafloxacin, ciprofloxacin, desethyleneciprofloxacin, danofloxacin, and difloxacin)
glycopeptides (incl. avoparcin and vancomycin)
macrolides (incl. tilmicosin and tylosin)[2]

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[1] FSIS quantitates most antibiotics using a 7-plate Bioassay that measures microbial inhibition. The pattern of inhibition (i.e., the combination of plates showing inhibition) is used to identify the antibiotic. There are some antibiotics, however, that share the same pattern of inhibition. In these cases, it is necessary to undertake follow-up testing (High Performance Liquid Chromatography [HPLC] or mass spectrometry) to identify the compound. The compounds that share patterns of inhibition, and which are thus individually identified through follow-up testing, are:
*tetracycline/oxytetracycline/chlortetracycline* - compounds individually identified by follow-up with HPLC method for tetracyclines
*tilmicosin/tylosin* - differentiated by mass spectrometry

[2] As indicated in the previous footnote, the FSIS Bioassay, when combined with appropriate follow-up HPLC or mass spectrometric methodologies, has the capability to identify and quantitate two of the macrolide compounds (tilmicosin and tylosin). Nevertheless, the SAT wished to consider implementing direct HPLC testing for the macrolides (i.e., without first employing the Bioassay as a screen), because chemical methods can offer greater sensitivity than the Bioassay, and thus provide more detailed low-level data on residue occurrences. Data on low-level residue occurrences is needed when generating exposure

pirlimycin
virginiamycin

--*Other Veterinary Drugs:*

arsenicals (detected as elemental arsenic)
avermectins in FSIS multi-residue method (incl. doramectin and ivermectin)
eprinomectin
benzimidazoles
berenil
beta agonists (incl. clenbuterol, mabuterol, salbutamol, brombuterol, cimaterol, fenoterol, terbutaline, and ractopamine)
carbadox
clorsulon
halofuginone
hormones, naturally-occurring (17-β estradiol, progesterone, testosterone)
diethylstilbestrol (DES)
glucocorticoids (incl. methyl prednisone and dexamethasone)
melengestrol acetate (MGA)
trenbolone
zeranol
lasalocid
levamisole
morantel and pyrantel
nicarbazin
nitrofurans (incl. furazolidone and nitrofurazone)
nitroimidazoles (incl. metronidazole, dimetridazole and ipronidazole)
non-steroidal anti-inflammatory drugs (NSAID's) other than phenylbutazone (incl. flunixin)
phenylbutazone
sulfonamides (incl. sulfapyridine, sulfadiazine, sulfathiazole, sulfamerazine, sulfamethazine, sulfachloropyridazine, sulfadoxine, sulfamethoxypyridazine, sulfaquinoxaline, sulfadimethoxine, sulfisoxazole, sulfacetamide, sulfamethoxazole, sulfamethizole, sulfanilamide, sulfaguanidine, sulfabromomethazine, sulfasalazine, sulfaethoxypyridazine, sulfaphenazole, and sulfatroxazole)
thyreostats (incl. thiouracil)
veterinary tranquilizers (azaperone and its metabolite azaperol, xylazine, haloperidol, acetopromazine, propionylpromazine, and chlorpromazine)

# RANKING OF CANDIDATE COMPOUNDS

## COMPOUND SCORING

Using a simple 4-point scale (4 = high; 3 = moderate; 2 = low; 1 = none), the SAT scored each of the above veterinary drugs or drug classes in each of the following categories:

- FSIS Historical Testing Information on Violations
- Regulatory Concern

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estimates for risk assessment, and is useful in planning future residue programs. To determine if the relative public health concern presented by the macrolides would be sufficient to merit direct sampling by HPLC, it was necessary to evaluate them separately.

- Lack of FSIS Testing Information on Violations
- Withdrawal Time
- Impact on New and Existing Human Disease
- Relative Number of Animals Treated
- Acute or Chronic Toxicity Concerns

Definitions of each of these categories, and the criteria used for scoring, appear at the end of this section is the "*Scoring Key for Veterinary Drugs, 1999 Domestic Residue Program*."

The results of the compound scoring process are presented in Table 4.1, *Scoring Table for Veterinary Drugs*.

## COMPOUND RANKING

### Background

As stated above, FSIS chose to employ techniques and principles from the field of risk assessment to obtain a ranking of the relative public health concern represented by each of the above candidate compounds or compound classes.

If FSIS were in possession of detailed historical data on the distribution of levels of each of the candidate compounds or compound classes in meat, poultry, and egg products, then that information could be combined with consumption data to estimate exposure. By combining these exposure data with toxicity information, risk estimates for each compound or compound class could be generated:

$$\begin{aligned} \text{Risk} &= \text{Exposure x Toxicity} \\ &= \text{Consumption x Residue Levels x Toxicity} \\ &= \text{Consumption x "Risk Per Unit of Consumption"} \end{aligned} \tag{4.1}$$

Given the limited resources available for this priority-setting effort, the Residue Prioritization Committee (RPC) did not attempt to associate different degrees of risk with different degrees of exceedance of the tolerance or action level. The RPC instead determined that the best available method for the measurement of relative toxicity is associated with the tolerance or action level. *Specifically, the frequency of violation of the tolerance or action level was used as an indicator of the risk per unit of consumption of a product.*

The first criterion evaluated in Table 4.1, "FSIS historical information on violations," is based on the percent of tested carcasses found to have residues in excess of the tolerance or action level, with the scores weighted towards violations in major production classes. Therefore, it can be seen from Equation (4.1) that the violation rate scores assigned in Table 4.1 represent a rough overall estimate of *relative* risk per unit of consumption.[3] However, for the many candidate

[3] As described in the *Scoring Key for Veterinary Drugs*, some consideration was given to the size of the production class in which violations were found. Specifically, a compound was not be assigned a "4" in the category "FSIS Historical Testing Information on Violations" unless it showed a violation rate of greater than or equal to 0.6% in at least one "major" production class. However, no systematic weighting was applied to the scores in this category based upon consumption. Hence the scores assigned to this category represent relative risk *per unit of consumption*, rather than relative risk. To obtain values for relative risk, the scores in this category must be multiplied by the consumption data for each individual production class. This calculation is implemented subsequently, in Phase IV, Equation (4.6).

compounds or compound classes of concern that have never been included in the FSIS NRP, data on violation rates is not available. It was necessary to generate an estimate of the overall violation rate for each these untested compounds and compound classes.

**Estimating the Violation Rate**

"Regulatory Concern," "Withdrawal Time," and "Relative Number of Animals Treated" were chosen as scoring categories because it was expected that each of these would be positively correlated with the violation rate. Therefore, they might serve as predictors of violations in those compounds or compound classes for which no reliable historical testing information was available. As indicated in the *Scoring Key for Veterinary Drugs*, the "Regulatory Concern" category was designed to predict the "likelihood of occurrence of violations, based on regulatory intelligence information about possible misuse." "Withdrawal Time" is expected to correlate with "FSIS Historical Testing Information on Violations" because a longer withdrawal time is less likely to be properly observed. When the withdrawal time is not observed prior to slaughter, the carcass may contain violative levels of residues, since the time necessary for sufficient metabolism and/or elimination of the drug would not have passed. "Relative Number of Animals Treated" is expected to correlate with "FSIS Historical Testing Information on Violations" simply because heavy compound use increases the likelihood of violations.

Recall that violation rate data are available for selected compounds and compounds classes. Using the scores assigned to these compounds and compound classes, it was possible to evaluate how well the above criteria were correlated. In an effort to impute values for the missing data, a linear regression model was applied. The dependent variable in this model was the category "FSIS Historical Testing Information on Violations," while the independent variables were the categories of "Regulatory Concern," "Withdrawal Time," and "Relative Number of Animals Treated."

Table 4.1 lists 12 compounds or compound classes for which current, reliable data were available to score the category "FSIS Historical Testing Information on Violations," and 26 compounds or compound classes for which they were not. A least squares linear regression model, combining the values for the three independent variables from the 12 scored compounds or compounds classes, was used to predict scores in the category "FSIS Historical Testing Information on Violations" for remaining 26. The following equation was derived:

$$Vp = 0.45R + 0.41W + 0.36N - 0.74 \qquad (4.2)$$

where Vp= Predicted score for "FSIS Historical Testing Information on Violations"
R = score for "Regulatory Concern"
W = score for "Withdrawal Time"
N = score for "Relative Number of Animals Treated"

This model was significant, with an overall model p-value of 0.004, and an $R^2$ value of 0.80, accounting for 80 percent of the variability in the data.

Where current, reliable historical testing data were available for a compound or compound class, FSIS used the score assigned in Table 4.1. Where current, reliable historical data were not available, FSIS used the predicted score generated by Equation (4.2).

**Rating the Veterinary Drugs According to Relative Public Health Concern**

As indicated above, the score for "FSIS Historical Testing Information on Violations," combines information on residue levels and toxicity, and thus represents a rough overall estimate of the relative risk per unit of consumption for each drug or drug class. Although this score, once multiplied by relative consumption data for each production class, would conform most closely to a purely risk-based ranking, the RPC believes that additional attributes should also be considered in the ranking. Thus, the ranking according to relative public health concern incorporates, as modifiers, the remaining scoring categories presented in Table 4.1:

Relative Public Health Concern = *Predicted* or *Actual* score for (4.3)
"FSIS Historical Testing Information on Violations" (Estimate of Relative Hazard)
x *modifier for* "Acute or Chronic Toxicity Concerns"
x *modifier for* "Impact on New and Existing Human Disease"
x *modifier for* "Lack of FSIS Testing Information on Violations"

The finding of a violation means that a compound was found at a level where the likelihood of a toxic effect exceeds FDA's standards (typically 1 in 1,000,000). However, this does not address the *severity* of the effect associated with the toxic endpoint. To capture this concern the SAT has added a modifier for "Acute or Chronic Toxicity Concerns." Thus compounds whose toxic effect can be severe (such as chloramphenicol, exposure to which has been associated with aplastic anemia) are given a maximum score in this category.

A modifier has also been added for "Impact on New and Existing Human Disease." This represents the extent to which the use or misuse of this compound will contribute to new and existing human disease. For example, there is a possibility that the creation of antibiotic-resistant human pathogens may result from the use of antibiotics in animals. This represents a potential public health concern that is not captured by the violation rate.

Finally, the modifier for "Lack of FSIS Testing Information on Violations" has been incorporated because sparse or dated data, or a complete lack of data altogether, increase the relative public health need to obtain information on residue violations for a compound or compound class. In other words, consider two hypothetical compounds, A and B. Suppose FSIS has sampled extensively for compound A, and that A's violation rate earns it a score of "3" in that category. Further suppose that FSIS has never sampled for compound B but that, based on its scores in the “Regulatory Concern,” “Withdrawal Time,” and “Number of animals treated” categories, B has a *predicted* violation rate score of "3." Also assume that A and B have been assigned identical scores in all other categories. FSIS believes there is greater relative need to sample for B than for A, because FSIS has extensive information on A, but none on B.

The use of modifiers presents an element of arbitrariness, as there are no fundamentally "correct" assumptions for the appropriate weight that should be given to each. The approach of the RPC was to consider several alternative sets of weighting factors, and assess the robustness of the final ranking. In Table 4.2, *Veterinary Drug Residues Rated with Various Weighting Formulas*, the drugs are rated for relative public health concern by combining the scoring categories presented in Equation (4.3), above, using four different weighting formulas. In all of the formulas, the score for "FSIS Historical Testing Information on Violations" has been multiplied by a weighted average of the modifiers for "Acute or Chronic Toxicity Concerns" and "Impact on New and Existing Human Disease." These last two categories were combined because they both represent the negative potential public health effects associated with the use of a compound or compound class. The product of these three categories was then multiplied by a modifier for "Lack of FSIS

Testing Information on Violations." The formulas differ in the relative weights given to "Acute or Chronic Toxicity Concerns" versus "Impact on New and Existing Human Disease," and in the magnitude of the modifier for "Lack of FSIS Testing Information on Violations." The RPC chose to use the second of these formulas (bolded and italicized in Table 4.3), based on a consensus about the relative importance of each modifier, and of how much each modifier should be allowed to alter the underlying risk-based score, "V," in Equation (4.4), below. The RPC used a range of formulas to help guide this judgmental process. The value of the selected mathematical formula is that it formalizes the basis of the RPC's judgement. This enables others to observe and understand the adjustments that were made, and it ensures consistency in how these adjustments were applied across a wide range of compounds. Equation (4.4) summarizes the way final adjustments were made.

Relative public health concern rating, veterinary drugs (4.4)
$= V*((D+3*T)/4) *\{1+[(L-1)*0.05]\}$

Where: V = *Predicted* or *Actual* score for "FSIS historical information on violations"
D = score for "Impact on New and Existing Human Disease"
T = score for "Acute or Chronic Toxicity Concerns"
L = score for "Lack of FSIS Testing Information on Violations

In this formula, the category of "Acute or Chronic Toxicity Concerns" was given three times the weight of "Impact on New and Existing Human Disease," because the former represents known direct health effects, while the latter represents possible indirect health effects. In addition, in this formula, the final ratings of compounds or compound classes receiving scores of 4, 3, 2, and 1 in "Lack of FSIS Testing Information on Violations" would be increased by 15%, 10%, 5%, and 0% respectively. In other words, the rating of a compound or compound class that had never been tested by FSIS (in the production classes and matrices of concern) would be increased by 15%, while the rating of one that had been recently tested by FSIS (again, in the production classes and matrices of concern) would remain unchanged.

All of the formulas used here for the veterinary drugs, and below for the pesticides, have been normalized. For a given drug or drug class, this permits comparison of the scores generated by the four different weighting formulas presented in Table 4.2. Because the formulas for the pesticides use different terms (i.e., scoring categories) from those for the veterinary drugs, their scores are not precisely comparable. However, as a result of the normalization the scores for the pesticides and veterinary drugs are comparable in magnitude, thus enabling at least a rough comparison to be made across these two very different categories of compounds.

In Table 4.3, *Veterinary Drug Residues Rated with Various Weighting Formulas, Sorted by Rating*, the drugs are ranked by their rating scores, as generated using each of the four different weighting formulas (again, the results obtained with the selected formula are bolded and italicized). Inspection of this chart reveals the extent to which changes in the weighting formula result in changes in ranking. In this case, the results from the four formulas are similar. The scores presented in Table 4.3 enable the RPC to bring consistency, grounded in formal risk-based considerations, to its efforts to differentiate among a very diverse range of drugs and drug classes in a situation that is marked by minimal data on relative exposures**.** These rankings do not account for differences in exposure due to differences in overall consumption.[4] Data on relative

[4] *Ibid*.

consumption are applied subsequently, in Phase IV, when relative exposure values for each compound/production class (C/PC) pair are estimated.

A key to the abbreviations used in Table 4.3 is presented in Table 4.4, *Key to Abbreviations Used for Veterinary Drugs*.

# PHASE II - SELECTING DRUGS FOR INCLUSION IN THE 1999 NRP

Following the completion of the ranking of the veterinary drugs, the RPC (1) used these rankings to select those compounds and compound classes that should be included in the 1999 NRP, based purely on their relative public health concern and (2) determined which of these compounds and compound classes actually could be included in the 1999 NRP, based on the availability of laboratory resources.

The consensus of the RPC participants was that those compounds and compound classes ranked 21st or higher represented a potential public health concern sufficient to justify their inclusion in the 1999 NRP. In addition, FDA expressed an interest in having FSIS perform limited testing on one compound that did not fall within this group of 21 (veterinary tranquilizers in market hogs). This compound was thus also identified as a candidate for inclusion.

Once the high-priority compounds and compound classes had been identified, it was necessary for the RPC to apply considerations beyond those related to public health to determine the compounds for which FSIS would sample. The principal consideration not related to public health was the availability of laboratory resources, especially the availability of appropriate analytical methods within the FSIS laboratories. Based on these considerations, the following compounds will be included in the 1999 FSIS Monitoring Plan and Special Projects:

--*Antibiotics:*

- those antibiotics quantitated by the FSIS Bioassay and associated follow-up methodologies[4] [tetracycline, oxytetracycline, chlortetracycline, beta-lactams (penicillins and cephalosporins; not differentiated within this category), gentamicin, streptomycin/spectinomycin (not differentiated), erythromycin, tilmicosin, tylosin, neomycin, flavomycin, bacitracin, hygromycin, novobiocin, lincomycin*, pirlimycin*, clindamycin*, spiramycin*, oleandomycin*] *identification by follow-up with mass spectrometry; not quantitated
- aminoglycosides (spectinomycin only)[5]
- fluoroquinolones (enrofloxacin, sarafloxacin, ciprofloxacin, desethyleneciprofloxacin, danofloxacin, and difloxacin)
- macrolides (tilmicosin only)[6]

[5] These analyses have been limited to a single compound, rather than all the compounds of concern within the class, because of restrictions in the analytical methodologies.

[6] *Ibid*.

--*Other Veterinary Drugs:*

- arsenicals (detected as elemental arsenic)
- avermectins in FSIS multi-residue method (doramectin and ivermectin)
- beta agonists (incl. clenbuterol, mabuterol, salbutamol, brombuterol, cimaterol, fenoterol, terbutaline, and ractopamine)
- carbadox
- DES
- glucocorticoids (dexamethasone only) [7]
- nitroimidazoles (metronidazole, dimetridazole and ipronidazole)
- NSAID's other than phenylbutazone (flunixin only)[7]
- phenylbutazone
- sulfonamides (sulfapyridine, sulfadiazine, sulfathiazole, sulfamerazine, sulfamethazine, sulfachloropyridazine, sulfadoxine, sulfamethoxypyridazine, sulfaquinoxaline, sulfadimethoxine, sulfisoxazole, sulfacetamide, sulfamethoxazole, sulfamethizole, sulfanilamide, sulfaguanidine, sulfabromomethazine, sulfasalazine, sulfaethoxypyridazine, sulfaphenazole, and sulfatroxazole)
- veterinary tranquilizers (azaperone and its metabolite azaperol, xylazine, haloperidol, acetopromazine, propionylpromazine, and chlorpromazine)

Thus, in the 1999 NRP, FSIS will employ 15 methodologies that analyze for veterinary drugs. Seven are single-compound methodologies, and nine are multi-residue methods (phenylbutazone is detected by the FSIS multi-residue method for chlorinated hydrocarbon and chlorinated organophosphate compounds). Together, these methodologies encompass a total of 67 different compounds (groups of individual drugs that are not differentiated have been counted as only a single compound; individual drugs that can be identified but not quantitated are not included in this count).

Table 4.5, *Rank and Status for Veterinary Drugs*, lists all of the original candidate veterinary drugs in rank order. This table specifies whether each compound or compound class will be sampled under the 1999 Monitoring Plan or Special Projects, or will not be included in the 1999 NRP. For each highly ranked compound or compound class that was not included in the 1999 NRP, a brief explanation of the reason for its exclusion is provided. This table will be used to identify future method development needs for veterinary drugs for the FSIS NRP.

# PHASE III - IDENTIFYING THE COMPOUND/PRODUCTION CLASS (C/PC) PAIRS

The SAT participants (principally FDA staff) identified the production classes of concern for each of the drugs and drug classes to be included in the 1999 NRP. These determinations were based upon professional judgment of the likelihood of finding violations within each production class (information examined included use approvals, extent of use, evidence of misuse and, if available, past violation history), combined with the proportion of total domestic meat consumption each production class represented. The results are presented in Table 4.6, *Production Classes Considered for Each Veterinary Drug/Drug Class*. C/PC pairs included in the 1999 NRP are designated by a "●." Those C/PC pairs that are of regulatory concern, but that could not be included in the 1999 NRP because of laboratory resource constraints, are marked

[7] *Ibid*.

with a "○." Since all production classes will be sampled by the chlorinated hydrocarbon/chlorinated organophosphate (CHC/COP) method (see Section 6), and since this method also detects phenylbutazone, the latter will, by default, likewise be sampled in all production classes. However, phenylbutazone is not of regulatory concern in all production classes. Those production classes in which phenylbutazone will be sampled, but where it is *not* of regulatory concern, are designated by a "**O**" (i.e., these production classes will be sampled for phenylbutazone, but only because it is automatically detected through the CHC/COP methodology).

# PHASE IV - ALLOCATION OF SAMPLING RESOURCES

## "FULL-RESOURCE" SAMPLING

Table 4.6 lists the estimated domestic consumption of each production class as a percentage of the total consumption of all the production classes in the table. To obtain these estimates, production data were employed as a surrogate for consumption. Specifically, as shown in Equation (4.5), the estimated relative percent of domestic consumption represented by each production class was obtained by dividing the estimated total annual U.S. domestic production (pounds dressed weight) for that class by the total poundage for all production classes listed in Table 6:

$$(\text{Est. rel. \% domestic consumption})_{PC} = \frac{(\text{Annual production, pounds dressed wt.})_{PC}}{\text{Total annual production, all production classes}} \qquad (4.5)$$

FSIS has sufficient analytical capability to consider sampling all production classes of concern for the following compound classes: antibiotics (by Bioassay); arsenicals; avermectins; and sulfonamides. To establish a relative sampling priority for each C/PC pair, the ranking score for each compound class (as calculated in Table 4.2) was multiplied by the estimated relative percent of domestic consumption for each production class (as calculated using Equation (4.5), and as presented in Table 4.6). This is shown in Equation (4.6):

$$(\text{Relative sampling priority})_{C/PC} = (\text{Ranking score})_{C} \times (\text{Rel. \% domestic consumption})_{PC} \qquad (4.6)$$

Equation (4.6) is analogous to the equation used to estimate risk (Equation (4.1)), in which risk per unit of consumption is multiplied by consumption. While the results of Equation (4.6) do not constitute an estimate of risk, they provide a numerical representation of the relative public health concern represented by each C/PC pair, and thus can be used to prioritize FSIS analytical sampling resources according to the latter. Note that the risk ranking provided by Equation (4.6) is based upon average consumption across the entire U.S. population, rather than upon maximally exposed individuals.

In Table 4.7, *Veterinary Drug Compound/Production Class Pairs, Sorted by Sampling Priority Score, "Full Resource" Sampling*, the calculation shown in Equation (4.6) has been carried out for the antibiotics, arsenicals, avermectins, and sulfonamides, for each production class in which the specified drug might appear (as indicated in Table 4.6). The C/PC pairs have been sorted by their sampling priority scores, and roughly divided into quartiles. In 1999, FSIS will analyze 460, 300, 230, and 90 samples from the C/PC pairs in the first through fourth quartiles, respectively. As described in Section 3, above, these sampling levels provide varying probabilities of detecting residue violations. Thus the larger sample sizes, which provide the greater chance of detecting

violations, are directed towards those C/PC pairs that have been identified as representing higher levels of relative public health concern.

## ADJUSTING RELATIVE SAMPLING NUMBERS

### Adjusting for historical data on violation rates of individual C/PC pairs

As described above, the RPC used "FSIS Historical Testing Information on Violations" as a critical factor in ranking the various drugs and drug classes according to their relative public health concern. Because this information is available for each production class individually, it can also be used to further refine the relative priority of sampling each C/PC pair. Table 4.8, *Adjusted Number of Analyses for Each Veterinary Drug Compound/Production Class Pair, "Full Resource" Sampling*, lists the number of analyses assigned to each C/PC pair in Table 4.7. It also lists, for the period 1/1/93 -10/15/98, the total number of samples analyzed by FSIS under its Monitoring Plan and Special Projects (i.e., random sampling only) for each C/PC pair, the percent of samples found to be violative (i.e., present at a level in excess of the action level or regulatory tolerance; or, for those compounds that are prohibited, present at any detectable level), and the percent of samples found to be positive but not violative ("non-violative positive," or NVP). Using this data, the following rules were applied to adjust the sampling numbers:

1. C/PC pair never tested: +1 level(i.e., increase by one sampling level, e.g., from 230 samples to 300 samples)
2. At least 300 samples tested, violation rate $\geq$ 0.50%: +1 level
3. At least 300 samples tested, violation rate $\geq$ 0.75%: +2 levels
4. At least 300 samples tested, violation rate = 0.00%: -1 level
5. The maximum number of samples to be scheduled for testing is 460

One exception to this system is:

1. Geese are never to be scheduled for more than 90 samples (because very few geese are produced, and because virtually all geese are slaughtered by a very limited number of plants, it is impractical to collect a larger number of samples).

All of the above adjustments were applied, and the sampling numbers obtained following these adjustments are listed in Table 4.8 under the heading "INITIAL ADJ. #" (initial adjusted number of samples).

### Adjusting for laboratory capacity

Following this, it was necessary to make a final set of adjustments to match the total sampling numbers for each compound class with the analytical capabilities of the FSIS laboratories. No adjustments were necessary for the avermectins or sulfonamides, since there was a close correspondence between the proposed number of samples listed in Table 4.8 and FSIS laboratory capacity.

In the case of the antibiotics, FSIS laboratory capacity exceeded the proposed number of samples by 6%. The RPC decided to use this excess capacity to improve the quality of information collected, by setting a 300-sample minimum for all production classes (except geese, as explained above). In addition, because FDA expressed a specific interest in obtaining as much information as possible on the levels of antibiotics in roaster pigs, the sampling level for roaster pigs was increased from 300 to 460.

FSIS laboratory capacity for arsenicals was 18% less than the proposed number of samples. To adjust for this discrepancy, the RPC set a 300-sample maximum for all production classes, except for young chickens, which were maintained at the highest sampling level (young chickens are the production class with the highest estimated relative consumption, and also exhibit the highest historical violation rate for arsenicals).

The sample numbers obtained following all needed adjustments for laboratory capacity are listed in the last column of Table 4.8, under the heading "FINAL ADJ. #" (final adjusted number of samples).

## "LIMITED RESOURCE" SAMPLING

The 1999 NRP includes a number of compounds never before sampled by FSIS. In sampling these compounds, FSIS was most concerned with obtaining information on their occurrence in particular production classes where it was suspected they might be of concern. To enable FSIS to sample this entire range of compounds, it was necessary to limit the number of samples taken per compound. In apportioning this "limited resource" sampling among the production classes of concern, it was particularly important to ensure that a sufficient number of samples was taken from each production class analyzed. If too few samples were taken from a production class, and no violations were detected, it would be difficult to interpret such a result (the interpretation could not be informed by data from earlier sampling, because no such sampling exists). With a small number of samples, the lack of a detected violation might mean that the true violation rate was very low, or it might mean that the true violation rate was high but that too few samples were taken to detect a violation. Thus, as a general policy for all domestic sampling of new compounds, a minimum of 300 analyses was to be carried out in each production class sampled. This yields a 95% chance of detecting a violation, if the true violation rate were 1%.

For example, FSIS has the capacity to conduct 840 tilmicosin analyses in 1999, and 13 production classes were identified as being of concern for this compound. Thus FSIS could carry out any combination of sampling in these 13 production classes that resulted in a total of 840 analyses, from performing 840 analyses in one production class to performing 64-65 analyses in each of the 13 production classes. However, since FSIS will analyze a minimum of 300 samples per production class for new compounds, the Agency can sample no more than two production classes for tilmicosin. Thus FSIS chose to conduct domestic tilmicosin sampling in the two highest-priority production classes (dairy cows and formula-fed veal), as designated by FDA.

Selection of production classes for the remainder of the limited resource compounds was made as follows:

Carbadox is of concern in heifers, steers, market hogs, roaster pigs, boars/stags, and sows. The analytical capacity for carbadox in 1999 is 300 samples, and the top priority production class is roaster pigs. Thus FSIS will conduct 300 analyses for carbadox in roaster pigs.

Spectinomycin is of concern in 23 different production classes. The analytical capacity for spectinomycin in 1999 is 360 samples, and the top priority production class is dairy cows. Thus FSIS will conduct 360 analyses for spectinomycin in dairy cows.

Fluoroquinolones are of concern in all production classes except horses. The analytical capacity for fluoroquinolones in 1999 is 900 samples, and the top three priority production classes are

dairy cows, young chickens, and young turkeys. FSIS will conduct 300 analyses for fluoroquinolones in each of these three production classes.

DES is of concern in heifers, formula-fed veal, and non-formula fed veal. The analytical capacity for DES in 1999 is 300 samples, and the top priority production class is formula-fed veal. FSIS will thus conduct 300 analyses for DES in formula-fed veal.

Flunixin is of concern in 15 different production classes. The analytical capacity for flunixin in 1999 is 320 samples, and the top priority production class is dairy cows. FSIS will thus conduct 320 analyses for flunixin in dairy cows.

Beta agonists are of concern in 11 different production classes. The analytical capacity for beta agonists in 1999 is 600 samples, and the top two priority production classes are formula-fed veal and market hogs. FSIS will work with FDA to conduct 300 analyses for beta agonists in each of these two production classes.

Nitroimidazoles are of concern in formula-fed veal, non-formula-fed veal, market hogs, roaster pigs, boars/stags, and sows. The analytical capacity for nitroimidazoles in 1999 is 530 samples, and the top priority production class is formula-fed veal. In addition, there was also a high concern to sample for nitroimidazoles in imported pork products. Thus FSIS will conduct 300 analyses for nitroimidazoles in formula-fed veal, and the remaining 230 analyses in imported pork products.

Dexamethasone is of concern in 8 different production classes. The analytical capacity for dexamethasone in 1999 is 300 samples, and the top priority production class is dairy cows. FSIS will thus conduct 300 analyses for dexamethasone in dairy cows.

Veterinary tranquilizers are of concern in 7 different production classes, but FDA had expressed particular concern about the possible misuse of this compound in market hogs (as a prophylactic treatment for porcine stress syndrome). The analytical capacity for the screening method for veterinary tranquilizers is 300 samples. FSIS will therefore conduct 300 screening tests for veterinary tranquilizers in market hogs.

The above information is presented in tabular format at the end of Section 9 in Table 9.1, *Sampling Plan for All Veterinary Drug and Pesticide Compound/Production Class Pairs*, and in Table 9.3, *Summary, 1999 FSIS National Residue Program, Domestic Monitoring Plan and Special Projects and Import Residue Plan*.

**NOTE ON SEASONALITY**

Many of the residues sampled under the limited-resource category will be analyzed over a period of three to four months, rather than over an entire year. This was done because, to cover such a wide range of residues, it was necessary for FSIS to maximize laboratory efficiency. It is more efficient to dedicate instrumentation and analysts to a small number of compounds, finish those analyses, and then change to a new set of analyses, rather than attempting to maintain analytical capacity for all of the above analytes simultaneously.

For those compounds where sampling was limited to a few months, and where usage was judged to be seasonal, sampling was scheduled to coincide with the period of greatest suspected usage. The two compounds in this category are dexamethasone and flunixin in dairy cattle. Usage for both of these compounds peaks in both February and late August/early September. Sampling

periods for both dexamethasone and flunixin were timed to coincide with the February peak, and were therefore scheduled from 2/1/99 - 5/31/99.

**NOTE ON SAMPLING OF TILMICOSIN**

It can be seen from Table 4.6 that the limited resource sampling for tilmicosin targets only a small portion of the production classes of concern for this compound. However, tilmicosin is also detected by the antibiotic Bioassay, which is used to sample all production classes. FSIS has chosen to implement the specific chemical method for as a supplement to the Bioassay, because this chemical method offers greater sensitivity than the Bioassay, and thus provides more detailed low-level data on residue occurrences. Such low-level data are needed when generating exposure estimates for risk assessment.

# SCORING KEY FOR VETERINARY DRUGS
# 1999 FSIS DOMESTIC RESIDUE PROGRAM

**FSIS Historical Testing Information on Violations (1983-1997)**

4 = Violation rate of 0.6% or greater for at least one year in at least one major production class, i.e., one which represents at least 1.5% of the U.S. consumption of meat poultry, and egg products. Based on this definition, the major production classes are: *beef cows, dairy cows, heifers, steers, market hogs, young chickens, young turkeys, and egg products.*

3 = More than two violations detected, but does not qualify for a “4"

2 = Total of one or two violations detected over all years of sampling

1 = No violations detected over all years of sampling

NT = Not tested by FSIS

NA = Tested by FSIS, but violation information does not apply because of change in withdrawal time (carbadox)

**Regulatory Concern**

This consists of professional judgments made about the likelihood of occurrence of violations, based on regulatory intelligence information about possible misuse. Due to the public health significance of drug residue violations, surveillance data pertaining to a compound must meet only one of the requirements listed under each number below to receive that numerical ranking.

4 = Well-documented intelligence information gathered from a variety of reliable sources indicates possible widespread misuse of the compound, and/or this compound is banned, or is on the list of compounds prohibited from use in food animals under AMDUCA, or is not approved for use in the U.S.

3 = Intelligence information gathered through a variety of sources indicates only occasional misuse of this compound. The dosage form/packaging of this compound has potential for misuse.

2 = Intelligence information rarely indicates misuse of this compound.

1 = Intelligence information has never indicated misuse of this compound.

**Lack of FSIS Testing Information on Violations**

This represents the extent to which FSIS analytical testing information on a residue is limited, absent or obsolete.

4 = FSIS has never included this compound in its sampling program; or FSIS has included this compound in its sampling program, but the information is not at all useful in predicting future violation rates, because of subsequent significant changes in the conditions of use of the compound (e.g., the reduction in withdrawal time for carbadox).

3 = FSIS has included this compound in its sampling program within the past 15 years, or has tested within the past 5 years, but only in a very limited number of production classes (relative to the potential number of affected production classes) (e.g., clenbuterol in fancy veal), or only in a very limited geographical area (e.g., berenil in Puerto Rico); or a class has been tested within the past 10 years, but the method omitted one or more of the compounds now of interest within the class; or this compound has been tested by FSIS, but using a method that was not sufficiently sensitive to permit accurate determination of the true violation rate.

2 = FSIS has included this compound in its sampling program within the past 10 years; or has sampled within the past 5 years, but has conducted only one year of sampling (e.g., the macrolides); or a class has been tested within the past 5 years, but the method omitted one or more of the compounds now of interest within the class (e.g., the addition of doramectin to the list of approved ivermectins).

1 = FSIS has included this compound in its sampling program within the past 5 years

**Withdrawal Time**

Producers using approved animal drugs are required to follow approved "conditions of use." For each drug, in each production class in which it is approved, the conditions of use specify the dosing regimen and the withdrawal time. The withdrawal time is the number of days that must pass between completion of the dosing regimen and the time of slaughter. This allows sufficient time for the concentration of drug in the animal to decrease below the tolerance. For approved drugs, the following scores were used. For unapproved drugs, scores in this category were assigned based on estimates of their half-lives.

4 = Withdrawal time greater than 14 days

3 = Withdrawal time between 8 and 14 days

2 = Withdrawal time between 1 and 7 days

1 = Zero-day withdrawal time

**Impact on New and Existing Human Disease**

This represents the extent to which the use or misuse of this compound may contribute to new and existing human disease. Examples could include the possible creation of antibiotic-resistant human pathogens from the use of antibiotics in animals, or the potentiation of new zoonotic diseases (which might subsequently be altered and transferred to humans) following pesticide-induced immunosuppression.

4= Scientific information gathered from a variety of reliable sources indicate that possible widespread use of this compound might significantly modify drug resistance patterns of human pathogenic organisms.

3 = Limited scientific information is available to suggest or document public health risk but compound has the potential to affect microflora.

2 = No scientific information available to suggest or document public health risk.

1 = Current scientific information available suggests no public health risk.

**Relative Number of Animals Treated**

These scores are based on surveys of treatment practices in animal populations that are representative of national feedlot, dairy, and swine production.

4 = Products containing this drug fall within the top third of those administered to animals treated within a particular category and dosage form of active ingredient.

3 = Products containing this drug fall within the middle third of those administered to animals treated within a particular category and dosage form of active ingredient.

2 = Products containing this drug fall within the bottom third of those administered to animals treated within a particular category and dosage form of active ingredient (but have more usage than products given a score of "1," as defined below).

1 = Products containing this drug are estimated to have extremely limited usage. This category includes all drugs banned under AMDUCA.

Note: Where data were unavailable, scores were estimated, based on comparison to related drugs with known usage levels. Numbers estimated in this way are contained within parentheses.

**Acute or Chronic Toxicity Concerns**

This represents a combination of the toxicity of the compound and the severity associated with the compound's toxic endpoint

4 = Compound is a carcinogen, or potentially life threatening , or has significant acute effects including the anaphylactic response to an allergen.

3 = Systemic no observed effect levels (NOEL's) seen at intermediate to low doses in laboratory test animals. Antimicrobial effects with a high potential to alter intestinal microflora.

2 = Systemic NOEL's seen at high oral doses in laboratory test animals. Antimicrobial effects with a moderate potential to alter intestinal microflora.

1 = Compound generally shows no toxicity in laboratory test animals even at doses much higher than present in edible tissues at zero-day withdrawal.

**Table 4.1**
**Scoring Table for Veterinary Drugs**
**1999 FSIS NRP, Monitoring Plan and Special Projects**

| COMPOUND/COMPOUND CLASS | HISTORICAL TESTING INFORMA-TION ON VIOLATIONS (FSIS) | REGULA-TORY CONCERN (CVM) | LACK OF TESTING INFORMA-TION ON VIOLATIONS (FSIS) | WITH-DRAW-AL TIME (CVM) | IMPACT ON NEW AND EXISTING HUMAN DISEASE (CDC) | RELATIVE NUMBER OF ANIMALS TREATED (CVM) | ACUTE OR CHRONIC TOXICITY CONCERNS (CVM) |
|---|---|---|---|---|---|---|---|
| Those antibiotics quantitated by the FSIS Bioassay | 4 | 4 | 1 | 4 | 3 | 4 | 4 |
| Aminoglycosides (incl. spectinomycin, streptomycin, apramycin) | NT | 4 | 4 | 4 | 3 | 3 | 2 |
| Bambermycins | NT | 1 | 4 | 1 | 1 | 3 | 1 |
| Ceftiofur | NT | 3 | 4 | 2 | 3 | 3 | 2 |
| Chloramphenicol | NA (2) | 4 | 3 | 2 | 4 | 1 | 4 |
| Florfenicol in cattle | NT | 3 | 4 | 4 | 3 | 4 | 3 |
| Fluoroquinolones (incl. enrofloxacin) | NT | 4 | 4 | 3 | 4 | 3 | 2 |
| Glycopeptides (incl. avoparcin, vancomycin) | NT | 4 | 4 | 2 | 4 | 1 | 1 |
| Macrolides (incl. tilmicosin, tylosin) | 4 | 4 | 2 | 4 | 3 | 3 | 3 |
| Pirlimycin | NT | 3 | 4 | 4 | 2 | 3 | 2 |
| Virginiamycin | NT | 1 | 4 | 1 | 3 | 3 | 1 |
| Arsenicals (detected as As) | 3 | 3 | 1 | 2 | 3 | 4 | 2 |
| Avermectins in FSIS multi-residue method (incl. doramectin, ivermectin) | 4 | 3 | 2 | 4 | 2 | 4 | 2 |
| Eprinomectin | NT | 2 | 4 | 2 | 2 | (3) | 2 |
| Benzimidazoles | 1 | 1 | 2 | 3 | 1 | 2 | 2 |
| Berenil | NA (2) | 4 | 3 | 4 | 2 | (2) | 3 |
| Beta agonists (incl. clenbuterol) | NA (2) | 4 | 4 | 2 | 1 | 1 | 4 |
| Carbadox | NA | 4 | 4 | 4 | 2 | (3) | 4 |
| Clorsulon | NT | 2 | 4 | 3 | 2 | 2 | 2 |
| Halofuginone | 2 | 1 | 1 | 2 | 2 | 2 | 2 |
| Hormones, naturally-occurring | NT | 2 | 4 | 1 | 2 | (4) | 2 |
| DES | NA (1) | 4 | 3 | 2 | 2 | 1 | 4 |

**Table 4.1 - *Continued***
**Scoring Table for Veterinary Drugs**
**1999 FSIS NRP, Monitoring Plan and Special Projects**

| COMPOUND/COMPOUND CLASS | HISTORICAL TESTING INFORMA-TION ON VIOLATIONS (FSIS) | REGULA-TORY CONCERN (CVM) | LACK OF TESTING INFORMA-TION ON VIOLATIONS (FSIS) | WITH-DRAW-AL TIME (CVM) | IMPACT ON NEW AND EXISTING HUMAN DISEASE (CDC) | RELATIVE NUMBER OF ANIMALS TREATED (CVM) | ACUTE OR CHRONIC TOXICITY CONCERNS (CVM) |
|---|---|---|---|---|---|---|---|
| Glucocorticoids (incl. methyl prednisone, dexamethasone) | NT | 3 | 4 | 1 | 1 | (2) | 3 |
| MGA | 1 | 1 | 2 | 1 | 2 | 4 | 2 |
| Trenbolone | NT | 2 | 4 | 1 | 2 | (3) | 2 |
| Zeranol | 1 | 2 | 2 | 1 | 2 | 3 | 2 |
| Lasalocid | NT | 2 | 4 | 1 | 2 | 3 | 2 |
| Levamisole | 2 | 3 | 1 | 3 | 1 | (2) | 1 |
| Morantel and pyrantel | 2 | 1 | 1 | 1 | 2 | (2) | 1 |
| Nicarbazin (in poultry) | 1 | 2 | 2 | 2 | 2 | 1 | 1 |
| Nicarbazin (in egg products) | NT | 2 | 4 | 2 | 2 | 1 | 1 |
| Nitrofurans (incl. furazolidone, nitrofurazone) | NT | 4 | 4 | 2 | 3 | 1 | 4 |
| Nitroimidazoles (incl. ronidazole, dimetridazole, ipronidazole) | NA (1) | 4 | 3 | 2 | 1 | (1) | 4 |
| NSAIDS besides phenylbutazone (incl. flunixin) | NT | 4 | 4 | 2 | 1 | 3 | 3 |
| Phenylbutazone | NA (3) | 4 | 3 | 3 | 1 | 2 | 3 |
| Sulfonamides | 4 | 4 | 1 | 3 | 3 | 4 | 3 |
| Thyreostats (incl. thiouracil) | NT | 4 | 4 | 3 | 2 | (1) | 4 |
| Veterinary tranquilizers | NT | 4 | 4 | 2 | 1 | 2 | 1 |

**Key:**
NT = Not Tested by FSIS (1983-1998)
NA = Compound has been tested by FSIS (1983-1998), but the information is Not Applicable (e.g., compound has not been tested in the current species of concern)
(FSIS) = Scores in this column supplied by FSIS
(CVM) = Scores in this column supplied by FDA-CVM
(CDC) = Sores in this column supplied by CDC
Numbers surrounded by parentheses are estimates

**Table 4.2**
**Veterinary Drug Residues Rated with Various Weighting Formulas**
**1999 FSIS NRP, Monitoring Plan and Special Projects**

| DRUG | ACTUAL VIOLA-TION SCORE | PREDIC-TED VIOLA-TION SCORE | VIOLA-TION SCORE USED IN FORMULAS (V) | LACK INFO. (L) | DIS-EASE (D) | TOXIC-ITY (T) | V*[(D+3*T)/4]*{1+[(L-1)*0.1]} | V*[(D+3*T)/4]*{1+[(L-1)*0.05]} | V*[(D+2*T)/3]*{1+[(L-1)*0.05]} | V*[(D+T)/2]*{1+[(L-1)*0.05]} |
|---|---|---|---|---|---|---|---|---|---|---|
| Antibiotics in Bioassay | 4 | 4.13 | 4.00 | 1 | 3 | 4 | 15.0 | 15.0 | 14.7 | 14.0 |
| Aminoglycosides | | 3.76 | 3.76 | 4 | 3 | 2 | 11.0 | 9.7 | 10.1 | 10.8 |
| Bambermycins | | 1.20 | 1.20 | 4 | 1 | 1 | 1.6 | 1.4 | 1.4 | 1.4 |
| Ceftiofur | | 2.50 | 2.50 | 4 | 3 | 2 | 7.3 | 6.5 | 6.7 | 7.2 |
| Chloramphenicol | | 2.23 | 2.23 | 3 | 4 | 4 | 10.7 | 9.8 | 9.8 | 9.8 |
| Florfenicol | | 3.68 | 3.68 | 4 | 3 | 3 | 14.3 | 12.7 | 12.7 | 12.7 |
| Fluoroquinolones | | 3.36 | 3.36 | 4 | 4 | 2 | 10.9 | 9.7 | 10.3 | 11.6 |
| Glycopeptides | | 2.23 | 2.23 | 4 | 4 | 1 | 5.1 | 4.5 | 5.1 | 6.4 |
| Macrolides | 4 | 3.76 | 4.00 | 2 | 3 | 3 | 13.2 | 12.6 | 12.6 | 12.6 |
| Pirlimycin | | 3.32 | 3.32 | 4 | 2 | 2 | 8.6 | 7.6 | 7.6 | 7.6 |
| Virginiamycin | | 1.20 | 1.20 | 4 | 3 | 1 | 2.3 | 2.1 | 2.3 | 2.8 |
| Arsenicals | 3 | 2.87 | 3.00 | 1 | 3 | 2 | 6.8 | 6.8 | 7.0 | 7.5 |
| Avermectins | 4 | 3.68 | 4.00 | 2 | 2 | 2 | 8.8 | 8.4 | 8.4 | 8.4 |
| Eprinomectin | | 2.06 | 2.06 | 4 | 2 | 2 | 5.3 | 4.7 | 4.7 | 4.7 |
| Benzimidazoles | 1 | 1.65 | 1.00 | 2 | 1 | 2 | 1.9 | 1.8 | 1.8 | 1.6 |
| Berenil | | 3.40 | 3.40 | 3 | 2 | 3 | 11.2 | 10.3 | 10.0 | 9.4 |
| Beta agonists | | 2.23 | 2.23 | 4 | 1 | 4 | 9.4 | 8.3 | 7.7 | 6.4 |
| Carbadox | | 3.76 | 3.76 | 4 | 2 | 4 | 17.1 | 15.1 | 14.4 | 13.0 |
| Clorsulon | | 2.10 | 2.10 | 4 | 2 | 2 | 5.5 | 4.8 | 4.8 | 4.8 |
| Halofuginone | 2 | 1.25 | 2.00 | 1 | 2 | 2 | 4.0 | 4.0 | 4.0 | 4.0 |
| Hormones, naturally-occurring. | | 2.01 | 2.01 | 4 | 2 | 2 | 5.2 | 4.6 | 4.6 | 4.6 |
| DES | | 2.23 | 2.23 | 3 | 2 | 4 | 9.3 | 8.6 | 8.2 | 7.3 |
| Glucocorticoids | | 1.74 | 1.74 | 4 | 1 | 3 | 5.6 | 5.0 | 4.7 | 4.0 |
| MGA | 1 | 1.57 | 1.00 | 2 | 2 | 2 | 2.2 | 2.1 | 2.1 | 2.1 |
| Trenbolone | | 1.65 | 1.65 | 4 | 2 | 2 | 4.3 | 3.8 | 3.8 | 3.8 |

**Table 4.2 – *Continued***
**Veterinary Drug Residues Rated with Various Weighting Formulas**
**1999 FSIS NRP, Monitoring Plan and Special Projects**

| DRUG | ACTUAL VIOLA-TION SCORE | PREDIC-TED VIOLA-TION SCORE | VIOLA-TION SCORE USED IN FORMULAS (V) | LACK INFO. (L) | DIS-EASE (D) | TOXIC-ITY (T) | V*[(D+3*T)/4]*{1+[(L-1)*0.1]} | V*[(D+3*T)/4]*{1+[(L-1)*0.05]} | V*[(D+2*T)/3]*{1+[(L-1)*0.05]} | V*[(D+T)/2]*{1+[(L-1)*0.05]} |
|---|---|---|---|---|---|---|---|---|---|---|
| Zeranol | 1 | 1.65 | 1.00 | 2 | 2 | 2 | 2.2 | 2.1 | 2.1 | 2.1 |
| Lasalocid | | 1.65 | 1.65 | 4 | 2 | 2 | 4.3 | 3.8 | 3.8 | 3.8 |
| Levamisole | 2 | 2.55 | 2.00 | 1 | 1 | 1 | 2.0 | 2.0 | 2.0 | 2.0 |
| Morantel and pyrantel | 2 | 0.84 | 2.00 | 1 | 2 | 1 | 2.5 | 2.5 | 2.7 | 3.0 |
| Nicarbazin in poultry | 1 | 1.33 | 1.00 | 2 | 2 | 1 | 1.4 | 1.3 | 1.4 | 1.6 |
| Nicarbazin in eggs | | 1.33 | 1.33 | 4 | 2 | 1 | 2.2 | 1.9 | 2.0 | 2.3 |
| Nitrofurans | | 2.23 | 2.23 | 4 | 3 | 4 | 10.9 | 9.6 | 9.4 | 9.0 |
| Nitroimidazoles | | 2.23 | 2.23 | 3 | 1 | 4 | 8.7 | 8.0 | 7.3 | 6.1 |
| NSAIDS | | 2.95 | 2.95 | 4 | 1 | 3 | 9.6 | 8.5 | 7.9 | 6.8 |
| Phenylbutazone | | 2.99 | 2.99 | 3 | 1 | 3 | 9.0 | 8.2 | 7.7 | 6.6 |
| Sulfonamides | 4 | 3.72 | 4.00 | 1 | 3 | 3 | 12.0 | 12.0 | 12.0 | 12.0 |
| Thyreostats | | 2.63 | 2.63 | 4 | 2 | 4 | 12.0 | 10.6 | 10.1 | 9.1 |
| Vet. tranquilizers | | 2.59 | 2.59 | 4 | 1 | 1 | 3.4 | 3.0 | 3.0 | 3.0 |

**Key:**
V = Predicted or actual score for FSIS Historical Information on Violations
L = Lack of FSIS Testing Information on Violations
D = Impact on New and Existing Human Disease
T = Acute or Chronic Toxicity Concerns

## Table 4.3
## Veterinary Drug Residues Rated with Various Weighting Formulas, Sorted by Rating
## 1999 FSIS NRP, Monitoring Plan and Special Projects

| RANK | DRUG | V*((D+3*T)/4)*{1+[(L-1)*0.1]} | DRUG | V*((D+3*T)/4)*{1+[(L-1)*0.05]} | DRUG | V*((D+2*T)/4)*{1+[(L-1)*0.05]} | DRUG | V*((D+T)/4) * {1+[(L-1)*0.05]} |
|---|---|---|---|---|---|---|---|---|
| **1** | Carbadx | 17.1 | ***Carbadx*** | ***15.1*** | Antibiots | 14.7 | Antibiots | 14.0 |
| **2** | Antibiots | 15.0 | ***Antibiots*** | ***15.0*** | Carbadx | 14.4 | Carbadx | 13.0 |
| **3** | Flofenco | 14.3 | ***Flofenco*** | ***12.7*** | Flofenco | 12.7 | Flofenco | 12.7 |
| **4** | Macros | 13.2 | ***Macros*** | ***12.6*** | Macros | 12.6 | Macros | 12.6 |
| **5** | Sulfas | 12.0 | ***Sulfas*** | ***12.0*** | Sulfas | 12.0 | Sulfas | 12.0 |
| **6** | Thyreos | 12.0 | ***Thyreos*** | ***10.6*** | Fluorqns | 10.3 | Fluorqns | 11.6 |
| **7** | Berenil | 11.2 | ***Berenil*** | ***10.3*** | Amiglys | 10.1 | Amiglys | 10.8 |
| **8** | Amiglys | 11.0 | ***Clfencol*** | ***9.8*** | Thyreos | 10.1 | Clfencol | 9.8 |
| **9** | Fluorqns | 10.9 | ***Amiglys*** | ***9.7*** | Berenil | 10.0 | Berenil | 9.4 |
| **10** | Nitrofurs | 10.9 | ***Fluorqns*** | ***9.7*** | Clfencol | 9.8 | Thyreos | 9.1 |
| **11** | Clfencol | 10.7 | ***Nitrofurs*** | ***9.6*** | Nitrofurs | 9.4 | Nitrofurs | 9.0 |
| **12** | NSAIDS | 9.6 | ***DES*** | ***8.6*** | Avmecs | 8.4 | Avmecs | 8.4 |
| **13** | Beta ags | 9.4 | ***NSAIDS*** | ***8.5*** | DES | 8.2 | Pirlmycn | 7.6 |
| **14** | DES | 9.3 | ***Avmecs*** | ***8.4*** | NSAIDS | 7.9 | Arsencls | 7.5 |
| **15** | Phnlbute | 9.0 | ***Beta ags*** | ***8.3*** | Phnlbute | 7.7 | DES | 7.3 |
| **16** | Avmecs | 8.8 | ***Phnlbute*** | ***8.2*** | Beta ags | 7.7 | Ceftiofur | 7.2 |
| **17** | Nitroims | 8.7 | ***Nitroims*** | ***8.0*** | Pirlmycn | 7.6 | NSAIDS | 6.8 |
| **18** | Pirlmycn | 8.6 | ***Pirlmycn*** | ***7.6*** | Nitroims | 7.3 | Phnlbute | 6.6 |
| **19** | Ceftiofur | 7.3 | ***Arsencls*** | ***6.8*** | Arsencls | 7.0 | Glycops | 6.4 |
| **20** | Arsencls | 6.8 | ***Ceftiofur*** | ***6.5*** | Ceftiofur | 6.7 | Beta ags | 6.4 |
| **21** | Glucorts | 5.6 | ***Glucorts*** | ***5.0*** | Glycops | 5.1 | Nitroims | 6.1 |
| **22** | Clorsuln | 5.5 | ***Clorsuln*** | ***4.8*** | Clorsuln | 4.8 | Clorsuln | 4.8 |
| **23** | Eprinom | 5.3 | ***Eprinom*** | ***4.7*** | Eprinom | 4.7 | Eprinom | 4.7 |
| **24** | Hrms,ntl | 5.2 | ***Hrms,ntl*** | ***4.6*** | Glucorts | 4.7 | Hrms,ntl | 4.6 |
| **25** | Glycops | 5.1 | ***Glycops*** | ***4.5*** | Hrms,ntl | 4.6 | Halofugi | 4.0 |
| **26** | Trenboln | 4.3 | ***Halofugi*** | ***4.0*** | Halofugi | 4.0 | Glucorts | 4.0 |
| **27** | Lasalcid | 4.3 | ***Trenboln*** | ***3.8*** | Trenboln | 3.8 | Trenboln | 3.8 |
| **28** | Halofugi | 4.0 | ***Lasalcid*** | ***3.8*** | Lasalcid | 3.8 | Lasalcid | 3.8 |
| **29** | Vt.tranks | 3.4 | ***Vt.tranks*** | ***3.0*** | Vt.tranks | 3.0 | Mor,pyr | 3.0 |
| **30** | Mor,pyr | 2.5 | ***Mor,pyr*** | ***2.5*** | Mor,pyr | 2.7 | Vt.tranks | 3.0 |
| **31** | Viginiam | 2.3 | ***MGA*** | ***2.1*** | Viginiam | 2.3 | Viginiam | 2.8 |
| **32** | MGA | 2.2 | ***Zeranol*** | ***2.1*** | MGA | 2.1 | Nic,eggs | 2.3 |
| **33** | Zeranol | 2.2 | ***Viginiam*** | ***2.1*** | Zeranol | 2.1 | MGA | 2.1 |
| **34** | Nic,eggs | 2.2 | ***Levamsol*** | ***2.0*** | Nic,eggs | 2.0 | Zeranol | 2.1 |
| **35** | Levamsol | 2.0 | ***Nic,eggs*** | ***1.9*** | Levamsol | 2.0 | Levamsol | 2.0 |
| **36** | Benzims | 1.9 | ***Benzims*** | ***1.8*** | Benzims | 1.8 | Benzims | 1.6 |
| **37** | Bambers | 1.6 | ***Bambers*** | ***1.4*** | Nic,poul | 1.4 | Nic,poul | 1.6 |
| **38** | Nic,poul | 1.4 | ***Nic,poul*** | ***1.3*** | Bambers | 1.4 | Bambers | 1.4 |

**Key:**
V = Predicted or actual score for FSIS Historical Information on Violations
D = Impact on New and Existing Human Disease
L = Lack of FSIS Testing Information on Violations
T = Acute or Chronic Toxicity Concerns
The two bolded columns show the results obtained with the formula chosen by the RPC.

**Table 4.4**
**Key to Abbreviations Used for Veterinary Drugs**
**1999 FSIS NRP, Monitoring Plan and Special Projects**

| ABBREVIATION | COMPOUND/COMPOUND CLASS |
|---|---|
| Antibiots | Those antibiotics quantitated by the FSIS Bioassay |
| Amiglys | Aminoglycosides (incl. spectinomycin, streptomycin, apramycin) |
| Bambers | Bambermycins |
| Ceftiofur | Ceftiofur |
| Clfencol | Chloramphenicol |
| Flofenco | Florfenicol |
| Fluorqns | Fluoroquinolones (incl. enrofloxacin) |
| Glycops | Glycopeptides (incl. avoparcin, vancomycin) |
| Macros | Macrolides (incl. tilmicosin, tylosin) |
| Pirlmycn | Pirlimycin |
| Viginiam | Virginiamycin |
| Arsencls | Arsenicals (detected as As) |
| Avmecs | Avermectins in FSIS multi-residue method (incl. doramectin, ivermectin) |
| Eprinom | Eprinomectin |
| Benzims | Benzimidazoles |
| Berenil | Berenil |
| Beta ags | Beta agonists |
| Carbadx | Carbadox |
| Clorsuln | Clorsulon |
| Halofugi | Halofuginone |
| Hrms,ntl | Hormones, naturally-occuring |
| DES | DES |
| Glucorts | Glucocorticoids (incl. methyl prednisone, dexamethasone) |
| MGA | MGA |
| Trenboln | Trenbolone |
| Zeranol | Zeranol |
| Lasalcid | Lasalocid |
| Levamsol | Levamisole |
| Mor,pyr | Morantel and pyrantel |
| Nic,poul | Nicarbazin (in poultry) |
| Nic,eggs | Nicarbazin (in egg products) |
| Nitrofurs | Nitrofurans (incl. furazolidone, nitrofurazone) |
| Nitroims | Nitroimidazoles (incl. ronidazole, dimetridazole, ipronidazole) |
| NSAIDS | NSAIDS besides phenylbutazone (incl. flunixin) |
| Phnlbute | Phenylbutazone |
| Sulfas | Sulfonamides |
| Thyreos | Thyreostats (incl. thiouracil) |
| Vt.tranks | Veterinary tranquilizers |

**Table 4.5**
**Rank and Status for Veterinary Drugs**
**1999 FSIS NRP, Monitoring Plan and Special Projects**

| RANK | DRUG | SCORE | STATUS IN 1999 NATIONAL RESIDUE PROGRAM |
|---|---|---|---|
| 1 | Carbadox | 15.1 | Special Project, roaster pigs |
| 2 | Antibiotics in Bioassay | 15.0 | Monitoring Plan, MRM, all production classes |
| 3 | Florfenicol | 12.7 | NIP, delay until MRM available for florfenicol and chloramphenicol (est. 2000) |
| 4 | Macrolides | 12.6 | Monitoring Plan, method available for tilmicosin only, dairy cows and formula-fed veal |
| 5 | Sulfonamides | 12.0 | Monitoring Plan, MRM, all production classes except egg products |
| 6 | Thyreostats | 10.6 | NIP, method not yet installed in FSIS laboratories |
| 7 | Berenil | 10.3 | NIP, current method requires improvement |
| 8 | Chloramphenicol | 9.8 | NIP, delay until MRM available for florfenicol and chloramphenicol (est. 2000) |
| 9 | Aminoglycosides | 9.7 | Special Project, spectinomycin only, dairy cows |
| 10 | Fluoroquinolones | 9.7 | Special Project, MRM, dairy cows, young chicken and young turkey |
| 11 | Nitrofurans | 9.6 | NIP, current method requires improvement |
| 12 | DES | 8.6 | Special Project, formula-fed veal |
| 13 | NSAIDS | 8.5 | Special Project, flunixin only, dairy cows |
| 14 | Avermectins | 8.4 | Monitoring Plan, MRM, all livestock production classes except bob veal calves |
| 15 | Beta agonists | 8.3 | Special Project, MRM, market hogs and formula-fed veal |
| 16 | Phenylbutazone | 8.2 | Monitoring Plan, all production classes except egg products |
| 17 | Nitroimidazoles | 8.0 | Special Project, MRM, formula-fed veal |
| 18 | Pirlimycin | 7.6 | NIP, method needs improvement |
| 19 | Arsenicals | 6.8 | Monitoring Plan, multiple production classes |
| 20 | Ceftiofur | 6.5 | NIP, new method - awaiting availability |
| 21 | Glucocorticoids | 5.0 | Special Project, dexamethasone only, dairy cows |
| 22 | Clorsulon | 4.8 | NIP, low priority |
| 23 | Eprinomectin | 4.7 | NIP, low priority |
| 24 | Hormones, nat.-occur. | 4.6 | NIP, low priority |
| 25 | Glycopeptides | 4.5 | NIP, low priority |
| 26 | Halofuginone | 4.0 | NIP, low priority |
| 27 | Trenbolone | 3.8 | NIP, low priority |
| 28 | Lasalocid | 3.8 | NIP, low priority |
| 29 | Vet. tranquilizers | 3.0 | Special Project, MRM, screening method only, market hogs |
| 30 | Morantel and pyrantel | 2.5 | NIP, low priority |
| 31 | MGA | 2.1 | NIP, low priority |
| 32 | Zeranol | 2.1 | NIP, low priority |
| 33 | Virginiamycin | 2.1 | NIP, low priority |
| 34 | Levamisole | 2.0 | NIP, low priority |
| 35 | Nicarbazin in eggs | 1.9 | NIP, low priority |
| 36 | Benzimidazoles | 1.8 | NIP, low priority |
| 37 | Bambermycins | 1.4 | NIP, low priority |
| 38 | Nicarbazin in poultry | 1.3 | NIP, low priority |

**Key:**
MRM = Multi-Residue Method
NIP = Not Included in 1999 FSIS National Residue Program

## Table 4.6
## Production Classes to be Considered for Each Veterinary Drug/Drug Class
## 1999 FSIS NRP, Monitoring Plan and Special Projects

| Est. Rel. % Dom. Cons. | DRUG-> | Carbadx | Anti-biots | Til-mic | Sulfas | Spec-tin | Fluor-qns | DES | Flu-nixin | Av-mecs | Phnl-bute | Beta Ags | Nitro-ims | Arsen-cls | Dex | Vet. Tranks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DRUG SCORE-> | 15.1 | 15.0 | 12.6 | 12.0 | 9.7 | 9.7 | 8.6 | 8.5 | 8.4 | 8.2 | 8.0 | 8.0 | 6.8 | 5.0 | 3.0 |
| 0.037 | Horses | | ● | | ● | ○ | | | ○ | ● | ● | ○ | | | ○ | ○ |
| 0.581 | Bulls | | ● | ○ | ● | ○ | ○ | | ○ | ● | ● | | | | ○ | ○ |
| 1.589 | Beef cows | | ● | ○ | ● | ○ | ○ | | ○ | ● | ● | ○ | | | ○ | ○ |
| 1.907 | Dairy cows | | ● | ● | ● | ● | ● | | ● | ● | ● | | | | ● | ○ |
| 8.107 | Heifers | ○ | ● | ○ | ● | ○ | ○ | ○ | ○ | ● | ● | ○ | | ● | | |
| 13.481 | Steers | ○ | ● | ○ | ● | ○ | ○ | | ○ | ● | ● | ○ | | ● | | |
| 0.057 | Bob veal calves | | ● | ○ | ● | ○ | ○ | | ○ | | ● | | | ● | | |
| 0.190 | Formula-fed veal | | ● | ● | ● | ○ | ○ | ● | ○ | ● | ● | ● | ● | ● | ○ | |
| 0.008 | Non-formula-fed veal | | ● | ○ | ● | ○ | ○ | ○ | ○ | ● | ● | ○ | ○ | | | |
| 0.017 | Heavy calves | | ● | ○ | ● | | ○ | | ○ | ● | ● | ○ | | | | |
| 0.013 | Sheep | | ● | | ○ | ○ | ○ | | ○ | ● | ● | | | | ○ | |
| 0.239 | Lambs | | ● | | ● | ○ | ○ | | | ● | ⭘ | ○ | | | | |
| 0.022 | Goats | | ● | | ● | ○ | ○ | | ○ | ● | ● | | | ● | | |
| 18.904 | Market hogs | ● | ● | ○ | ● | ○ | ○ | | | ● | ⭘ | ● | ○ | ● | | ● |
| 0.013 | Roaster pigs | ● | ● | ○ | ● | ○ | ○ | | ○ | ● | ⭘ | | ○ | ● | | |
| 0.168 | Boars/Stags | ○ | ● | ○ | ● | ○ | ○ | | ○ | ● | ● | | ○ | ● | ○ | ○ |
| 1.052 | Sows | ○ | ● | ○ | ● | ○ | ○ | | ○ | ● | ● | | ○ | ● | ○ | ○ |
| 42.083 | Young chickens | | ● | | ● | ○ | ● | | | | ⭘ | ○ | | ● | | |
| 0.402 | Mature chickens | | ● | | ● | ○ | ○ | | | | ⭘ | | | ● | | |
| 7.579 | Young turkeys | | ● | | ● | ○ | ● | | | | ⭘ | ○ | | ● | | |
| 0.057 | Mature turkeys | | ● | | ● | ○ | ○ | | | | ⭘ | | | ● | | |
| 0.175 | Ducks | | ● | | ● | | ○ | | | | ⭘ | | | ● | | |
| 0.003 | Geese | | ● | | ● | | ○ | | | | ⭘ | | | ● | | |
| 0.002 | Rabbits | | ● | | ○ | ○ | ○ | | | ● | ⭘ | | | | | |
| 3.328 | Egg products | | ● | | ● | ○ | ○ | | | | ⭘ | | | ● | | |

**Key:**

Est. Rel. % Dom. Cons. = Estimated relative percent of domestic consumption. This was derived by estimating the total annual U.S. domestic production (pounds dressed weight) for each production class, and dividing by the total poundage for all production classes on this list.

● = Sampled under the 1999 FSIS NRP

○ = Of potential regulatory concern, but could not be sampled under the 1999 FSIS NRP because of laboratory resource constraints

⭘ = Since all production classes will be sampled with the CHC/COP method (see Section 6), and since this method also detects phenylbutazone, the latter will, by default, likewise be sampled in all production classes. However, phenylbutazone is not of regulatory concern in all production class. Thus, this designation indicates those production classes in which phenylbutazone will be sampled because it is detected as part of the CHC/COP method, but where it is NOT of regulatory concern.

**Table 4.7**
**Veterinary Drug Compound/Production Class Pairs,**
**Sorted by Sampling Priority Score, "Full-Resource" Sampling**
**1999 FSIS NRP, Monitoring Plan and Special Projects**

| RANK | COMPOUND CLASS | COMPOUND PRIORITY RATING (P) | PRODUCTION CLASS | EST. RELATIVE % DOMESTIC CONSUMPTION (D) | C/PC PAIR PRIORITY SCORE (P x D) | # SAMPLES |
|---|---|---|---|---|---|---|
| 1 | Antibiotics | 15.00 | Young chickens | 42.083 | 631.24 | 460 |
| 2 | Sulfonamides | 12.00 | Young chickens | 42.083 | 505.00 | 460 |
| 3 | Arsenicals | 6.75 | Young chickens | 42.083 | 284.06 | 460 |
| 4 | Antibiotics | 15.00 | Market hogs | 18.904 | 283.56 | 460 |
| 5 | Sulfonamides | 12.00 | Market hogs | 18.904 | 226.85 | 460 |
| 6 | Antibiotics | 15.00 | Steers | 13.481 | 202.22 | 460 |
| 7 | Sulfonamides | 12.00 | Steers | 13.481 | 161.78 | 460 |
| 8 | Avermectins | 8.40 | Market hogs | 18.904 | 158.79 | 460 |
| 9 | Arsenicals | 6.75 | Market hogs | 18.904 | 127.60 | 460 |
| 10 | Antibiotics | 15.00 | Heifers | 8.107 | 121.60 | 460 |
| 11 | Antibiotics | 15.00 | Young turkeys | 7.579 | 113.69 | 460 |
| 12 | Avermectins | 8.40 | Steers | 13.481 | 113.24 | 460 |
| 13 | Sulfonamides | 12.00 | Heifers | 8.107 | 97.28 | 460 |
| 14 | Arsenicals | 6.75 | Steers | 13.481 | 91.00 | 460 |
| 15 | Sulfonamides | 12.00 | Young turkeys | 7.579 | 90.95 | 460 |
| 16 | Avermectins | 8.40 | Heifers | 8.107 | 68.10 | 460 |
| 17 | Arsenicals | 6.75 | Heifers | 8.107 | 54.72 | 460 |
| 18 | Arsenicals | 6.75 | Young turkeys | 7.579 | 51.16 | 460 |
| 19 | Antibiotics | 15.00 | Egg products | 3.328 | 49.92 | 460 |
| 20 | Sulfonamides | 12.00 | Egg products | 3.328 | 39.94 | 460 |
| 21 | Antibiotics | 15.00 | Dairy cows | 1.907 | 28.60 | 460 |
| 22 | Antibiotics | 15.00 | Beef cows | 1.589 | 23.83 | 300 |
| 23 | Sulfonamides | 12.00 | Dairy cows | 1.907 | 22.88 | 300 |
| 24 | Arsenicals | 6.75 | Egg products | 3.328 | 22.46 | 300 |
| 25 | Sulfonamides | 12.00 | Beef cows | 1.589 | 19.07 | 300 |
| 26 | Avermectins | 8.40 | Dairy cows | 1.907 | 16.01 | 300 |
| 27 | Antibiotics | 15.00 | Sows | 1.052 | 15.79 | 300 |
| 28 | Avermectins | 8.40 | Beef cows | 1.589 | 13.35 | 300 |
| 29 | Sulfonamides | 12.00 | Sows | 1.052 | 12.63 | 300 |
| 30 | Avermectins | 8.40 | Sows | 1.052 | 8.84 | 300 |
| 31 | Antibiotics | 15.00 | Bulls | 0.581 | 8.71 | 300 |
| 32 | Arsenicals | 6.75 | Sows | 1.052 | 7.10 | 300 |
| 33 | Sulfonamides | 12.00 | Bulls | 0.581 | 6.97 | 300 |
| 34 | Antibiotics | 15.00 | Mature chickens | 0.402 | 6.02 | 300 |
| 35 | Avermectins | 8.40 | Bulls | 0.581 | 4.88 | 300 |
| 36 | Sulfonamides | 12.00 | Mature chickens | 0.402 | 4.82 | 300 |
| 37 | Antibiotics | 15.00 | Lambs | 0.239 | 3.59 | 300 |
| 38 | Sulfonamides | 12.00 | Lambs | 0.239 | 2.87 | 300 |
| 39 | Antibiotics | 15.00 | Formula-fed | 0.190 | 2.85 | 300 |
| 40 | Arsenicals | 6.75 | Mature chickens | 0.402 | 2.71 | 300 |
| 41 | Antibiotics | 15.00 | Ducks | 0.175 | 2.62 | 300 |
| 42 | Antibiotics | 15.00 | Boars/Stags | 0.168 | 2.51 | 300 |

**Table 4.7 - *Continued***
**Veterinary Drug Compound/Production Class Pairs,**
**Sorted by Sampling Priority Score, "Full-Resource" Sampling**
**1999 FSIS NRP, Monitoring Plan and Special Projects**

| RANK | COMPOUND CLASS | COMPOUND PRIORITY RATING (P) | PRODUCTION CLASS | EST. RELATIVE % DOMESTIC CONSUMPTION (D) | C/PC PAIR PRIORITY SCORE (P x D) | # SAMPLES |
|---|---|---|---|---|---|---|
| 43 | Sulfonamides | 12.00 | Formula-fed | 0.190 | 2.28 | 300 |
| 44 | Sulfonamides | 12.00 | Ducks | 0.175 | 2.10 | 230 |
| 45 | Avermectins | 8.40 | Lambs | 0.239 | 2.01 | 230 |
| 46 | Sulfonamides | 12.00 | Boars/Stags | 0.168 | 2.01 | 230 |
| 47 | Avermectins | 8.40 | Formula-fed | 0.190 | 1.60 | 230 |
| 48 | Avermectins | 8.40 | Boars/Stags | 0.168 | 1.41 | 230 |
| 49 | Arsenicals | 6.75 | Formula-fed | 0.190 | 1.28 | 230 |
| 50 | Arsenicals | 6.75 | Ducks | 0.175 | 1.18 | 230 |
| 51 | Arsenicals | 6.75 | Boars/Stags | 0.168 | 1.13 | 230 |
| 52 | Antibiotics | 15.00 | Mature turkeys | 0.057 | 0.86 | 230 |
| 53 | Antibiotics | 15.00 | Bob calves | 0.057 | 0.86 | 230 |
| 54 | Sulfonamides | 12.00 | Mature turkeys | 0.057 | 0.69 | 230 |
| 55 | Sulfonamides | 12.00 | Bob calves | 0.057 | 0.68 | 230 |
| 56 | Antibiotics | 15.00 | Horses | 0.037 | 0.55 | 230 |
| 57 | Sulfonamides | 12.00 | Horses | 0.037 | 0.44 | 230 |
| 58 | Arsenicals | 6.75 | Mature turkeys | 0.057 | 0.39 | 230 |
| 59 | Arsenicals | 6.75 | Bob calves | 0.057 | 0.39 | 230 |
| 60 | Antibiotics | 15.00 | Goats | 0.022 | 0.33 | 230 |
| 61 | Avermectins | 8.40 | Horses | 0.037 | 0.31 | 230 |
| 62 | Sulfonamides | 12.00 | Goats | 0.022 | 0.26 | 230 |
| 63 | Antibiotics | 15.00 | Heavy calves | 0.017 | 0.26 | 230 |
| 64 | Sulfonamides | 12.00 | Heavy calves | 0.017 | 0.21 | 230 |
| 65 | Antibiotics | 15.00 | Sheep | 0.013 | 0.19 | 230 |
| 66 | Antibiotics | 15.00 | Roaster pigs | 0.013 | 0.19 | 230 |
| 67 | Avermectins | 8.40 | Goats | 0.022 | 0.18 | 90 |
| 68 | Sulfonamides | 12.00 | Sheep | 0.013 | 0.15 | 90 |
| 69 | Sulfonamides | 12.00 | Roaster pigs | 0.013 | 0.15 | 90 |
| 70 | Arsenicals | 6.75 | Goats | 0.022 | 0.15 | 90 |
| 71 | Avermectins | 8.40 | Heavy calves | 0.017 | 0.14 | 90 |
| 72 | Antibiotics | 15.00 | Non-formula | 0.008 | 0.13 | 90 |
| 73 | Avermectins | 8.40 | Sheep | 0.013 | 0.11 | 90 |
| 74 | Avermectins | 8.40 | Roaster pigs | 0.013 | 0.11 | 90 |
| 75 | Sulfonamides | 12.00 | Non-formula | 0.008 | 0.10 | 90 |
| 76 | Arsenicals | 6.75 | Roaster pigs | 0.013 | 0.08 | 90 |
| 77 | Avermectins | 8.40 | Non-formula | 0.008 | 0.07 | 90 |
| 78 | Antibiotics | 15.00 | Geese | 0.003 | 0.04 | 90 |
| 79 | Sulfonamides | 12.00 | Geese | 0.003 | 0.03 | 90 |
| 80 | Antibiotics | 15.00 | Rabbits | 0.002 | 0.03 | 90 |
| 81 | Sulfonamides | 12.00 | Rabbits | 0.002 | 0.02 | 90 |
| 82 | Arsenicals | 6.75 | Geese | 0.003 | 0.02 | 90 |
| 83 | Avermectins | 8.40 | Rabbits | 0.002 | 0.02 | 90 |

**Table 4.8**
**Adjusted Number of Analyses for Each Veterinary Drug Compound/Production Class Pair, "Full Resource" Sampling**
**1999 FSIS NRP Monitoring Plan and Special Projects**

| DRUG CLASS | PRODUCTION CLASS | SCORE | # SAMP. | %VIOL. | %NVP | UNADJ. # | ADJUST-MENT | INITIAL ADJ.# | ADJUST-MENT | FINAL ADJ.# |
|---|---|---|---|---|---|---|---|---|---|---|
| Antibiotics | Young chickens | 631.24 | 2585 | 0.00 | 0.12 | 460 | | 460 | | 460 |
| Antibiotics | Market hogs | 283.56 | 2160 | 0.37 | 3.29 | 460 | | 460 | | 460 |
| Antibiotics | Steers | 202.22 | 1972 | 0.05 | 0.00 | 460 | | 460 | | 460 |
| Antibiotics | Heifers | 121.60 | 1673 | 0.00 | 0.00 | 460 | | 460 | | 460 |
| Antibiotics | Young turkeys | 113.69 | 2631 | 0.19 | 0.91 | 460 | | 460 | | 460 |
| Antibiotics | Egg products | 49.92 | NT | NT | NT | 460 | +1 level | 460 | | 460 |
| Antibiotics | Dairy cows | 28.60 | 2636 | 0.34 | 0.08 | 460 | | 460 | | 460 |
| Antibiotics | Beef cows | 23.83 | 3123 | 0.06 | 0.19 | 300 | | 300 | | 300 |
| Antibiotics | Sows | 15.79 | 3011 | 0.23 | 0.96 | 300 | | 300 | | 300 |
| Antibiotics | Bulls | 8.71 | 1732 | 0.00 | 0.00 | 300 | | 300 | | 300 |
| Antibiotics | Mature chickens | 6.02 | 2108 | 0.00 | 0.14 | 300 | | 300 | | 300 |
| Antibiotics | Lambs | 3.59 | 2528 | 0.24 | 0.12 | 300 | | 300 | | 300 |
| Antibiotics | Formula-fed | 2.85 | 3047 | 0.30 | 2.43 | 300 | | 300 | | 300 |
| Antibiotics | Ducks | 2.62 | 2511 | 0.20 | 0.60 | 300 | | 300 | | 300 |
| Antibiotics | Boars/Stags | 2.51 | 2328 | 0.13 | 1.33 | 300 | | 300 | | 300 |
| Antibiotics | Mature turkeys | 0.86 | 1148 | 0.17 | 0.78 | 230 | | 230 | min 300 | 300 |
| Antibiotics | Bob calves | 0.86 | 2743 | 1.09 | 1.06 | 230 | +2 levels | 460 | | 460 |
| Antibiotics | Horses | 0.55 | 1046 | 3.63 | 1.43 | 230 | +2 levels | 460 | | 460 |
| Antibiotics | Goats | 0.33 | 1903 | 0.00 | 0.05 | 230 | | 230 | min 300 | 300 |
| Antibiotics | Heavy calves | 0.26 | 2221 | 0.27 | 0.59 | 230 | | 230 | min 300 | 300 |
| Antibiotics | Sheep | 0.19 | 1913 | 0.10 | 0.00 | 230 | | 230 | min 300 | 300 |
| Antibiotics | Roaster pigs | 0.19 | NT | NT | NT | 230 | +1 level | 300 | +1 level | 460 |
| Antibiotics | Non-formula | 0.13 | 1994 | 0.50 | 0.60 | 90 | +1 level | 230 | min 300 | 300 |
| Antibiotics | Geese | 0.04 | 113 | 0.00 | 0.00 | 90 | | 90 | NO ADJ | 90 |
| Antibiotics | Rabbits | 0.03 | 647 | 2.63 | 27.05 | 90 | +2 levels | 300 | | 300 |
| | | | | | | | | | | |
| **TOTAL # SAMPLES** | | | | | | **7500** | | **8380** | | **8890** |
| | | | | | | | | | | |

**Table 4.8 - *Continued***
**Adjusted Number of Analyses for Each Veterinary Drug Compound/Production Class Pair, "Full Resource" Sampling**
**1999 FSIS NRP Monitoring Plan and Special Projects**

| DRUG CLASS | PRODUCTION CLASS | SCORE | # SAMP. | %VIOL. | %NVP | UNADJ. # | ADJUST-MENT | INITIAL ADJ.# | ADJUST-MENT | FINAL ADJ.# |
|---|---|---|---|---|---|---|---|---|---|---|
| Avermectins | Market hogs | 158.79 | 1189 | 0.00 | 0.08 | 460 | | 460 | | 460 |
| Avermectins | Steers | 113.24 | 2069 | 0.05 | 0.05 | 460 | | 460 | | 460 |
| Avermectins | Heifers | 68.10 | 1333 | 0.00 | 0.08 | 460 | | 460 | | 460 |
| Avermectins | Dairy cows | 16.01 | 1682 | 0.18 | 0.24 | 300 | | 300 | | 300 |
| Avermectins | Beef cows | 13.35 | 1986 | 0.10 | 0.20 | 300 | | 300 | | 300 |
| Avermectins | Sows | 8.84 | 1204 | 0.00 | 0.42 | 300 | | 300 | | 300 |
| Avermectins | Bulls | 4.88 | 1233 | 0.16 | 1.46 | 300 | | 300 | | 300 |
| Avermectins | Lambs | 2.01 | 1084 | 0.00 | 0.18 | 230 | | 230 | | 230 |
| Avermectins | Formula-fed | 1.60 | 1704 | 0.18 | 1.53 | 230 | | 230 | | 230 |
| Avermectins | Boars/Stags | 1.41 | 1034 | 0.00 | 0.10 | 230 | | 230 | | 230 |
| Avermectins | Horses | 0.31 | 509 | 0.39 | 0.20 | 230 | | 230 | | 230 |
| Avermectins | Goats | 0.18 | 1652 | 0.67 | 0.06 | 90 | +1 level | 230 | | 230 |
| Avermectins | Heavy calves | 0.14 | 1936 | 0.26 | 0.41 | 90 | | 90 | | 90 |
| Avermectins | Sheep | 0.11 | 1761 | 0.28 | 0.34 | 90 | | 90 | | 90 |
| Avermectins | Roaster pigs | 0.11 | NT | NT | NT | 90 | +1 level | 230 | | 230 |
| Avermectins | Non-formula | 0.07 | 1281 | 0.39 | 0.86 | 90 | | 90 | | 90 |
| Avermectins | Rabbits | 0.02 | NT | NT | NT | 90 | +1 level | 230 | | 230 |
| | | | | | | | | | | |
| **TOTAL # SAMPLES** | | | | | | **4040** | | **4460** | | **4460** |

**Table 4.8 - *Continued***
**Adjusted Number of Analyses for Each Veterinary Drug Compound/Production Class Pair, "Full Resource" Sampling**
**1999 FSIS NRP Monitoring Plan and Special Projects**

| DRUG CLASS | PRODUCTION CLASS | SCORE | # SAMP. | %VIOL. | %NVP | UNADJ. # | ADJUST-MENT | INITIAL ADJ.# | ADJUST-MENT | FINAL ADJ.# |
|---|---|---|---|---|---|---|---|---|---|---|
| Sulfonamides | Young chickens | 505.00 | 2474 | 0.12 | 0.28 | 460 | | 460 | | 460 |
| Sulfonamides | Market hogs | 226.85 | 2314 | 0.52 | 0.61 | 460 | +1 level | 460 | | 460 |
| Sulfonamides | Steers | 161.78 | 1643 | 0.18 | 0.00 | 460 | | 460 | | 460 |
| Sulfonamides | Heifers | 97.28 | 1622 | 0.00 | 0.43 | 460 | -1 level | 300 | | 300 |
| Sulfonamides | Young turkeys | 90.95 | 2448 | 0.20 | 0.86 | 460 | | 460 | | 460 |
| Sulfonamides | Egg products | 39.94 | NT | NT | NT | 460 | +1 level | 460 | | 460 |
| Sulfonamides | Dairy cows | 22.88 | 2282 | 0.31 | 0.09 | 300 | | 300 | | 300 |
| Sulfonamides | Beef cows | 19.07 | 2807 | 0.14 | 0.39 | 300 | | 300 | | 300 |
| Sulfonamides | Sows | 12.63 | 2721 | 0.85 | 0.59 | 300 | +2 levels | 460 | | 460 |
| Sulfonamides | Bulls | 6.97 | 1752 | 0.06 | 0.40 | 300 | | 300 | | 300 |
| Sulfonamides | Mature chickens | 4.82 | 2108 | 0.00 | 0.19 | 300 | -1 level | 230 | | 230 |
| Sulfonamides | Lambs | 2.87 | 1643 | 0.12 | 0.00 | 300 | | 300 | | 300 |
| Sulfonamides | Formula-fed | 2.28 | 2726 | 0.07 | 0.66 | 300 | | 300 | | 300 |
| Sulfonamides | Ducks | 2.10 | 1945 | 0.05 | 0.00 | 230 | | 230 | | 230 |
| Sulfonamides | Boars/Stags | 2.01 | 2337 | 0.77 | 1.33 | 230 | +2 levels | 460 | | 460 |
| Sulfonamides | Mature turkeys | 0.69 | 1236 | 0.40 | 1.05 | 230 | | 230 | | 230 |
| Sulfonamides | Bob calves | 0.68 | 2868 | 0.84 | 0.45 | 230 | +2 levels | 460 | | 460 |
| Sulfonamides | Horses | 0.44 | 737 | 0.54 | 0.00 | 230 | +1 level | 300 | | 300 |
| Sulfonamides | Goats | 0.26 | 1737 | 0.40 | 0.00 | 230 | | 230 | | 230 |
| Sulfonamides | Heavy calves | 0.21 | 2098 | 0.19 | 0.62 | 230 | | 230 | | 230 |
| Sulfonamides | Sheep | 0.15 | 1340 | 0.00 | 0.00 | 90 | -1 level | 0 | | 0 |
| Sulfonamides | Roaster pigs | 0.15 | NT | NT | NT | 90 | +1 level | 230 | | 230 |
| Sulfonamides | Non-formula | 0.10 | 2015 | 0.55 | 1.04 | 90 | +1 level | 230 | | 230 |
| Sulfonamides | Geese | 0.03 | 120 | 0.83 | 0.00 | 90 | NO ADJ | 90 | | 90 |
| Sulfonamides | Rabbits | 0.02 | 646 | 0.00 | 0.15 | 90 | -1 level | 0 | | 0 |
| | | | | | | | | | | |
| **TOTAL # SAMPLES** | | | | | | **6920** | | **7480** | | **7480** |

**Table 4.8 - *Continued***
**Adjusted Number of Analyses for Each Veterinary Drug Compound/Production Class Pair, "Full Resource" Sampling**
**1999 FSIS NRP Monitoring Plan and Special Projects**

| DRUG CLASS | PRODUCTION CLASS | SCORE | # SAMP. | %VIOL. | %NVP | UNADJ. # | ADJUST-MENT | INITIAL ADJ.# | ADJUST-MENT | FINAL ADJ.# |
|---|---|---|---|---|---|---|---|---|---|---|
| Arsenicals | Young chickens | 284.06 | 2368 | 0.46 | 77.62 | 460 | | 460 | | 460 |
| Arsenicals | Market hogs | 127.60 | 1194 | 0.00 | 21.19 | 460 | | 460 | max 300 | 300 |
| Arsenicals | Steers | 91.00 | 172 | 0.00 | 1.16 | 460 | | 460 | max 300 | 300 |
| Arsenicals | Heifers | 54.72 | 173 | 0.00 | 2.31 | 460 | | 460 | max 300 | 300 |
| Arsenicals | Young turkeys | 51.16 | 1702 | 0.35 | 38.31 | 460 | | 460 | max 300 | 300 |
| Arsenicals | Egg products | 22.46 | NT | NT | NT | 300 | +1 level | 460 | max 300 | 300 |
| Arsenicals | Sows | 7.10 | 933 | 0.00 | 28.62 | 300 | -1 level | 230 | | 230 |
| Arsenicals | Mature chickens | 2.71 | 1127 | 0.00 | 32.03 | 300 | -1 level | 230 | | 230 |
| Arsenicals | Formula-fed | 1.28 | 187 | 0.00 | 0.53 | 230 | | 230 | | 230 |
| Arsenicals | Ducks | 1.18 | 90 | 0.00 | 0.00 | 230 | | 230 | | 230 |
| Arsenicals | Boars/Stags | 1.13 | 774 | 0.00 | 26.87 | 230 | -1 level | 90 | | 90 |
| Arsenicals | Mature turkeys | 0.39 | 445 | 0.00 | 40.00 | 230 | -1 level | 90 | | 90 |
| Arsenicals | Bob calves | 0.39 | 140 | 0.00 | 0.71 | 230 | | 230 | | 230 |
| Arsenicals | Goats | 0.15 | 612 | 0.00 | 22.06 | 90 | -1 level | 0 | | 0 |
| Arsenicals | Roaster pigs | 0.08 | NT | NT | NT | 90 | +1 level | 230 | | 230 |
| Arsenicals | Geese | 0.02 | NT | NT | NT | 90 | NO ADJ | 90 | | 90 |
| | | | | | | | | | | |
| **TOTAL # SAMPLES** | | | | | | **4620** | | **4410** | | **3610** |

**Key:**
#SAMP. = Total number of samples analyzed by the FSIS Monitoring Plan and/or Special Projects (i.e., random sampling only), 1/1/93 - 10/15/98;
%VIOL. = Percent violative, i.e., the percent of samples with residue concentrations exceeding the tolerance or action level (or, for a drug whose use was not permitted in the production class in which it was detected, the percent of samples with any detectable residue)
%NVP = Percent non-violative positive, i.e., the percent of samples in which the drug was detected at a level below the tolerance or action level
UNADJ. # = Unadjusted number of samples, obtained from last column of Table 4.7
INITIAL ADJ.# = Number of samples proposed following adjustment for historical violation rate information or lack of testing information
FINAL ADJ.# = Finalized sample numbers, obtained following any adjustments needed to match sample volume to laboratory capacity.
NT = Not Tested
+1 level, +2 levels, -1 level = There are four different sampling levels: 90, 230, 300 and 460. Sampling levels were increased or decreased (e.g., changed from 300 samples to 230 samples) based on the rules described in Section 4.
NO ADJ = As explained in Section 4, the number of samples taken from geese is limited to 90 per compound class per year, and thus this number could not be adjusted upward based on the rules applied to the other production class

# SECTION 5
# PLANNING THE 1999 FSIS IMPORT RESIDUE PLAN: VETERINARY DRUGS

# SECTION 5. PLANNING THE 1999 FSIS IMPORT RESIDUE PLAN: VETERINARY DRUGS

## PHASE I - GENERATING AND RANKING LIST OF CANDIDATE COMPOUNDS

### LIST OF CANDIDATE COMPOUNDS

The candidate veterinary drugs of concern selected by members of the Surveillance Advisory Team (SAT) for the import residue plan are the same as those listed in Section 4.

#### RANKING OF CANDIDATE COMPOUNDS

**Compound Scoring and Ranking**

Using a simple 4-point scale (4 = high; 3 = moderate; 2 = low; 1 = none), the SAT scored each of the above veterinary drugs or drug classes in each of the following categories:

- Food Safety and Inspection Service (FSIS) Historical Testing Information on Violations
- Regulatory Concern
- Lack of FSIS Testing Information on Violations
- Historical Testing Information on Violations Reported by the Foreign Countries
- Withdrawal Time
- Impact on New and Existing Human Disease
- Acute or Chronic Toxicity Concerns

Categories used to score the veterinary drugs for the import residue plan parallel those for the domestic plan. However, three categories are different:

1. **FSIS Historical Testing Information on Violations**: The FSIS historical testing information for imported products is different from that for the domestic products.

2. **Historical Testing Information on Violations Reported by the Foreign Countries**: The foreign countries submit their residue testing information to FSIS. FSIS uses this information as an additional category to score the veterinary drugs for the import residue plan.

3. **Relative Number of Animals Treated**: This category was not used in the design of the import residue plan because it is not possible to obtain detailed information on treatment practices in the animal populations of each country.

Definitions of each of these categories and the criteria used for scoring, appear at the end of this section, "*Scoring Key for Veterinary Drugs.*"

The results of the scoring process are presented in Table 5.1, *Scoring Table for Veterinary Drugs.*

**Background**

As stated in Section 3, FSIS chose to employ techniques and principles from the field of risk assessment to obtain a ranking of the relative public health concern represented by each of the candidate compounds or compound classes.

The equation used to measure hazard is the same as that in the domestic plan:

Risk = Exposure x Toxicity (5.1)
= Consumption x Residue Levels x Toxicity
= Consumption x "Risk Per Unit of Consumption"

As stated in Section 4, given the limited resources available for this priority-setting effort, the Residue Prioritization Committee (RPC) did not attempt to associate different degrees of risk with different degrees of exceedance of the tolerance or action level. The RPC instead determined that the best available method for the measurement of relative toxicity is associated with the tolerance or action level. *Specifically, the frequency of violation of the tolerance or action level was used as an indicator of the risk per unit of consumption of a product.*

The categories of " FSIS Historical Testing Information on Violations " and “Historical Testing Information on Violations Reported by the Foreign Countries " represent the percent of tested product found to have residues in excess of the tolerance or action level. Therefore, based on this equation, it can be seen that the violation rate scores assigned in Table 5.1 represent a rough overall estimate of *relative* risk per unit consumption. However, since most of the candidate compounds or compound classes of concern are ones that have not yet been included in the FSIS National Residue program (NRP), data on violation rates is not available for them. Therefore, it was necessary to generate an estimate of the overall violation rate for each these untested compounds and compound classes.

**Estimating the Violation Rate**

In the domestic residue plan, a regression equation was developed to predict violation history scores for those veterinary drugs that had not been tested. However, in the import residue plan the data from FSIS testing and the data reported by the foreign countries are not sufficient to independently develop a similar predictive formula. Since it would be expected that similar underlying data on usage should lead to similar violation rate in foreign countries, the RPC decided to predict the score for “FSIS Historical Testing Information on Violations” using the regression equation obtained from the domestic values. In other words, (for purpose of planning the International Residue Plan) it was assumed that the relationship among the categories of “Regulatory Concern," "Withdrawal Time,” "Relative Number of Animals Treated" and “FSIS Historical Testing Information on Violations,” in foreign countries is similar to that in the U.S. The "Regulatory Concern" scores used for each drug or drug class in the import plan were the same as those in the domestic plan, because the veterinary control practices in foreign countries were judged to be approximately similar to those in the U.S. However, if the veterinary control practices in foreign countries were known to be different from those in U.S., the "Regulatory Concern" score for a drug or drug class in the import plan would reflect such differences. The “Withdrawal Time” is based upon the pharmacokinetic properties of the drug in the animal. Therefore, “Withdrawal Time” score for each drug in the import residue plan is the same as that used in the domestic residue plan.

As stated above, no data was available for the “Relative Number of Animals Treated.” Hence, this variable was removed from the formula used for the design of import residue plan. To retain comparability of the import residue plan scores with the domestic residue plan scores, this variable was converted into a constant by multiplying the average of the "Relative Number of Animals Treated" used

in the domestic plan by its respective regression coefficient, and adding the result as a constant term of the formula.

Thus, the equation used to predict the violation rate for the import residue plan is:

$V_P = 0.45*(R) + 0.41*(W) + 0.36*(Na) - 0.74$ (5.2)

$V_P$ = Predicted Violation Rate
R = Regulatory Concern
W= Withdrawal Time
Na = Average of Relative number of animals treated (2.44)

The results of the predicted violation rate are presented in Table 5.2, *Predicted Violation Rate for Veterinary Drugs*.

**Rating the Veterinary Drugs According to Relative Public Health Concern**

As stated in Section 4, the scores for predicted violation rate combines information on residue levels and toxicity, and thus represents a rough overall estimate of the relative risk per unit of consumption for each drug or drug class. Although this score, once multiplied by relative consumption data for each production class, would conform most closely to a purely risk-based ranking, the RPC believes that additional attributes should also be considered in the ranking. Thus, the ranking according to relative public health concern incorporates, as modifiers, the remaining scoring categories presented in Table 5.3, *Drug Residues Rated with Various Weighting Formulas.* The equation used is similar to the equation in, Section 4.

Relative Public Health Concern = *Predicted* score for "FSIS Historical testing information on violations" (Estimate of Relative Hazard)
x *modifier for* "Acute or chronic toxicity concerns"
x *modifier for* "Impact on new and existing human disease" (5.3)
x *modifier for* "Lack of FSIS testing information on violations"

The discussion on the use of modifiers is presented in Section 4 and following the same concept, the RPC decided to use the same weighting factors used in the domestic plan to calculate the relative public health concern for the import plan. In Table 5.3, *Drug Residues Rated with Various Weighting Formulas, 1999 Import Residue Plan*, the drugs are rated for relative public health concern by combining the scoring categories presented in Equation (3), above, using four different weighting formulas. As in the domestic plan, the RPC chose to use the second of these formulas (bolded in Table 5.3), based on a consensus about the relative importance of each modifier, and of how much each modifier should be allowed to alter the underlying risk-based score, "$V_P$," in Equation (4), below. Equation (4) summarizes the way final adjustments were made.

Thus, a similar equation as in Section 4 was used to calculate the relative public health concern.

Relative Public Health Concern, veterinary drugs = $V_P*((D+3*T)/4) *\{1+[(L-1)*0.05]\}$ (5.4)

*Where:* *$V_P$ = Predicted score for "FSIS Historical Information on Violations"*
*D = score for "Impact on New and Existing Human Disease"*
*T = score for "Acute or Chronic Toxicity Concerns"*
*L = score for "Lack of FSIS Testing Information on Violations*

In Table 5.4, *Drug Residues Rated with Various Weighting Formulas, Sorted by Rating,* the drugs are ranked by their rating scores using the four different weighting formulas as discussed in Section 4. Results obtained with the selected formula are bolded. Inspection of this chart reveals the extent to which changes in the weighting formula result in changes in ranking. In this case, the results from all four formulas are relatively similar.

The rating scores and rankings presented in Table 5.4 enables the RPC to bring consistency, grounded in formal risk-based considerations, to its efforts to differentiate among a very diverse range of drugs and drug classes in a situation that is marked by minimal data on relative exposures.

A key to the abbreviations used in Table 5.1 to 5.4 is presented in table 5.5, *Key to Abbreviations Used for Veterinary Drugs.*

**PHASE II - SELECTING DRUGS FOR INCLUSION IN THE 1999 NRP**

As stated in Section 4, after the completion of the ranking of the veterinary drugs, RPC used these rankings to select those compounds and compound classes that should be included in the 1999 NRP, based purely on their relative public health concern. It also determined which of these compounds and compound classes actually could be included in the 1999 NRP, based on the availability of laboratory resources.

The consensus of the RPC participants was that those compounds and compound classes ranked 23rd or higher represented a potential public health concern sufficient to justify their inclusion in the 1999.

Once the high-priority compounds and compound classes had been identified, it was necessary for the RPC to apply non-public health considerations to determine the compounds for which FSIS would actually sample. The principal consideration not related to public health was the availability of laboratory resources, especially the availability of appropriate analytical methods within the FSIS laboratories. When the laboratory resource was limited, FSIS decided (it is more important) to test for the domestic products since the import residue plan is the recheck of the product at the port of entry. Based on these considerations, the following compounds will be included in the 1999 FSIS Import Residue Plan.

--Antibiotics:

- those antibiotics quantitated by the FSIS Bioassay and associated follow-up methodologies[1] [tetracycline, oxytetracycline, chlortetracycline, beta-lactams (penicillins and cephalosporins; not differentiated within this category), gentamicin, streptomycin/spectinomycin (not differentiated), erythromycin, tilmicosin, tylosin, neomycin, flavomycin, bacitracin, hygromycin, novobiocin, lincomycin*, pirlimycin*, clindamycin*, spiramycin*, oleandomycin*] *identification by mass spectrometry; not quantitated

--Other Veterinary Drugs:

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[1] FSIS quantitates most antibiotics using a 7-plate Bioassay that measures microbial inhibition. The pattern of inhibition (i.e., the combination of plates showing inhibition) is used to identify the antibiotic. However, there are some antibiotics that share the same pattern of inhibition. In these cases, it is necessary to undertake follow-up testing (HPLC or mass spectrometry) to identify the compound. The compounds that share patterns of inhibition, and which are thus individually identified through follow-up testing, are:
*tetracycline/oxytetracycline/chlortetracycline* - compounds individually identified by follow-up with HPLC method for tetracyclines
*tilmicosin/tylosin* - differentiated by mass spectrometry

- arsenicals (detected as elemental arsenic)
- avermectins in FSIS multi-residue method (doramectin and ivermectin)
- carbadox
- nitroimidazoles (ronidazole, dimetridazole and ipronidazole)
- phenylbutazone (detected in the CHC3 method)
- sulfonamides (sulfapyridine, sulfadiazine, sulfathiazole, sulfamerazine, sulfamethazine, sulfachloropyridazine, sulfadoxine, sulfamethoxypyridazine, sulfaquinoxaline, sulfadimethoxine, sulfisoxazole, sulfacetamide, sulfamethoxazole, sulfamethizole, sulfanilamide, sulfaguanidine, sulfabromomethazine, sulfasalazine, sulfaethoxypyridazine, sulfaphenazole, sulfatroxazole, and sulfanitran)

In 1999, FSIS will employ 7 methodologies that analyze for veterinary drugs in the Import Residue Plan. One of these is a single-compound methodology, and six are multi-residue methods (phenylbutazone is detected by the FSIS multi-residue method for chlorinated hydrocarbon and chlorinated organophosphate compounds).

**PHASE III - IDENTIFYING THE COMPOUND/PRODUCT CLASS PAIRS**

FDA participants of SAT identified, for each of the drugs and drug classes to be included in the 1999 NRP, the product classes in which they might be of concern. The results are presented in Table 5.6, *Product Classes Considered for Each Drug/Drug Class.* Compound/product class pairs included in the 1999 NRP are designated by a "●." Those compound/product class pairs that are of potential public health concern, but that could not be included in the 1999 NRP because of laboratory resource constraints, are marked with a "○." Since all product classes will be sampled by the chlorinated hydrocarbon/chlorinated organophosphate (CHC/COP) method (see Section 7), and since this method also detects phenylbutazone, the latter, by default, will be sampled in all product classes. However, phenylbutazone is not of regulatory concern in all product classes. Those product classes in which phenylbutazone will be sampled, but where it is NOT of regulatory concern, are designated by a "**O** "

**PHASE IV - ALLOCATION OF SAMPLING RESOURCES**

**ALLOCATION OF SAMPLING RESOURCES AMONG DIFFERENT PRODUCTION CLASSES**

Table-5.7**,** *Estimated Annual Amount of Product Imported,* lists the estimated amount of all the product classes imported into US and the percentage of each of the product classes. The percent of each product class imported annually is calculated using the following formula:

$$\% \text{ Product Class Imported } (P_C) = \frac{\text{Amount Product Class Imported}}{\text{Total Product Imported}} \times 100 \qquad (5.5)$$

The relative sampling priority is obtained by multiplying the percent product class ($P_C$) by the drug scores obtained in Phase I, using the following equation

$$\text{Relative Sampling Priority} = (P_C) \times \text{Drug Score} \qquad (5.6)$$

Based on the scores, four different sampling options were chosen; very high regulatory concern (460 analyses/year); high regulatory concern (300 analyses/year); moderate regulatory concern (230 samples/year); low regulatory concern (90 samples/year). This is indicated in Table 10, *Number of Drug Samples/Product Class,* in the column labeled “Unadjusted Number of Samples.”

If a product class represents less than one percent (by weight) of total combined U.S. imports of meat, poultry and egg products, then the total number of samples analyzed for any compound or compound class is eight times the number of countries from which that product is imported. For example, fresh goat is imported from only two countries. The amount imported is 0.30% relative to the total U.S. import. Therefore, sixteen samples of fresh goat would be taken for each analysis, eight from each country.

In case of carbadox and nitroimidazoles based on the laboratory capacity, the number of samples was adjusted downwards.

The adjusted numbers of samples is listed in Table 5.10, *Number of Drug Samples/Product Class,* in the column labeled "Minimum Number of Samples." The final number of samples for a compound/product class is obtained after the allocation of samples among different countries is completed. The final number of samples is listed in Table 5.10 in the column labeled "Final Number of Samples." The numbers in the column labeled "Adjusted Number of Samples" and "Final Number of Samples" may vary slightly because of the rounding upwards or downwards of the samples.

## ALLOCATION OF SAMPLES AMONG DIFFERENT COUNTRIES

The total number of samples chosen for each compound/product class pair was subdivided among the different countries. The number of samples for each country was based on the relative amount of total product class imported: less than one percent and greater than one percent.

### Allocation of Samples in Product Classes Whose Total Volume Imported is Less Than 1%

As stated above, if the amount of an import product class was less than 1%, eight samples per compound/compound class were taken from each country. The relative amounts of fresh goat, fresh chicken, beef/pork processed, turkey fresh and processed, other fowl fresh and processed, lamb/mutton processed, and veal processed were less than 1%. The numbers of samples per country per product class for each compound/compound class are listed in Tables 5.11-5.19.

### Allocation of Samples in Product Classes Whose Total Volume Imported is Greater Than 1%

For major product classes, the number of samples was allocated to each country depending upon the relative amount of product imported from that country. Table 5.8, *Estimated Annual Volume of Import Product/Country,* lists the amount of product imported from each country. The percent of a product class imported from a country was calculated as follows and is in Table 5.9, *Relative Annual Amount of Import Product /Country.*

$$\text{Percent Product Class Imported per Country } (P_{C/C}) = \frac{\text{Amount of Product Class from Country}}{\text{Total Amount of Product Class}} \times 100 \quad (5.7)$$

Based upon the relative amount of product class imported per country, the number of samples that should be taken at the port of entry was calculated using the following formula:

$$\text{Unadjusted Number of Samples per Country } (U_{C/S}) = \text{Total Number of Samples} \times \frac{(P_{C/C})}{100} \quad (5.8)$$

This is indicated in the column labeled "Unadjusted Number of Samples ($U_{C/S}$)," in Tables 5.20 to 5.26.

After the determination of the number of samples from each country, each country with less than eight samples was assigned a minimum of eight samples. This is indicated in the column labeled "Adjustment

#1" in Tables 5.20 to 5.26. The results of this adjustment are in the column labeled "Initial Adj#." After this adjustment, the total number of samples for a compound/product class resulted in more than the total number of samples allocated to that compound/product class pair. A second adjustment then had to be made, so that the total number of samples would be within an allocated number. This adjustment was made only to those countries from which greater than eight samples were to be taken. This was accomplished using the following equations:

$$\text{Number of Samples after Adjustment \#2} = (U_{C/S}) - \frac{(N \times P_{C/C})}{(P_{T/C})} \qquad (5.9)$$

where ,

$N = (N_1) - (N_T)$
$N_1$ = Total Number of Samples after Adjustment #1
$N_T$ = Total Number of Samples Allocated
$P_{T/C}$ = Total Percent of Product Class from the Countries That Had Greater Than Eight Samples
$P_{C/C}$ = Percent Product Class Imported Per Country
$U_{C/S}$ = Unadjusted Number of Samples

The final numbers of product sampled are indicated in Tables 5.20 to 5.26 in the column labeled "Final Adj.#."

**Notes:**

The number of samples for carbadox and nitroimidazoles is based on the limited laboratory capability and is discussed in detail in Section 4 under, "Limited Resource Sampling."

Phenylbuatzone is detected by the FSIS CHC/COP method. Therefore, all product classes that are sampled for CHC/COP are sampled for phenylbuatzone. The number of samples/product class/country is discussed in Section 7.

## SCORING KEY FOR VETERINARY DRUGS

### FSIS Historical Testing Information on Violations

Information based on the testing performed by FSIS on the imported product collected at port of entry

4 = Violation rate of 0.6% or greater for at least one year in at least one country,

3 = More than two violations detected, but does not qualify for a "4"

2 = Total of one or two violations detected over all years of sampling

1 = No violations detected over all years of sampling

NT = Not tested by FSIS

NA =Tested by FSIS but the violation information does not apply because of change in withdrawal time

**Regulatory Concern**

Professional judgements made about the likelihood of occurrence of violations, based on regulatory intelligence information about possible misuse. Due to the public health significance of drug residue violations, surveillance data pertaining to a compound must meet only one of the requirements listed under each number below to receive that numerical ranking.

4 = Well-documented intelligence information gathered from a variety of reliable sources indicates possible widespread misuse of the compound. This compound is either banned and/or is on the AMDUCA Prohibited list. This compound is not approved for use in the U.S.

3 = Intelligence information gathered through a variety of sources indicates only occasional misuse of this compound. The dosage form/packaging of this compound has potential for misuse.

2 = Intelligence information rarely indicates misuse of this compound.

1 = Intelligence information has never indicated misuse of this compound.

**Lack of FSIS Testing Information on Violations**

Represents the extent to which FSIS analytical testing information on a residue is lacking.

1 = FSIS has included this compound in its sampling program within the past 5 years

2 = FSIS has included this compound in its sampling program within the past 8 years

3 = FSIS has included this compound in its sampling program within the past 10 years

4 = FSIS has never included this compound in its sampling program

**Historical Testing Information on Violation Reported by the Foreign Countries**

The foreign countries report the results of their residue testing plans to FSIS. The data from 1989 to 1995 was used to score this category.

4 = Violation rate of 0.6% or greater for at least one year in at least one country,

3 = More than two violations detected, but does not qualify for a "4"

2 = Total of one or two violations detected over all years of sampling

1 = No violations detected over all years of sampling

ND = No data available

**Acute or Chronic Toxicity Concerns**

This represents a combination of the toxicity of the compound and the severity associated with the compound's toxic endpoint

4 = Compound is a carcinogen, or potentially life threatening , or has significant acute effects including the anaphylactic response to an allergen.

3 = Systemic no observed effect levels (NOEL's) seen at intermediate to low doses in laboratory test animals. Antimicrobial effects with a high potential to alter intestinal microflora.

2 = Systemic NOEL's seen at high oral doses in laboratory test animals. Antimicrobial effects with a moderate potential to alter intestinal microflora.

1 = Compound generally shows no toxicity in laboratory test animals even at doses much higher than present in edible tissues at zero-day withdrawal.

**Withdrawal Time**

Producers using approved animal drugs are required to follow approved "conditions of use." For each drug, in each production class in which it is approved, the conditions of use specify the dosing regimen and the withdrawal time. The withdrawal time is the number of days that must pass between completion of the dosing regimen and the time of slaughter. This allows sufficient time for the concentration of drug in the animal to decrease below the tolerance. For approved drugs, the following scores were used. For unapproved drugs, scores in this category were assigned based on estimates of their half-lives.

4 = Withdrawal time greater than 14 days

3 = Withdrawal time between 8 and 14 days

2 = Withdrawal time between 1 and 7 days

1 = Zero-day withdrawal time

**Impact on New and Existing Human Disease**

This represents the extent to which the use or misuse of this compound will contribute to new and existing human disease. Note that these are not direct effects of exposure to the residue. Examples are the possibility of the creation of antibiotic-resistant human pathogens from the use of antibiotics in animals, or the potentiation of new zoonotic diseases (which might subsequently be altered and transferred to humans), as a result of pesticide-induced immunosuppression.

4= Scientific information gathered from reliable sources indicate possible widespread use of this compound could significantly modify drug resistance patterns of human pathogenic organisms.

3 = Limited scientific information is available to suggest or document public health risk but compound has the potential to affect microflora.

2 = No scientific information available to suggest or document public health risk.

1 = Current scientific information available suggests no public health risk.

**Table 5.1**
**Scoring Table for Veterinary Drugs**
**1999 FSIS Import Residue Plan**

| COMPOUND/ COMPOUND CLASS) | FSIS HISTORICAL TESTING INFORM. ON VIOLATIONS (FSIS) | HISTORICAL TESTING INFORM. ON VIOLATION REPORTED BY THE FOREIGN COUNTRIES (FSIS) | REGULATORY CONCERN (CVM) | WITH-DRAWAL TIME (CVM) | LACK OF TESTING INFORM. ON VIOLATION (FSIS) | IMPACT ON NEW AND EXISTING HUMAN DISEASE (CDC) | ACUTE OR CHRONIC TOXICITY CONCERNS (CVM) |
|---|---|---|---|---|---|---|---|
| Those antibiotics quantitated by the FSIS Bioassay | 2 | 4 | 4 | 4 | 1 | 3 | 4 |
| Aminoglycosides (incl. spectinomycin, apramycin) | NT | 4 | 4 | 4 | 4 | 3 | 2 |
| Bambermycin | NT | ND | 1 | 1 | 4 | 1 | 1 |
| Ceftiofur | NT | ND | 3 | 2 | 4 | 3 | 2 |
| Chloramphenicol | 2 | 1 | 4 | 2 | 3 | 4 | 4 |
| Florfenicol | NT | ND | 3 | 4 | 4 | 3 | 3 |
| Fluoroquinolones (incl. enrofloxacin) | NT | 3 | 4 | 3 | 4 | 4 | 2 |
| Glycopeptides (incl. avoparcin, vancomycin) | NT | ND | 4 | 2 | 4 | 4 | 1 |
| Macrolides (incl. tilmicosin, tylosin) | 1 | 4 | 4 | 4 | 2 | 3 | 3 |
| Pirlimicin | NT | ND | 3 | 4 | 4 | 2 | 2 |
| Virginiamycin | NT | ND | 1 | 1 | 4 | 3 | 1 |
| Arsenicals (detected as As) | 1 | 4 | 3 | 2 | 1 | 3 | 2 |
| Avermectins (incl. doramectin, ivermectin) | 1 | 3 | 3 | 4 | 2 | 2 | 2 |
| Eprinomectin | NT | ND | 2 | 2 | 4 | 2 | 2 |
| Benzimidizoles | 1 | 4 | 1 | 3 | 2 | 1 | 2 |
| Berenil | NT | ND | 4 | 4 | 4 | 2 | 3 |
| Beta agonists (incl. clenbuterol) | NT | 4 | 4 | 2 | 4 | 1 | 4 |
| Carbadox | 1 | 4 | 4 | 4 | 4 | 2 | 4 |
| Clorsulon | NT | 3 | 2 | 3 | 4 | 2 | 2 |
| Glucocorticosteroids (incl. methyl predisone, dexamethazone) | NT | 1 | 3 | 1 | 4 | 1 | 3 |
| Halofuginone | 1 | ND | 1 | 2 | 1 | 2 | 2 |

**Table 5.1 - *Continued***
**Scoring Table for Veterinary Drugs**
**1999 FSIS Import Residue Plan**

| COMPOUND/ COMPOUND CLASS) | FSIS HISTORICAL TESTING INFORM. ON VIOLATIONS (FSIS) | HISTORICAL TESTING INFORM. ON VIOLATION REPORTED BY THE FOREIGN COUNTRIES (FSIS) | REGULATORY CONCERN (CVM) | WITH-DRAWAL TIME (CVM) | LACK OF TESTING INFORM. ON VIOLATION (FSIS) | IMPACT ON NEW AND EXISTING HUMAN DISEASE (CDC) | ACUTE OR CHRONIC TOXICITY CONCERNS (CVM) |
|---|---|---|---|---|---|---|---|
| Hormones, naturally occurring | NT | 1 | 2 | 1 | 4 | 2 | 2 |
| DES | 1 | 4 | 4 | 2 | 3 | 2 | 4 |
| MGA | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| Trenbolone | NT | 4 | 2 | 1 | 4 | 2 | 2 |
| Zeranol | 1 | 3 | 2 | 1 | 2 | 2 | 2 |
| Lasalocid | NT | 3 | 2 | 1 | 4 | 2 | 2 |
| Levamisole | 1 | 3 | 3 | 3 | 1 | 1 | 1 |
| Morantel and pyrantel | 1 | 2 | 1 | 1 | 1 | 2 | 1 |
| Nicarbazin (in poultry) | 1 | ND | 2 | 2 | 2 | 2 | 1 |
| Nicarbazin (in egg products) | NT | 4 | 2 | 2 | 4 | 2 | 1 |
| Nitrofurans (incl. furazolidone, nitrofurazone) | NT | 1 | 4 | 2 | 4 | 3 | 4 |
| Nitroimidazoles (incl. ronidazole, dimitridazole, ipronidazole) | NT | 3 | 4 | 2 | 3 | 1 | 4 |
| NSAIDs besides phenylbutazone (incl. flunixin) | NT | ND | 4 | 2 | 4 | 1 | 3 |
| Phenylbutazone | 1 | ND | 4 | 3 | 3 | 1 | 3 |
| Sulfonamides | 4 | 4 | 4 | 3 | 1 | 3 | 3 |
| Thyreostats | NT | 1 | 4 | 3 | 4 | 2 | 4 |
| Veterinary tranquilizers | NT | 3 | 4 | 2 | 4 | 1 | 1 |

**Key:**
1 = None; 2 = Low; 3 = Moderate; 4 = High
NT = Not Tested
ND = No Data Reported

**Table 5.2**
**PREDICTED VIOLATION RATE FOR VETERINARY DRUGS**
**1999 FSIS Import Residue Plan**

| COMPOUND/ COMPOUND CLASS | REGULATORY CONCERN (R) (CVM) | WITHDRAWAL TIME (W) (CVM) | AVERAGE OF DOMESTIC NUMBER OF ANIMAL TREATED ($N_a$) (CVM) | PREDICTED VIOLATION RATE ($V_P$ )= 0.45*(R) + 0.41*(W) + 0.36*($N_a$))-0.74 |
|---|---|---|---|---|
| Those antibiotics quantitated by the FSIS Bioassay | 4 | 4 | 2.44 | 3.6 |
| Aminoglycosides (incl. spectinomycin, apramycin) | 4 | 4 | 2.44 | 3.6 |
| Bambermycin | 1 | 1 | 2.44 | 1.0 |
| Ceftiofur | 3 | 2 | 2.44 | 2.3 |
| Chloramphenicol | 4 | 2 | 2.44 | 2.7 |
| Florfenicol | 3 | 4 | 2.44 | 3.1 |
| Fluoroquinolones (incl. enrofloxacin) | 4 | 3 | 2.44 | 3.2 |
| Glycopeptides (incl. avoparcin, vancomycin) | 4 | 2 | 2.44 | 2.7 |
| Macrolides (incl. tilmicosin, tylosin) | 4 | 4 | 2.44 | 3.6 |
| Pirlimicin | 3 | 4 | 2.44 | 3.1 |
| Virginiamycin | 1 | 1 | 2.44 | 1.0 |
| Arsenicals (detected as As) | 3 | 2 | 2.44 | 2.3 |
| Avermectins (incl. doramectin, ivermectin) | 3 | 4 | 2.44 | 3.1 |
| Eprinomectin | 2 | 2 | 2.44 | 1.9 |
| Benzimidizoles | 1 | 3 | 2.44 | 1.8 |
| Berenil | 4 | 4 | 2.44 | 3.6 |
| Beta agonists (incl. clenbuterol) | 4 | 2 | 2.44 | 2.7 |
| Carbadox | 4 | 4 | 2.44 | 3.6 |
| Clorsulon | 2 | 3 | 2.44 | 2.3 |
| Glucocorticosteroids (incl. methyl predisone, dexamethazone) | 3 | 1 | 2.44 | 1.9 |
| Halofuginone | 1 | 2 | 2.44 | 1.4 |
| Hormones, naturally occurring | 2 | 1 | 2.44 | 1.4 |
| DES | 4 | 2 | 2.44 | 2.7 |
| MGA | 1 | 1 | 2.44 | 1.0 |
| Trenbolone | 2 | 1 | 2.44 | 1.4 |
| Zeranol | 2 | 1 | 2.44 | 1.4 |
| Lasalocid | 2 | 1 | 2.44 | 1.4 |
| Levamisole | 3 | 3 | 2.44 | 2.7 |
| Morantel and pyrantel | 1 | 1 | 2.44 | 1.0 |
| Nicarbazin (in poultry) | 2 | 2 | 2.44 | 1.9 |

**Table 5.2 - *Continued***
**PREDICTED VIOLATION RATE FOR VETERINARY DRUGS**
**1999 FSIS Import Residue Plan**

| | | | | |
|---|---|---|---|---|
| Nicarbazin (in egg products) | 2 | 2 | 2.44 | 1.9 |
| Nitrofurans (incl. furazolidone, nitrofurazone) | 4 | 2 | 2.44 | 2.7 |
| Nitroimidazoles (incl. ronidazole, dimitridazole, ipronidazole) | 4 | 2 | 2.44 | 2.7 |
| NSAIDs besides phenylbutazone (incl. flunixin) | 4 | 2 | 2.44 | 2.7 |
| Phenylbutazone | 4 | 3 | 2.44 | 3.2 |
| Sulfonamides | 4 | 3 | 2.44 | 3.2 |
| Thyreostats | 4 | 3 | 2.44 | 3.2 |
| Veterinary tranquilizers | 4 | 2 | 2.44 | 2.7 |

**Key:**
1 = None; 2 = Low; 3 = Moderate; 4 = High

**Table 5.3**
**Drugs Residues Rated with Various Weighting Formula**
**1999 FSIS Import Residue Plan**

| **Compound/Compound Class** | **Predicted Rate of Violation ($V_P$)** | **Lack of Testing Information on Violation (L) (FSIS)** | **Impact On New And Existing Human Diseases (D) (CDC)** | **Acute or Chronic Toxicity Concerns (T) (CVM)** | $V_P$*(.25D+0.75T)*{1+[(L-1)*0.1]} | **$V_P$*(.25*D+.75*T)*{1+[(L-1)*0.05]}** | $V_P$*((0.33*D+0.67*T)*{1+[(L-1)*0.05]} | $V_P$*(0.5*D+0.5*T)*{1+[(L-1)*0.05]} |
|---|---|---|---|---|---|---|---|---|
| Those antibiotics quantitated by the FSIS Bioassay | 3.6 | 1 | 3 | 4 | 13.35 | **13.35** | 13.06 | 12.46 |
| Aminoglycosides (incl. spectinomycin, apramycin) | 3.6 | 4 | 3 | 2 | 10.41 | **9.21** | 9.54 | 10.23 |
| Bambermycin | 1.0 | 4 | 1 | 1 | 1.30 | **1.15** | 1.15 | 1.15 |
| Ceftiofur | 2.3 | 4 | 3 | 2 | 6.73 | **5.95** | 6.16 | 6.61 |
| Chloramphenicol | 2.7 | 3 | 4 | 4 | 13.18 | **12.08** | 12.08 | 12.08 |
| Florfenicol | 3.1 | 4 | 3 | 3 | 12.14 | **10.74** | 10.74 | 10.74 |
| Fluoroquinolones (incl. enrofloxacin) | 3.2 | 4 | 4 | 2 | 10.25 | **9.06** | 9.64 | 10.88 |
| Glycopeptides (incl. avoparcin, vancomycin) | 2.7 | 4 | 4 | 1 | 6.25 | **5.53** | 6.29 | 7.90 |
| Macrolides (incl. tilmicosin, tylosin) | 3.6 | 2 | 3 | 3 | 11.74 | **11.21** | 11.21 | 11.21 |
| Pirlimicin | 3.1 | 4 | 2 | 2 | 8.09 | **7.16** | 7.16 | 7.16 |
| Virginiamycin | 1.0 | 4 | 3 | 1 | 1.95 | **1.73** | 1.91 | 2.30 |
| Arsenicals (detected as As) | 2.3 | 1 | 3 | 2 | 5.17 | **5.17** | 5.36 | 5.75 |
| Avermectins (incl. doramectin, ivermectin) | 3.1 | 2 | 2 | 2 | 6.85 | **6.54** | 6.54 | 6.54 |
| Eprinomectin | 1.9 | 4 | 2 | 2 | 4.82 | **4.26** | 4.26 | 4.26 |
| Benzimidizoles | 1.8 | 2 | 1 | 2 | 3.49 | **3.33** | 3.18 | 2.86 |
| Berenil | 3.6 | 4 | 2 | 3 | 12.72 | **11.26** | 10.93 | 10.23 |
| Beta agonists (incl. clenbuterol) | 2.7 | 4 | 1 | 4 | 11.60 | **10.26** | 9.51 | 7.90 |
| Carbadox | 3.6 | 4 | 2 | 4 | 16.19 | **14.33** | 13.67 | 12.28 |
| Clorsulon | 2.3 | 4 | 2 | 2 | 5.87 | **5.20** | 5.20 | 5.20 |
| Glucocorticosteroids (incl. methyl predisone, dexamethazone) | 1.9 | 4 | 1 | 3 | 6.15 | **5.44** | 5.10 | 4.35 |
| Halofuginone | 1.4 | 1 | 2 | 2 | 2.81 | **2.81** | 2.81 | 2.81 |
| Hormones, naturally occurring | 1.4 | 4 | 2 | 2 | 3.76 | **3.33** | 3.33 | 3.33 |
| DES | 2.7 | 3 | 2 | 4 | 11.53 | **10.57** | 10.09 | 9.06 |
| MGA | 1.0 | 2 | 2 | 2 | 2.20 | **2.10** | 2.10 | 2.10 |
| Trenbolone | 1.4 | 4 | 2 | 2 | 3.76 | **3.33** | 3.33 | 3.33 |
| Zeranol | 1.4 | 2 | 2 | 2 | 3.18 | **3.04** | 3.04 | 3.04 |

**Table 5.3 - *Continued***
**Drugs Residues Rated With Various Weighting Formula**
**1999 FSIS Import Residue Plan**

| **Compound/Compound Class** | **Predicted Rate of Violation ($V_P$)** | **Lack of Testing Information on Violation (L) (FSIS)** | **Impact On New And Existing Human Diseases (D) (CDC)** | **Acute or Chronic Toxicity Concerns (T) (CVM)** | $V_P$*(.25D+0.75T)*{1+[(L-1)*0.1]} | **$V_P$*(.25*D+.75*T)*{1+[(L-1)*0.05]}** | $V_P$*((0.33*D+0.67*T)*{1+[(L-1)*0.05]} | $V_P$*(0.5*D+0.5*T)*{1+[(L-1)*0.05]} |
|---|---|---|---|---|---|---|---|---|
| Lasalocid | 1.4 | 4 | 2 | 2 | 3.76 | **3.33** | 3.33 | 3.33 |
| Levamisole | 2.7 | 1 | 1 | 1 | 2.71 | **2.71** | 2.71 | 2.71 |
| Morantel and pyrantel | 1.0 | 1 | 2 | 1 | 1.25 | **1.25** | 1.33 | 1.50 |
| Nicarbazin (in poultry) | 1.9 | 2 | 2 | 1 | 2.55 | **2.43** | 2.59 | 2.92 |
| Nicarbazin (in egg products) | 1.9 | 4 | 2 | 1 | 3.01 | **2.66** | 2.83 | 3.20 |
| Nitrofurans (incl. furazolidone, nitrofurazone) | 2.7 | 4 | 3 | 4 | 13.39 | **11.84** | 11.59 | 11.05 |
| Nitroimidazoles (incl. ronidazole, dimitridazole, ipronidazole) | 2.7 | 3 | 1 | 4 | 10.71 | **9.82** | 9.09 | 7.55 |
| NSAIDs besides phenylbutazone (incl. flunixin) | 2.7 | 4 | 1 | 3 | 8.93 | **7.90** | 7.39 | 6.32 |
| Phenylbutazone | 3.2 | 3 | 1 | 3 | 9.46 | **8.67** | 8.12 | 6.94 |
| Sulfonamides | 3.2 | 1 | 3 | 3 | 9.46 | **9.46** | 9.46 | 9.46 |
| Thyreostats | 3.2 | 4 | 2 | 4 | 14.34 | **12.69** | 12.11 | 10.88 |
| Veterinary tranquilizers | 2.7 | 4 | 1 | 1 | 3.57 | **3.16** | 3.16 | 3.16 |

**Table 5.4**
**Drugs Residues Rated with Various Weighting Formula**
**Sorted by Rating**
**1999 FSIS Import Residue Plan**

| **RANK** | DRUG | $V_P$*(.25D+ 0.75T)*{1+[(L-1)*0.1]} | **DRUG** | **$V_P$*(.25*D+ 0.75*T)*{1+[(L-1)*0.05]}** | DRUG | $V_P$*((0.33*D +0.67*T)*{1 +[(L-1)*0.05]} | DRUG | $V_P$*(0.5*D+ 0.5*T)*{1+[(L-1)*0.05]} |
|---|---|---|---|---|---|---|---|---|
| **1** | Carbadx | 16.2 | ***Carbadx*** | ***14.3*** | Carbadx | 13.6 | Antibiots | 12.5 |
| **2** | Thyreos | 14.3 | ***Antibiots*** | ***13.3*** | Antibiots | 13.1 | Carbadx | 12.3 |
| **3** | Nitrofurs | 13.4 | ***Thyreos*** | ***12.7*** | Thyreos | 12.1 | Clfencol | 12.1 |
| **4** | Antibiots | 13.3 | ***Clfencol*** | ***12.1*** | Clfencol | 12.1 | Macros | 11.2 |
| **5** | Clfencol | 13.2 | ***Nitrofurs*** | ***11.8*** | Nitrofurs | 11.6 | Nitrofurs | 11.1 |
| **6** | Berenil | 12.7 | ***Berenil*** | ***11.3*** | Macros | 11.2 | Fluorqns | 10.9 |
| **7** | Flofenco | 12.1 | ***Macros*** | ***11.2*** | Berenil | 10.9 | Thyreos | 10.9 |
| **8** | Macros | 11.7 | ***Flofenco*** | ***10.7*** | Flofenco | 10.7 | Flofenco | 10.7 |
| **9** | Beta Ags | 11.6 | ***DES*** | ***10.6*** | DES | 10.1 | Amiglys | 10.2 |
| **10** | DES | 11.5 | ***Beta Ags*** | ***10.3*** | Fluorqns | 9.7 | Berenil | 10.2 |
| **11** | Nitroims | 10.7 | ***Nitroims*** | ***9.8*** | Amiglys | 9.6 | Sulfas | 9.5 |
| **12** | Amiglys | 10.4 | ***Sulfas*** | ***9.5*** | Beta Ags | 9.5 | DES | 9.1 |
| **13** | Fluorqns | 10.2 | ***Amiglys*** | ***9.2*** | Sulfas | 9.5 | Glycops | 7.9 |
| **14** | Phnlbute | 9.5 | ***Fluorqns*** | ***9.1*** | Nitroims | 9.1 | Beta Ags | 7.9 |
| **15** | Sulfas | 9.5 | ***Phnlbute*** | ***8.7*** | Phnlbute | 8.1 | Nitroims | 7.6 |
| **16** | NSAIDs | 8.9 | ***NSAIDs*** | ***7.9*** | NSAIDs | 7.4 | Pirlmycn | 7.2 |
| **17** | Pirlmycn | 8.1 | ***Pirlmycn*** | ***7.2*** | Pirlmycn | 7.2 | Phnlbute | 6.9 |
| **18** | Avmecs | 6.8 | ***Avmecs*** | ***6.5*** | Avmecs | 6.5 | Ceftiofur | 6.6 |
| **19** | Ceftiofur | 6.7 | ***Ceftiofur*** | ***6.0*** | Glycops | 6.3 | Avmecs | 6.5 |
| **20** | Glycops | 6.2 | ***Glycops*** | ***5.5*** | Ceftiofur | 6.2 | NSAIDs | 6.3 |
| **21** | Glucorts | 6.2 | ***Glucorts*** | ***5.4*** | Arsencls | 5.4 | Arsencls | 5.7 |
| **22** | Clorsuln | 5.9 | ***Clorsuln*** | ***5.2*** | Clorsuln | 5.2 | Clorsuln | 5.2 |
| **23** | Arsencls | 5.2 | ***Arsencls*** | ***5.2*** | Glucorts | 5.1 | Glucorts | 4.4 |
| **24** | Eprinom | 4.8 | ***Eprinom*** | ***4.3*** | Eprinom | 4.3 | Eprinom | 4.3 |
| **25** | Hrms,Ntl | 3.8 | ***Benzims*** | ***3.3*** | Hrms,Ntl | 3.3 | Hrms,Ntl | 3.3 |
| **26** | Trenboln | 3.8 | ***Hrms,Ntl*** | ***3.3*** | Trenboln | 3.3 | Trenboln | 3.3 |
| **27** | Lasalcid | 3.8 | ***Trenboln*** | ***3.3*** | Lasalcid | 3.3 | Lasalcid | 3.3 |
| **28** | Vt.Tranks | 3.6 | ***Lasalcid*** | ***3.3*** | Benzims | 3.2 | Nic,Eggs | 3.2 |
| **29** | Benzims | 3.5 | ***Vt.Tranks*** | ***3.2*** | Vt.Tranks | 3.2 | Vt.Tranks | 3.2 |
| **30** | Zeranol | 3.2 | ***Zeranol*** | ***3.0*** | Zeranol | 3.0 | Zeranol | 3.0 |
| **31** | Nic,Eggs | 3.0 | ***Halofugi*** | ***2.8*** | Nic,Eggs | 2.8 | Nic,Poul | 2.9 |
| **32** | Halofugi | 2.8 | ***Levamsol*** | ***2.7*** | Halofugi | 2.8 | Benzims | 2.9 |
| **33** | Levamsol | 2.7 | ***Nic,Eggs*** | ***2.7*** | Levamsol | 2.7 | Halofugi | 2.8 |
| **34** | Nic,Poul | 2.5 | ***Nic,Poul*** | ***2.4*** | Nic,Poul | 2.6 | Levamsol | 2.7 |
| **35** | MGA | 2.2 | ***MGA*** | ***2.1*** | MGA | 2.1 | Viginiam | 2.3 |
| **36** | Viginiam | 2.0 | ***Viginiam*** | ***1.7*** | Viginiam | 1.9 | MGA | 2.1 |
| **37** | Bambers | 1.3 | ***Mor,Pyr*** | ***1.3*** | Mor,Pyr | 1.3 | Mor,Pyr | 1.5 |
| **38** | Mor,Pyr | 1.3 | ***Bambers*** | ***1.2*** | Bambers | 1.2 | Bambers | 1.2 |

**Key:**
D = Impact on New and Existing Diseases
$N_a$ = Average of Domestic Animals Treated
T = Acute and Chronic Toxicity
$V_P$ = Predicted Rate of Violation

**Table 5.5**
**Abbreviations**
**1999 FSIS Import Residue Plan**

| Abbreviation | Description |
|---|---|
| D | Impact on New and Existing Diseases |
| L | Lack of testing |
| $N_a$ | Average of Domestic Animals Treated |
| R | Regulatory Concern |
| T | Acute and Chronic Toxicity |
| V | FSIS Historical Testing Information on Violation |
| $V_F$ | Historical Testing Information on Violation Reported by the Foreign Countries |
| $V_P$ | Predicted Rate of Violation |
| W | Withdrawal Time |

**Table 5.6**
**Product Classes Considered for Each Drug/Drug Class**
**1999 Import Residue Plan**

| DRUG-> | CARBADOX | ANTIBIOTICS | NITROIMIDAZOLES | SULFONAMIDES | PHENYLBUTAZONE | AVERMECTINS | ARSENICALS |
|---|---|---|---|---|---|---|---|
| Beef, fresh | ○ | ● | | ● | ● | ● | |
| Beef, processed | ○ | | | ● | ● | ○ | |
| Pork, fresh | ● | ● | ● | ● | ● | ● | |
| Pork, processed | ○ | | ○ | ● | ● | ○ | ● |
| Beef/Pork, processed | ○ | | ○ | ● | ● | ○ | ● |
| Veal, fresh | | ● | | ● | ● | ● | |
| Veal, processed | | | | ● | ● | ○ | |
| Mutton/Lamb, fresh | | ● | | ● | ● | ● | |
| Mutton/Lamb, processed | | | | ● | ● | ○ | |
| Goat, fresh | | ● | | ● | ● | | |
| Chicken, fresh | | ● | | ● | ⭘ | | ● |
| Chicken, processed | | | | ● | ⭘ | | ● |
| Turkey, fresh | | ● | | ● | ⭘ | | ● |
| Turkey, processed | | | | ● | ⭘ | | ● |
| Other Fowl, fresh | | ● | | ● | ⭘ | | ● |
| Other Fowl, processed | | ● | | ● | ⭘ | | ● |
| Eggs, processed | | ○ | | ○ | ⭘ | | ○ |

**Key**
● = Compound/product class sampled in the 1999 FSIS Import Residue Plan
○ = Compound/product class pair of regulatory concern but not included in the plan because of lab resources
⭘ = Since all product classes will be sampled by the CHC/COP method (see Section 7), and since this method also detects phenylbutazone, the latter, by default, will be sampled in all product classes. However, phenylbutazone is not of regulatory concern in all product classes. Those product classes in which phenylbutazone will be sampled, but where it is NOT of regulatory concern.

**Table 5.7**
**Estimated Amount of Product Imported During Twelve Month**
**1999 Import Residue Plan**

| PRODUCT CLASS | PRODUCT IMPORTED IN POUNDS | %PRODUCT IMPORTED |
|---|---|---|
| **Beef fresh** | 1,748,156,641 | 63.37 |
| **Beef, processed** | 158,233,288 | 5.74 |
| **Pork, fresh** | 472,602,535 | 17.13 |
| **Pork, processed** | 171,667,928 | 6.22 |
| **Beef/Pork, processed** | 6,576,917 | 0.24 |
| **Veal, fresh** | 40,912,019 | 1.48 |
| **Veal, processed** | 68,043 | 0.002 |
| **Mutton/Lamb, fresh** | 94,001,588 | 3.41 |
| **Mutton/Lamb, processed** | 619,160 | 0.02 |
| **Goat, fresh** | 8,224,953 | 0.30 |
| **Chicken, fresh** | 6,898,958 | 0.25 |
| **Chicken, processed** | 36,129,233 | 1.31 |
| **Turkey, fresh** | 1,891,998 | 0.07 |
| **Turkey, processed** | 1,994,047 | 0.07 |
| **Other Fowl, fresh** | 1,981,649 | 0.07 |
| **Other Fowl, processed** | 1,153,612 | 0.04 |
| **Varied combination, processed** | 2,285,164 | 0.08 |
| **Eggs, processed** | 5,175,144 | 0.19 |
| Total/country | 2,758,572,877 | 100.00 |

**Table 5.8**
**Estimated Annual Amount (in lbs.) of Product Imported/Country**
**1999 Import Residue Plan**

| PRODUCT CLASS | ARGENTINA | AUSTRALIA | AUSTRIA | BELGIUM | BRAZIL | CANADA | COSTA RICA | CROATIA |
|---|---|---|---|---|---|---|---|---|
| Beef, fresh | 19,184,692 | 511,313,192 | | | | 694,928,715 | 22,214,770 | |
| Beef, processed | 58,489,402 | 1,532,522 | | | 56,379,662 | 30,985,733 | 138,943 | 360,624 |
| Pork, fresh | | 93,814 | | | | 397,587,376 | | |
| Pork, processed | | 41,267 | 49,401 | 12,367,449 | | 85,498,279 | | 1,748,413 |
| Beef/Pork, processed | | 14,384 | 19,237 | | | 2,740,380 | | 1,759 |
| Veal, fresh | | 2,770,537 | | | | 15,665,946 | 1,484 | |
| Veal, processed | | | | | | 68,043 | | |
| Mutton/Lamb, fresh | | 58,646,728 | | | | 579,950 | | |
| Mutton/Lamb, processed | | 99,832 | | | 5,397 | 302,094 | | |
| Goat, fresh | | 7,923,542 | | | | | | |
| chicken, fresh | | | | | | 6,898,958 | | |
| chicken, processed | | | | | | 35,661,468 | | |
| Turkey, fresh | | | | | | 1,891,998 | | |
| Turkey, processed | | | | | | 831,024 | | |
| Other Fowl, fresh | | | | | | 1,981,649 | | |
| Other Fowl, processed | | | | | | 1,114,863 | | |
| Varied combination, processed | | | | | | 2,167,791 | | 1,759 |
| Eggs, processed | | | | | | 5175144 | | |
| Total/country | 77,674,094 | 582,435,818 | 68,638 | 12,367,449 | 56,385,059 | 1,278,904,267 | 22,355,197 | 2,112,555 |

**Table 5.8 - *Continued***
**Estimated Annual Amount (in lbs.) of Product Imported/Country**
**1999 Import Residue Plan**

| PRODUCT CLASS | DENMARK | DOMINICAN REPUBLIC | FINLAND | FRANCE | GERMANY | HONDURAS | HONG KONG | HUNGARY |
|---|---|---|---|---|---|---|---|---|
| Beef, fresh | 30,426 | | | | | 8,058,469 | | |
| Beef, processed | | | | | | | | |
| Pork, fresh | 60,286,595 | | 921,443 | | | | | |
| Pork, processed | 39,884,273 | | | 423,604 | 218,736 | | | 5,315,935 |
| Beef/Pork, processed | 2,556,698 | 614,100 | | | 2,710 | | | |
| Veal, fresh | | | | | | | | |
| Veal, processed | | | | | | | | |
| Mutton/Lamb, fresh | | | | | | | | |
| Mutton/Lamb, processed | | | | | | | | |
| Goat, fresh | | | | | | | | |
| Chicken, fresh | | | | | | | | |
| Chicken, processed | | | | 11 | | | 110,522 | |
| Turkey, fresh | | | | | | | | |
| Turkey, processed | | | | | | | 796,187 | |
| Other Fowl, fresh | | | | | | | | |
| Other Fowl, processed | | | | 36,413 | | | | |
| Varied combination, processed | 36,488 | | | 21,705 | | | | |
| Eggs, processed | | | | | | | | |
| Total/country | 102,794,480 | 614,100 | 921,443 | 481,733 | 221,446 | 8,058,469 | 906,709 | 5,315,935 |

**Table 5.8 - *Continued***
**Estimated Annual Amount (in lbs.) of Product Imported/Country**
**1999 Import Residue Plan**

| PRODUCT CLASS | ICELAND | IRELAND | ISRAEL | ITALY | JAPAN | MEXICO | NETHERLANDS | NEW ZEALAND |
|---|---|---|---|---|---|---|---|---|
| Beef, fresh | | | | | 18,354 | 5,168,672 | 5,414 | 431,914,971 |
| Beef, processed | | | | 128,101 | | 2,496,888 | | 1,281,588 |
| Pork, fresh | | 3,977,663 | | | | 51,769 | | |
| Pork, processed | | 866,333 | | 2,667,876 | | 212,916 | 10,800,577 | |
| Beef/Pork, processed | | | | | | | 603,317 | |
| Veal, fresh | 1,898 | | | | | | 242,698 | 22,229,456 |
| Veal, processed | | | | | | | | |
| Mutton/Lamb, fresh | 46,705 | | | | | | | 34,265,124 |
| Mutton/Lamb, processed | | | | | | | | 124,281 |
| Goat, fresh | | | | | | | | 301,411 |
| Chicken, fresh | | | | | | | | |
| Chicken, processed | | | 357,232 | | | | | |
| Turkey, fresh | | | | | | | | |
| Turkey, processed | | | 366,836 | | | | | |
| Other Fowl, fresh | | | | | | | | |
| Other Fowl, processed | | | 2,336 | | | | | |
| Varied combination, processed | | | | | | | | 21,662 |
| Eggs, processed | | | | | | | | |
| Total/country | 48,603 | 4,843,996 | 726,404 | 2,795,977 | 18,354 | 7,930,245 | 11,652,006 | 490,138,493 |

**Table 5.8 - *Continued***
**Estimated Annual Amount (in lbs.) of Product Imported/Country**
**1999 Import Residue Plan**

| PRODUCT CLASS | NICARAGUA | POLAND | SLOVENIA | SPAIN | SWEDEN | SWITZERLAND | UK | URUGUAY |
|---|---|---|---|---|---|---|---|---|
| Beef, fresh | 24,399,419 | | | | | | | 30,919,547 |
| Beef, processed | | 10,628 | | | 9,051 | 32,074 | | 6,388,072 |
| Pork, fresh | | | | | 1,194,257 | | 8,489,618 | |
| Pork, processed | | 11,409,887 | 56 | 146,278 | | 16,648 | | |
| Beef/Pork, processed | | 8,475 | | 4,952 | 10,905 | | | |
| Veal, fresh | | | | | | | | |
| Veal, processed | | | | | | | | |
| Mutton/Lamb, fresh | | | | | | | | 463,081 |
| Mutton/Lamb, processed | | | | | | | | 87,556 |
| Goat, fresh | | | | | | | | |
| Chicken, fresh | | | | | | | | |
| Chicken, processed | | | | | | | | |
| Turkey, fresh | | | | | | | | |
| Turkey, processed | | | | | | | | |
| Other Fowl, fresh | | | | | | | | |
| Other Fowl, processed | | | | | | | | |
| Varied combination, processed | | 35,759 | | | | | | |
| Eggs, processed | | | | | | | | |
| Total/country | 24,399,419 | 11,464,749 | 56 | 151,230 | 1,214,213 | 48,722 | 8,489,618 | 37,858,256 |

**Table 5.9**
**Relative Annual Amount Product Imported/Country**
**1999 Import Residue Plan**

| PRODUCT CLASS | ARGENTINA | AUSTRALIA | AUSTRIA | BELGIUM | BRAZIL | CANADA | COSTA RICA | CROATIA |
|---|---|---|---|---|---|---|---|---|
| Beef, fresh | 1.10 | 29.25 | - | - | - | 39.75 | 1.27 | - |
| Beef, processed | 36.96 | 0.97 | - | - | 35.63 | 19.58 | 0.09 | 0.23 |
| Pork, fresh | - | 0.02 | - | - | - | 84.13 | - | - |
| Pork, processed | - | 0.02 | 0.03 | 7.20 | - | 49.80 | - | 1.02 |
| Beef/Pork, processed | - | 0.22 | 0.29 | - | - | 41.67 | - | 0.03 |
| Veal, fresh | - | 6.77 | - | - | - | 38.29 | 0.004 | - |
| Veal, processed | - | - | - | - | - | 100.00 | - | - |
| Mutton/Lamb, fresh | - | 62.39 | - | - | - | 0.62 | - | - |
| Mutton/Lamb, processed | - | 16.12 | - | - | 0.87 | 48.79 | - | - |
| Goat, fresh | - | 96.34 | - | - | - | - | - | - |
| Chicken, fresh | - | - | - | - | - | 100.00 | - | - |
| Chicken, processed | - | - | - | - | - | 98.71 | - | - |
| Turkey, fresh | - | - | - | - | - | 100.00 | - | - |
| Turkey, processed | - | - | - | - | - | 41.68 | - | - |
| Other Fowl, fresh | - | - | - | - | - | 100.00 | - | - |
| Other Fowl, processed | - | - | - | - | - | 96.64 | - | - |
| Varied combination, processed | - | - | - | - | - | 94.86 | - | 0.08 |
| Eggs, processed | - | - | - | - | - | 100.00 | - | - |

**Table 5.9 - *Continued***
**Relative Annual Amount Product Imported/Country**
**1999 Import Residue Plan**

| PRODUCT CLASS | DENMARK | DOMINICAN REPUBLIC | FINLAND | FRANCE | GERMANY | HONDURAS | HONG KONG | HUNGARY |
|---|---|---|---|---|---|---|---|---|
| Beef, fresh | 0.00 | - | - | - | - | 0.46 | - | - |
| Beef, processed | - | - | - | - | - | - | - | - |
| Pork, fresh | 12.76 | - | 0.19 | - | - | - | - | - |
| Pork, processed | 23.23 | - | - | 0.25 | 0.13 | - | - | 3.10 |
| Beef/Pork, processed | 38.87 | 9.34 | - | - | 0.04 | - | - | - |
| Veal, fresh | - | - | - | - | - | - | - | - |
| Veal, processed | - | - | - | - | - | - | - | - |
| Mutton/Lamb, fresh | - | - | - | - | - | - | - | - |
| Mutton/Lamb, processed | - | - | - | - | - | - | - | - |
| Goat, fresh | - | - | - | - | - | | - | - |
| Chicken, fresh | - | - | - | - | - | - | - | - |
| Chicken, processed | - | - | - | 0.00003 | - | - | 0.31 | - |
| Turkey, fresh | - | - | - | - | - | - | - | - |
| Turkey, processed | - | - | - | - | - | - | 39.93 | - |
| Other Fowl, fresh | - | - | - | - | - | - | - | - |
| Other Fowl, processed | - | - | - | 3.16 | - | - | - | - |
| Varied combination, processed | 1.60 | - | - | 0.95 | - | - | - | - |
| Eggs, processed | - | - | - | - | - | - | - | - |

**Table 5.9 - *Continued***
**Relative Annual Amount Product Imported/Country**
**1999 Import Residue Plan**

| PRODUCT CLASS | ICELAND | IRELAND | ISRAEL | ITALY | JAPAN | MEXICO | NETHERLANDS | NEW ZEALAND |
|---|---|---|---|---|---|---|---|---|
| Beef, fresh | - | - | - | - | 0.001 | 0.30 | 0.0003 | 24.71 |
| Beef, processed | - | - | - | 0.08 | - | 1.58 | - | 0.81 |
| Pork, fresh | - | 0.84 | - | - | - | 0.01 | - | - |
| Pork, processed | - | 0.50 | - | 1.55 | - | 0.12 | 6.29 | - |
| Beef/Pork, processed | - | - | - | - | - | - | 9.17 | - |
| Veal, fresh | 0.00 | - | - | - | - | - | 0.59 | 54.33 |
| Veal, processed | - | - | - | - | - | - | - | - |
| Mutton/Lamb, fresh | 0.05 | - | - | - | - | - | - | 36.45 |
| Mutton/Lamb, processed | - | - | - | - | - | - | - | 20.07 |
| Goat, fresh | - | - | - | - | - | - | - | 3.66 |
| Chicken, fresh | - | - | - | - | - | - | - | - |
| Chicken, processed | - | - | 0.99 | - | - | - | - | - |
| Turkey, fresh | - | - | - | - | - | - | - | - |
| Turkey, processed | - | - | 18.40 | - | - | - | - | - |
| Other Fowl, fresh | - | - | - | - | - | - | - | - |
| Other Fowl, processed | - | - | 0.20 | - | - | - | - | - |
| Varied combination, processed | - | - | - | - | - | - | - | 0.95 |
| Eggs, processed | - | - | - | - | - | - | - | - |

**Table 5.9 - *Continued***
**Relative Annual Amount Product Imported/Country**
**1999 Import Residue Plan**

| PRODUCT CLASS | NICARAGUA | POLAND | SLOVENIA | SPAIN | SWEDEN | SWITZERLAND | UK | URUGUAY |
|---|---|---|---|---|---|---|---|---|
| Beef, fresh | 1.40 | - | - | - | - | - | - | 1.77 |
| Beef, processed | - | 0.01 | - | - | 0.01 | 0.02 | - | 4.04 |
| Pork, fresh | - | - | - | - | 0.25 | - | 1.80 | - |
| Pork, processed | - | 6.65 | 0.00003 | 0.09 | | 0.01 | - | - |
| Beef/Pork, processed | - | 0.13 | - | 0.08 | 0.17 | - | - | - |
| Veal, fresh | - | - | - | - | - | - | - | - |
| Veal, processed | - | - | - | - | - | - | - | - |
| Mutton/Lamb, fresh | - | - | - | - | - | - | - | 0.49 |
| Mutton/Lamb, processed | - | - | - | - | - | - | - | 14.14 |
| Goat, fresh | - | - | - | - | - | - | - | - |
| Chicken, fresh | - | - | - | - | - | - | - | - |
| Chicken, processed | - | - | - | - | - | - | - | - |
| Turkey, fresh | - | - | - | - | - | - | - | - |
| Turkey, processed | - | - | - | - | - | - | - | - |
| Other Fowl, fresh | - | - | - | - | - | - | - | - |
| Other Fowl, processed | - | - | - | - | - | - | - | - |
| Varied combination, processed | - | 1.56 | - | - | - | - | - | - |
| Eggs, processed | - | - | - | - | - | - | - | - |

**Table 5.10**
**Number of Drug Samples/Product Class**
**1999 Import Residue Plan**

| No.Countries | Product Class | Drug | Drug Score | Percent Product | Relative Sampling Priority | Unadjusted Number of Samples | Adjusted Number of Samples | Final Number of Samples |
|---|---|---|---|---|---|---|---|---|
| 12 | Beef, fresh | Antibiots | 14.3 | 63.37 | 846.01 | 460 | 460 | 459 |
| 12 | Beef, fresh | Sulfas | 9.5 | 63.37 | 599.50 | 460 | 460 | 459 |
| 12 | Beef, fresh | Avmecs | 6.5 | 63.37 | 414.45 | 460 | 460 | 459 |
| 8 | Pork, fresh | Carbadx | 11.8 | 17.13 | 245.50 | 460 | 240 | 240 |
| 8 | Pork, fresh | Antibiots | 14.3 | 17.13 | 228.71 | 460 | 460 | 461 |
| 8 | Pork, fresh | Nitroims | 9.8 | 17.13 | 168.24 | 300 | 230 | 230 |
| 8 | Pork, fresh | Sulfas | 9.5 | 17.13 | 162.07 | 300 | 300 | 300 |
| 8 | Pork, fresh | Avmecs | 6.5 | 17.13 | 112.04 | 300 | 300 | 300 |
| 8 | Pork, fresh | Arsencls | 5.2 | 17.13 | 88.57 | 300 | 300 | 300 |
| 17 | Pork, processed | Sulfas | 9.5 | 6.22 | 58.87 | 300 | 300 | 301 |
| 13 | Beef, processed | Sulfas | 9.5 | 5.74 | 54.26 | 300 | 300 | 300 |
| 5 | Lamb/Mutton, fresh | Antibiots | 14.3 | 3.41 | 45.49 | 300 | 300 | 300 |
| 5 | Lamb/Mutton, fresh | Sulfas | 9.5 | 3.41 | 32.24 | 230 | 230 | 232 |
| 17 | Pork, processed | Arsencls | 5.2 | 6.22 | 32.17 | 230 | 230 | 230 |
| 5 | Lamb/Mutton, fresh | Avmecs | 6.5 | 3.41 | 22.29 | 230 | 230 | 232 |
| 6 | Veal, fresh | Antibiots | 14.3 | 1.48 | 19.80 | 230 | 230 | 229 |
| 6 | Veal, fresh | Sulfas | 9.5 | 1.48 | 14.03 | 230 | 230 | 229 |
| 4 | Chicken , processed | Sulfas | 9.5 | 1.31 | 12.39 | 230 | 230 | 230 |
| 6 | Veal, fresh | Avmecs | 6.5 | 1.48 | 9.70 | 230 | 230 | 229 |
| 4 | Chicken, processed | Arsencls | 5.2 | 1.31 | 6.77 | 90 | 90 | 90 |
| 2 | Goat, fresh | Antibiots | 14.3 | 0.30 | 3.98 | 90 | 16 | 16 |
| 1 | Chicken, fresh | Antibiots | 14.3 | 0.25 | 3.34 | 90 | 8 | 8 |
| 2 | Goat, fresh | Sulfas | 9.5 | 0.30 | 2.82 | 90 | 16 | 16 |
| 1 | Chicken, fresh | Sulfas | 9.5 | 0.25 | 2.37 | 90 | 8 | 8 |
| 11 | Beef/Pork, P | Sulfas | 9.5 | 0.24 | 2.26 | 90 | 88 | 88 |
| 2 | Goat, fresh | Avmecs | 6.5 | 0.30 | 1.95 | 90 | 16 | 16 |
| 1 | Chicken, fresh | Arsencls | 5.2 | 0.25 | 1.29 | 90 | 8 | 8 |
| 1 | Other Fowl, fresh | Antibiots | 14.3 | 0.07 | 0.96 | 90 | 8 | 8 |
| 1 | Turkey, fresh | Antibiots | 14.3 | 0.07 | 0.92 | 90 | 8 | 8 |
| 3 | Turkey, processed | Sulfas | 9.5 | 0.07 | 0.68 | 90 | 24 | 24 |
| 1 | Other Fowl, fresh | Sulfas | 9.5 | 0.07 | 0.68 | 90 | 8 | 8 |
| 1 | Turkey, fresh | Sulfas | 9.5 | 0.07 | 0.65 | 90 | 8 | 8 |
| 3 | Other , Fowl , processed | Sulfas | 9.5 | 0.04 | 0.40 | 90 | 24 | 24 |
| 3 | Turkey, processed | Arsencls | 5.2 | 0.07 | 0.37 | 90 | 24 | 24 |
| 1 | Other Fowl, fresh | Arsencls | 5.2 | 0.07 | 0.37 | 90 | 8 | 8 |
| 1 | Turkey, fresh | Arsencls | 5.2 | 0.07 | 0.35 | 90 | 8 | 8 |
| 3 | Other , Fowl , processed | Arsencls | 5.2 | 0.04 | 0.22 | 90 | 24 | 24 |
| 5 | Lamb/Mutton,processed | Sulfas | 9.5 | 0.02 | 0.21 | 90 | 40 | 40 |
| 1 | Veal, processed | Sulfas | 9.5 | 0.002 | 0.02 | 90 | 8 | 8 |
| | Total | | | | | 7810 | 6162 | 6162 |

Phenylbutazone is detected by the CHC/COP method hence the "No. of Samples/Product Class" for phenylbutazone is the same as that for the CHC's/COP's. (see Section 7).

**Table 5.11**
**Number of Samples/Product Class-Goat, Fresh**
**1999 FSIS Import Residue Plan**

| GOAT, FRESH/ ANTIBIOTICS | PERCENT PRODUCT | FINAL NUMBER OF SAMPLES |
|---|---|---|
| Australia | 96.34 | 8 |
| New Zealand | 3.66 | 8 |
| Total | 100 | 16 |
| | | |
| **GOAT, FRESH/ SULFA** | | |
| Australia | 96.34 | 8 |
| New Zealand | 3.66 | 8 |
| Total | 100 | 16 |
| | | |
| **GOAT, FRESH/ AVERMECTIN** | | |
| Australia | 96.34 | 8 |
| New Zealand | 3.66 | 8 |
| Total | 100 | 16 |
| | | |

**Table 5.12**
**Number of Samples/Product Class-Chicken, Fresh**
**1999 FSIS Import Residue Plan**

| CHICKEN,FRESH/ ANTIBIOTICS | PERCENT PRODUCT | FINAL NUMBER OF SAMPLES |
|---|---|---|
| Canada | 100 | 8 |
| Total | 100 | 8 |
| | | |
| **CHICKEN,FRESH/ SULFA** | | |
| Canada | 100 | 8 |
| Total | 100 | 8 |
| | | |
| **CHICKEN,FRESH/ ARSENICALS8** | | |
| Canada | 100 | 8 |
| Total | 100 | 8 |

**Table 5.13**
**Number of Samples/Product Class-Turkey, Fresh**
**1999 FSIS Import Residue Plan**

| TURKEY, FRESH/ ANTIBIOTICS | PERCENT PRODUCT | FINAL NUMBER OF SAMPLES |
|---|---|---|
| Canada | 100 | 8 |
| Total | 100 | 8 |
| | | |
| **TURKEY, FRESH/ SULFAS** | | |
| Canada | 100 | 8 |
| Total | 100 | 8 |
| | | |
| **TURKEY, FRESH/ ARSENICALS** | | |
| Canada | 100 | 8 |
| Total | 100 | 8 |

**Table 5.14**
**Number of Samples/Product Class-Turkey, Processed**
**1999 FSIS Import Residue Plan**

| TURKEY, PROCESSED/ SULFAS | PERCENT PRODUCT | FINAL NUMBER OF SAMPLES |
|---|---|---|
| Canada | 41.68 | 8 |
| Hong Kong | 39.93 | 8 |
| Israel | 18.40 | 8 |
| Total | 100 | 24 |
| | | |
| **TURKEY, PROCESSED/ ARSENICALS** | | |
| Canada | 41.68 | 8 |
| Hong Kong | 39.93 | 8 |
| Israel | 18.40 | 8 |
| Total | 100 | 24 |

**Table 5.15**
**Number of Samples/Product Class-Other, Fowl, Processed**
**1999 FSIS Import Residue Plan**

| OTHER, FOWL, PROCESSED/SULFA | PERCENT PRODUCT | FINAL NUMBER OF SAMPLES |
|---|---|---|
| Canada | 96.64 | 8 |
| France | 3.16 | 8 |
| Israel | 0.20 | 8 |
| Total | 100 | 24 |
| | | |
| **OTHER,FOWL, PROCESSED/ ARSENICALS** | | |
| Canada | 96.64 | 8 |
| France | 3.16 | 8 |
| Israel | 0.20 | 8 |
| Total | 100 | 24 |
| | | |

**Table 5.16**
**Number of Samples/Product Class-Other, Fowl, Fresh**
**1999 FSIS Import Residue Plan**

| OTHER FOWL, FRESH/ ANTIBIOTICS | PERCENT PRODUCT | FINAL NUMBER OF SAMPLES |
|---|---|---|
| Canada | 100 | 8 |
| Total | 100 | 8 |
| | | |
| **OTHER FOWL, FRESH/ SULFAS** | | |
| Canada | 100 | 8 |
| Total | 100 | 8 |
| | | |
| **OTHER FOWL, FRESH /ARSENICALS** | | |
| Canada | 100 | 8 |
| Total | 100 | 8 |

**Table 5.17**
**Number of Samples/Product Class-Beef/Pork, Processed**
**1999 FSIS Import Residue Plan**

| BEEF/PORK, PROCESSED/SULFA | PERCENT PRODUCT | FINAL NUMBER OF SAMPLES |
|---|---|---|
| Australia | 0.22 | 8 |
| Austria | 0.29 | 8 |
| Canada | 41.67 | 8 |
| Croatia | 0.03 | 8 |
| Denmark | 38.87 | 8 |
| Dominican Republic | 9.34 | 8 |
| Germany | 0.04 | 8 |
| Netherlands | 9.17 | 8 |
| Poland | 0.13 | 8 |
| Spain | 0.08 | 8 |
| Sweden | 0.17 | 8 |
| Total | | 88 |

**Table 5.18**
**Number of Samples/Product Class-Lamb/Mutton, Processed**
**1999 FSIS Import Residue Plan**

| LAMB/MUTTON, PROCESSED/ SULFA | PERCENT PRODUCT | FINAL NUMBER OF SAMPLES |
|---|---|---|
| Australia | 16.12 | 8 |
| Brazil | 0.87 | 8 |
| Canada | 48.79 | 8 |
| New Zealand | 20.07 | 8 |
| Uruguay | 14.14 | 8 |
| Total | | 40 |

**Table 5.19**
**Number of Samples/Product Class-Veal, Processed**
**1999 FSIS Import Residue Plan**

| VEAL, PROCESSED/ SULFA | PERCENT PRODUCT | FINAL NUMBER OF SAMPLES |
|---|---|---|
| Canada | 100 | 8 |
| Total | | 8 |

**Table 5.20**
**Number of Samples/Product Class-Beef, Fresh**
**1999 FSIS Import Residue Plan**

| **BEEF, FRESH/ ANTIBIOTICS** | **PERCENT PRODUCT ($P_{C/C}$)** | **UNADJUSTED NUMBER OF SAMPLES (U) = 460*(($P_{C/C}$)/100)** | **ADJUST. #1 (MIN. 8 SAMPLES/ COUNTRY)** | **INITIAL ADJ NUMBER** | **ADJUST. # 2** | **FINAL NUMBER OF SAMPLES** |
|---|---|---|---|---|---|---|
| Argentina | 1.10 | 5 | 8 | 8 | | 8 |
| Australia | 29.25 | 135 | | 135 | 121 | 121 |
| Canada | 39.75 | 183 | | 183 | 164 | 164 |
| Costa Rica | 1.27 | 6 | 8 | 8 | | 8 |
| Denmark | 0.00 | 0 | 8 | 8 | | 8 |
| Honduras | 0.46 | 2 | 8 | 8 | | 8 |
| Japan | 0.00 | 0 | 8 | 8 | | 8 |
| Mexico | 0.30 | 1 | 8 | 8 | | 8 |
| Netherlands | 0.00 | 0 | 8 | 8 | | 8 |
| New Zealand | 24.71 | 114 | | 114 | 102 | 102 |
| Nicaragua | 1.40 | 6 | 8 | 8 | | 8 |
| Uruguay | 1.77 | 8 | 8 | 8 | | 8 |
| Total | | 460 | | 504 | | 459 |
| | | | | | | |
| **BEEF, FRESH/ SULFA** | | **UNADJUSTED NUMBER OF SAMPLES (U) = 460*(($P_{C/C}$)/100)** | | | | |
| Argentina | 1.10 | 5 | 8 | 8 | | 8 |
| Australia | 29.25 | 135 | | 135 | 121 | 121 |
| Canada | 39.75 | 183 | | 183 | 164 | 164 |
| Costa Rica | 1.27 | 6 | 8 | 8 | | 8 |
| Denmark | 0.00 | 0 | 8 | 8 | | 8 |
| Honduras | 0.46 | 2 | 8 | 8 | | 8 |
| Japan | 0.00 | 0 | 8 | 8 | | 8 |
| Mexico | 0.30 | 1 | 8 | 8 | | 8 |
| Netherlands | 0.00 | 0 | 8 | 8 | | 8 |
| New Zealand | 24.71 | 114 | | 114 | 102 | 102 |
| Nicaragua | 1.40 | 6 | 8 | 8 | | 8 |
| Uruguay | 1.77 | 8 | 8 | 8 | | 8 |
| Total | | 460 | | 504 | | 459 |

## Table 5.20 - *Continued*
## Number of Samples/Product Class-Beef, Fresh
## 1999 FSIS Import Residue Plan

| BEEF, FRESH/ AVERMECTINS | PERCENT PRODUCT ($P_{C/C}$) | UNADJUSTED NUMBER OF SAMPLES (U) = 460*(($P_{C/C}$)/100) | ADJUST. #1 (MIN. 8 SAMPLES/ COUNTRY) | INITIAL ADJ NUMBER | ADJUST. # 2 | FINAL NUMBER OF SAMPLES |
|---|---|---|---|---|---|---|
| Argentina | 1.10 | 5 | 8 | 8 | | 8 |
| Australia | 29.25 | 135 | | 135 | 121 | 121 |
| Canada | 39.75 | 183 | | 183 | 164 | 164 |
| Costa Rica | 1.27 | 6 | 8 | 8 | | 8 |
| Denmark | 0.00 | 0 | 8 | 8 | | 8 |
| Honduras | 0.46 | 2 | 8 | 8 | | 8 |
| Japan | 0.00 | 0 | 8 | 8 | | 8 |
| Mexico | 0.30 | 1 | 8 | 8 | | 8 |
| Netherlands | 0.00 | 0 | 8 | 8 | | 8 |
| New Zealand | 24.71 | 114 | | 114 | 102 | 102 |
| Nicaragua | 1.40 | 6 | 8 | 8 | | 8 |
| Uruguay | 1.77 | 8 | 8 | 8 | | 8 |
| Total | | 460 | | 504 | | 459 |

## Table 5.21
## Number of Samples/Product Class-Beef, Processed
## 1999 FSIS Import Residue Plan

| BEEF, PROCESSED/ SULFA | PERCENT PRODUCT ($P_{C/C}$) | UNADJUSTED NUMBER OF SAMPLES (U) = 300*(($P_{C/C}$)/100) | ADJUST. #1 (MIN. 8 SAMPLES/ COUNTRY) | INITIAL ADJ NUMBER | ADJUST. # 2 | FINAL NUMBER OF SAMPLES |
|---|---|---|---|---|---|---|
| Argentina | 36.96 | 111 | | 111 | 88 | 88 |
| Australia | 0.97 | 3 | 8 | 8 | | 8 |
| Brazil | 35.63 | 107 | | 107 | 84 | 84 |
| Canada | 19.58 | 59 | | 59 | 47 | 47 |
| Costa Rica | 0.09 | 0 | 8 | 8 | | 8 |
| Croatia | 0.23 | 0 | 8 | 8 | | 8 |
| Italy | 0.08 | 0 | 8 | 8 | | 8 |
| Mexico | 1.58 | 5 | 8 | 8 | | 8 |
| New Zealand | 0.81 | 2 | 8 | 8 | | 8 |
| Poland | 0.01 | 0 | 8 | 8 | | 8 |
| Sweden | 0.01 | 0 | 8 | 8 | | 8 |
| Switzerland | 0.02 | 0 | 8 | 8 | | 8 |
| Uruguay | 4.04 | 12 | | 12 | 9 | 9 |
| Total | | 299 | | 361 | | 300 |

**Table 5.22**
**Number of Samples/Product Class-Veal, Fresh**
**1999 Import Residue Plan**

| **VEAL, FRESH/ ANTIBIOTICS/230** | **PERCENT PRODUCT ($P_{C/C}$)** | **UNADJUSTED NUMBER OF SAMPLES (U) = 230*(($P_{C/C}$)/100)** | **ADJUST. #1 (MIN. 8 SAMPLES/ COUNTRY)** | **INITIAL ADJ.#** | **ADJUST. # 2** | **FINAL ADJ.#** |
|---|---|---|---|---|---|---|
| Australia | 6.77 | 16 | | 16 | 14 | 14 |
| Canada | 38.29 | 88 | | 88 | 79 | 79 |
| Costa Rica | 0.004 | 0 | 8 | 8 | | 8 |
| Iceland | 0.005 | 0 | 8 | 8 | | 8 |
| Netherlands | 0.59 | 1 | 8 | 8 | | 8 |
| New Zealand | 54.33 | 125 | | 125 | 112 | 112 |
| Total | | 230 | | 253 | | 229 |
| | | | | | | |
| **VEAL, FRESH/ SULFA/230** | | **UNADJUSTED NUMBER OF SAMPLES (U) = 230*(($P_{C/C}$)/100** | | | | |
| Australia | 6.77 | 16 | | 16 | 14 | 14 |
| Canada | 38.29 | 88 | | 88 | 79 | 79 |
| Costa Rica | 0.004 | 0 | 8 | 8 | | 8 |
| Iceland | 0.005 | 0 | 8 | 8 | | 8 |
| Netherlands | 0.59 | 1 | 8 | 8 | | 8 |
| New Zealand | 54.33 | 125 | | 125 | 112 | 112 |
| Total | | 230 | | 253 | | 229 |
| | | | | | | |
| **VEAL, FRESH/ AVERMECTIN/230** | | **UNADJUSTED NUMBER OF SAMPLES (U) = 230*(($P_{C/C}$)/100** | | | | |
| Australia | 6.77 | 16 | | 16 | 16 | 14 |
| Canada | 38.29 | 88 | | 88 | 88 | 79 |
| Costa Rica | 0.004 | 0 | 8 | 8 | | 8 |
| Iceland | 0.005 | 0 | 8 | 8 | | 8 |
| Netherlands | 0.59 | 1 | 8 | 8 | | 8 |
| New Zealand | 54.33 | 125 | | 125 | 112 | 112 |
| Total | | 230 | | 253 | | 229 |

**Table 5.23**
**Number of Samples/Product Class-Pork, Fresh**
**1999 Import Residue Plan**

| **PORK, FRESH/ CARBADOX/240** | **PERCENT PRODUCT ($P_{C/C}$)** | **UNADJUSTED NUMBER OF SAMPLES (U) = 240*(($P_{C/C}$)/100)** | **ADJUST. #1 (MIN. 8 SAMPLES/ COUNTRY)** | **INITIAL ADJ.#** | **ADJUST. # 2** | **FINAL ADJ.#** |
|---|---|---|---|---|---|---|
| Australia | 0.02 | 0 | 8 | 8 | | 8 |
| Canada | 84.13 | 202 | | 202 | 166 | 166 |
| Denmark | 12.76 | 31 | | 31 | 26 | 26 |
| Finland | 0.19 | 1 | 8 | 8 | | 8 |
| Ireland | 0.84 | 2 | 8 | 8 | | 8 |
| Mexico | 0.01 | 0 | 8 | 8 | | 8 |
| Sweden | 0.25 | 0 | 8 | 8 | | 8 |
| UK | 1.80 | 4 | 8 | 8 | | 8 |
| Total | | 240 | | 281 | | 240 |
| | | | | | | |
| **PORK, FRESH/ ANTIBIOTICS/460** | | **UNADJUSTED NUMBER OF SAMPLES (U) = 460*(($P_{C/C}$)/100** | | | | |
| Australia | 0.02 | 0 | 8 | 8 | | 8 |
| Canada | 84.13 | 387 | | 387 | 358 | 358 |
| Denmark | 12.76 | 59 | | 59 | 55 | 55 |
| Finland | 0.19 | 1 | 8 | 8 | | 8 |
| Ireland | 0.84 | 4 | 8 | 8 | | 8 |
| Mexico | 0.01 | 0 | 8 | 8 | | 8 |
| Sweden | 0.25 | 1 | 8 | 8 | | 8 |
| UK | 1.80 | 8 | 8 | 8 | | 8 |
| Total | | 460 | | 494 | | 461 |
| | | | | | | |
| **PORK, FRESH/ NITROIMS/230** | | **UNADJUSTED NUMBER OF SAMPLES (U) = 230*(($P_{C/C}$)/100)** | | | | |
| Australia | 0.02 | 0 | 8 | 8 | | 8 |
| Canada | 84.13 | 194 | | 193 | 133 | 133 |
| Denmark | 12.76 | 29 | | 29 | 20 | 20 |
| Finland | 0.19 | 0 | 8 | 8 | | 8 |
| Ireland | 0.84 | 2 | 8 | 8 | | 8 |
| Mexico | 0.01 | 0 | 8 | 8 | | 8 |
| Sweden | 0.25 | 1 | 8 | 8 | | 8 |
| UK | 1.80 | 4 | 8 | 8 | | 8 |
| Total | | 230 | | 270 | | 230 |

**Table 5.23 - *Continued***
**Number of Samples/Product Class-Pork, Fresh**
**1999 Import Residue Plan**

| **PORK, FRESH/ SULFAS/300** | **PERCENT PRODUCT ($P_{C/C}$)** | **UNADJUSTED NUMBER OF SAMPLES (U) = 300*(($P_{C/C}$)/100)** | **ADJUST. #1 (MIN. 8 SAMPLES/ COUNTRY)** | **INITIAL ADJ.#** | **ADJUST. # 2** | **FINAL ADJ.#** |
|---|---|---|---|---|---|---|
| Australia | 0.012 | 0 | 8 | 8 | | 8 |
| Canada | 84.13 | 252 | | 252 | 219 | 219 |
| Denmark | 12.76 | 38 | | 38 | 26 | 26 |
| Finland | 0.19 | 1 | 8 | 8 | | 8 |
| Ireland | 0.84 | 3 | 8 | 8 | | 8 |
| Mexico | 0.01 | 0 | 8 | 8 | | 8 |
| Sweden | 0.25 | 1 | 8 | 8 | | 8 |
| UK | 1.80 | 5 | 8 | 8 | | 8 |
| Total | | 300 | | 338 | | 300 |
| | | | | | | |
| **PORK, FRESH/ AVMECTIN/300** | | **UNADJUSTED NUMBER OF SAMPLES (U) = 300*(($P_{C/C}$)/100)** | | | | |
| Australia | 0.02 | 0 | 8 | 8 | | 8 |
| Canada | 84.13 | 252 | | 252 | 219 | 219 |
| Denmark | 12.76 | 38 | | 38 | 26 | 26 |
| Finland | 0.19 | 1 | 8 | 8 | | 8 |
| Ireland | 0.84 | 3 | 8 | 8 | | 8 |
| Mexico | 0.01 | 0 | 8 | 8 | | 8 |
| Sweden | 0.25 | 1 | 8 | 8 | | 8 |
| UK | 1.80 | 5 | 8 | 8 | | 8 |
| Total | | 300 | | 338 | | 300 |
| | | | | | | |
| **PORK, FRESH/ ARSENICALS/300** | | **UNADJUSTED NUMBER OF SAMPLES (U) = 300*(($P_{C/C}$)/100)** | | | | |
| Australia | 0.02 | 0 | 8 | 8 | | 8 |
| Canada | 84.13 | 252 | | 252 | 219 | 219 |
| Denmark | 12.76 | 38 | | 38 | 26 | 26 |
| Finland | 0.19 | 1 | 8 | 8 | | 8 |
| Ireland | 0.84 | 3 | 8 | 8 | | 8 |
| Mexico | 0.01 | 0 | 8 | 8 | | 8 |
| Sweden | 0.25 | 1 | 8 | 8 | | 8 |
| UK | 1.80 | 5 | 8 | 8 | | 8 |
| Total | | 300 | 8 | 338 | | 300 |

**Table 5.24**
**Number of Samples/Product Class-Pork, Processed**
**1999 Import Residue Plan**

| **PORK, PROCESSED/ SULFA/300** | **PERCENT PRODUCT ($P_{C/C}$)** | **UNADJUSTED NUMBER OF SAMPLES (U) = 300*(($P_{C/C}$)/100)** | **ADJUST. #1 (MIN. 8 SAMPLES/ COUNTRY)** | **INITIAL ADJ.#** | **ADJUST. # 2** | **FINAL ADJ.#** |
|---|---|---|---|---|---|---|
| Australia | 0.02 | 0 | 8 | 8 | | 8 |
| Austria | 0.03 | 0 | 8 | 8 | | 8 |
| Belgium | 7.20 | 22 | | 22 | 16 | 16 |
| Canada | 49.80 | 149 | | 150 | 109 | 109 |
| Croatia | 1.02 | 3 | 8 | 8 | | 8 |
| Denmark | 23.23 | 70 | | 70 | 51 | 51 |
| France | 0.25 | 1 | 8 | 8 | | 8 |
| Germany | 0.13 | 0 | 8 | 8 | | 8 |
| Hungary | 3.10 | 9 | | 9 | | 8 |
| Ireland | 0.50 | 2 | 8 | 8 | | 8 |
| Italy | 1.55 | 5 | 8 | 8 | | 8 |
| Mexico | 0.12 | 0 | 8 | 8 | | 8 |
| Netherlands | 6.29 | 19 | | 19 | 14 | 14 |
| Poland | 6.65 | 20 | | 20 | 15 | 15 |
| Slovenia | 0.00 | 0 | 8 | 8 | | 8 |
| Spain | 0.09 | 0 | 8 | 8 | | 8 |
| Switzerland | 0.01 | 0 | 8 | 8 | | 8 |
| | | 300 | | 378 | | 301 |
| | | | | | | |
| **PORK, PROCESSED/ ARSENICALS/230** | | **UNADJUSTED NUMBER OF SAMPLES (U) = 230*(($P_{C/C}$)/100)** | | | | |
| Australia | 0.02 | 0 | 8 | 8 | | 8 |
| Austria | 0.03 | 0 | 8 | 8 | | 8 |
| Belgium | 7.20 | 17 | | 17 | 10 | 10 |
| Canada | 49.80 | 115 | | 115 | 72 | 72 |
| Croatia | 1.02 | 2 | 8 | 8 | | 8 |
| Denmark | 23.23 | 53 | | 53 | 33 | 33 |
| France | 0.25 | 1 | 8 | 8 | | 8 |
| Germany | 0.13 | 0 | 8 | 8 | | 8 |
| Hungary | 3.10 | 7 | 8 | 8 | | 8 |
| Ireland | 0.50 | 1 | 8 | 8 | | 8 |
| Italy | 1.55 | 4 | 8 | 8 | | 8 |
| Mexico | 0.12 | 0 | 8 | 8 | | 8 |
| Netherlands | 6.29 | 15 | | 14 | 10 | 10 |
| Poland | 6.65 | 15 | | 15 | 9 | 9 |
| Slovenia | 0.00 | 0 | 8 | 8 | | 8 |
| Spain | 0.09 | 0 | 8 | 8 | | 8 |
| Switzerland | 0.01 | 0 | 8 | 8 | | 8 |
| Total | | 230 | | 310 | | 230 |

**Table 5.25**
**Number of Samples/Product Class-Chicken, Processed**
**1999 Import Residue Plan**

| **CHICKEN, PROCESSED/ SULFA/230** | **PERCENT PRODUCT ($P_{C/C}$)** | **UNADJUSTED NUMBER OF SAMPLES (U) = 230*(($P_{C/C}$)/100)** | **ADJUST. #1 (MIN. 8 SAMPLES/ COUNTRY)** | **INITIAL ADJ.#** | **ADJUST. # 2** | **FINAL ADJ.#** |
|---|---|---|---|---|---|---|
| Canada | 98.71 | 227 | | 227 | 206 | 206 |
| France | 0.00 | 0 | 8 | 8 | | 8 |
| Hong Kong | 0.31 | 1 | 8 | 8 | | 8 |
| Israel | 0.99 | 2 | 8 | 8 | | 8 |
| Total | | 230 | | 251 | | 230 |
| | | | | | | |
| **CHICKEN, PROCESSED/ ARSENLS/90** | | **UNADJUSTED NUMBER OF SAMPLES (U) = 90*(($P_{C/C}$)/100** | | | | |
| Canada | 98.71 | 89 | | 89 | 66 | 66 |
| France | 0.00 | 0 | 8 | 8 | | 8 |
| Hong Kong | 0.31 | 0 | 8 | 8 | | 8 |
| Israel | 0.99 | 1 | 8 | 8 | | 8 |
| Total | 100 | 90 | | 113 | | 90 |

**Table 5.26**
**Number of Samples/Product Class-Lamb/Mutton, Fresh**
**1999 Import Residue Plan**

| **LAMB/MUTTON, FRESH/ ANTIBIOTICS/300** | **PERCENT PRODUCT ($P_{C/C}$)** | **UNADJUSTED NUMBER OF SAMPLES (U) = 300*(($P_{C/C}$)/100)** | **ADJUST. #1 (MIN. 8 SAMPLES/ COUNTRY)** | **INITIAL ADJ.#** | **ADJUST. # 2** | **FINAL ADJ.#** |
|---|---|---|---|---|---|---|
| Australia | 62.39 | 187 | | 187 | 174 | 174 |
| Canada | 0.62 | 2 | 8 | 8 | | 8 |
| Iceland | 0.05 | 0 | 8 | 8 | | 8 |
| New Zealand | 36.45 | 109 | | 109 | 102 | 102 |
| Uruguay | 0.49 | 2 | 8 | 8 | | 8 |
| Total | | 300 | | 320 | | 300 |
| | | | | | | |
| **LAMB/MUTTON, FRESH/ SULFAS/230** | | **UNADJUSTED NUMBER OF SAMPLES (U) = 230*(($P_{C/C}$)/100** | | | | |
| Australia | 62.39 | 144 | | 143 | 131 | 131 |
| Canada | 0.62 | 1 | 8 | 8 | | 8 |
| Iceland | 0.05 | 0 | 8 | 8 | | 8 |
| New Zealand | 36.45 | 84 | | 84 | 77 | 77 |
| Uruguay | 0.49 | 1 | 8 | 8 | | 8 |
| Total | | 230 | | 251 | | 232 |
| | | | | | | |
| **LAMB/MUTTON, FRESH/ AVERMECTIN/230** | | **UNADJUSTED NUMBER OF SAMPLES (U) = 230*(($P_{C/C}$)/100** | | | | |
| Australia | 62.39 | 144 | | 143 | 131 | 131 |
| Canada | 0.62 | 1 | 8 | 8 | | 8 |
| Iceland | 0.05 | 0 | 8 | 8 | | 8 |
| New Zealand | 36.45 | 84 | | 84 | 77 | 77 |
| Uruguay | 0.49 | 1 | 8 | 8 | | 8 |
| Total | | 230 | | 251 | | 232 |

# SECTION 6
# PLANNING THE 1999 FSIS DOMESTIC MONITORING PLAN AND SPECIAL PROJECTS: PESTICIDES

# SECTION 6. PLANNING THE 1999 FSIS DOMESTIC MONITORING PLAN AND SPECIAL PROJECTS: PESTICIDES

## PHASE I - GENERATING AND RANKING LIST OF CANDIDATE COMPOUNDS

## LIST OF CANDIDATE COMPOUNDS

The candidate pesticides of concern selected by the Environmental Protection Agency (EPA) members of the Surveillance Advisory Team (SAT) is presented in Table 6.1, *Scored Pesticide Residues, Rated with Various Weighting Formulas*. Since the Food Safety and Inspection Service (FSIS) wishes to prioritize which *analyses* should be conducted, compounds that are, or are likely to be, detected by the same analytical methodology have been grouped together.

## RANKING OF CANDIDATE COMPOUNDS

### COMPOUND SCORING

Using a simple 4-point scale (4 = high; 3 = moderate; 2 = low; 1 = none), members of the SAT scored each of the pesticides in each of the following categories (all scores, except for those in the first category, were generated by EPA). Note that some of these categories differ from those used for the veterinary drugs:

- FSIS Historical Testing Information on Violations
- Regulatory Concern
- Lack of FSIS Testing Information on Violations
- Pre-slaughter Interval
- Bioconcentration Factor
- Endocrine Disruption
- Toxicity

Definitions of each of these categories, and the criteria used for scoring, appear at the end of this section in the "*Scoring Key for Pesticides, FSIS 1999 Domestic Residue Program*."

The results of the compound scoring process are presented in Table 6.1. Where compounds were grouped together, the score assigned to each category is the highest score for all members of the group.

### COMPOUND RANKING

#### Background

As stated above, FSIS chose to employ techniques and principles from the field of risk assessment to obtain a ranking of the relative public health concern represented by each of the above candidate compounds or compound classes. Unlike the case with veterinary drugs (see above), FSIS does

not have historical data on a sufficient range of different pesticide compounds or compound classes to predict violation scores using a regression equation. Therefore a somewhat different approach (although related to that used for the veterinary drugs) was necessary. Repeating Equation (4.1), we have:

Risk = Exposure x Toxicity (6.1)
= Consumption x Residue Levels x Toxicity
= Consumption x "Risk Per Unit of Consumption"

**Rating the Pesticides According to Relative Public Health Concern**

The categories of "Regulatory Concern," "Pre-slaughter Interval," and "Bioconcentration Factor" were employed as predictors of risk per unit of consumption from pesticides in animal products. As indicated above, the "Regulatory Concern" category reflects EPA's professional judgment that a compound or compound class will exceed the Reference Dose. It thus combines residue level and toxicity information. As with the “Withdrawal Time” category for veterinary drugs, the “Pre-slaughter Interval” category is expected to correlate with residue level because longer pre-slaughter intervals are less likely to be properly observed. When the pre-slaughter interval is not observed prior to slaughter, the carcass may contain violative levels of residues, since the time necessary for sufficient metabolism and/or elimination of the pesticide would not have passed. Bioconcentration is a measure of the extent to which a pesticide concentrates within the fat deposits of animals. Pesticides that bioconcentrate are more likely to accumulate to higher levels within animal tissue, thus increasing the potential for human exposure.

The "Toxicity" reflects both the dose required to achieve a toxic effect and the severity of that effect. It can thus be used directly as a term in Equation (6.1).

By multiplying toxicity times a weighted average of those categories used as indicators of potential residue level, we can obtain a rough estimate of the relative risk per unit of consumption represented by each compound or compound class. And as with the veterinary drugs, we can refine the equation somewhat by adding a modifier for "Lack of FSIS Testing Information on Violations." Thus, with appropriate substitution, we obtain the following equation:

Relative Public Health Concern (6.2)
= Estimated relative risk per unit of consumption x *modifier for* "Lack of FSIS Testing Information on Violations"
= Estimated relative exposure x Relative toxicity
x *modifier for* "Lack of FSIS Testing Information on Violations"
= Weighted average of {"Regulatory Concern," "Pre-slaughter Interval," "Bioconcentration factor"}
x "Toxicity" x *modifier for* "Lack of FSIS Testing Information on Violations"

Scores for "Endocrine Disruption" and "FSIS Historical Testing Information on Violations" were not available for most of the compounds, making it impossible to use these categories in determining a relative ranking among the different pesticide compounds. Therefore, these categories were not employed in Equation (6.2).

The pesticides are rated for relative public health concern by combining the scoring categories presented in Equation (6.2), using four different weighting formulas. The rating numbers are presented in Table 6.1. Inspection of this table reveals the extent to which changes in the

weighting formula result in changes in rating score. In this case, the results from all four formulas are relatively similar. The SAT chose to use the second formula (bolded in Table 6.1):

Relative public health concern rating, pesticides = {[(2*R+P+B)/4]*T}*{[(L-1)*0.05]+1} (6.3)

Where: R = score for "Regulatory Concern"
P = score for "Pre-slaughter Interval"
B = score for "Bioconcentration Factor"
T = score for "Toxicity"
L = score for "Lack of FSIS Testing Information on Violations

In this formula, "Regulatory Concern" was weighted twice as heavily as both "Pre-slaughter Interval" and "Bioconcentration Factor," because “Regulatory Concern” was considered to be a more direct measure of exposure. And as with the veterinary drugs, the final ratings of compounds or compound classes receiving scores of 4, 3, 2, and 1 in "Lack of FSIS Testing Information on Violations" are increased by 15%, 10%, 5%, and 0% respectively. In other words, the rating of a compound or compound class that had never been tested by FSIS (in the production classes and matrices of concern) would be increased by 15%, while the rating of one that had been recently tested by FSIS (again, in the production classes and matrices of concern) would remain unchanged.

All of the formulas used here for the pesticides, and above for the veterinary drugs, have been normalized. In other words, the veterinary drug and pesticide weighting formulas have been adjusted to give the same maximum value. For a given pesticide or pesticide class, this permits comparison of the scores generated by the four different weighting formulas presented in Table 6.1. Because the formulas for veterinary drugs use different terms from those for pesticides, the scores cannot be precisely compared across these two different types of residues. However, as a result of this normalization, the scores for pesticides and veterinary drugs are comparable in magnitude, permitting a rough comparison to be made across these two very different categories of compounds.

In Table 6.2, *Pesticides Residues Rated with the Selected Weighting Formula, Sorted by Rating*, the pesticides are ranked by their rating scores, as generated using the selected weighting formula (Equation (6.3), above). The scores presented in Table 6.2 enable the Residue Prioritization Committee (RPC) to bring consistency, grounded in formal risk-based considerations, to its efforts to differentiate among a very diverse range of drugs and drug classes in a situation that is marked by minimal data on relative exposures**.** These rankings do not account for differences in exposure due to differences in overall consumption. Data on relative consumption are applied subsequently in Phase IV when relative exposure values for each compound/production class (C/PC) pair are estimated.

# PHASE II - SELECTING PESTICIDES FOR INCLUSION IN THE 1999 NRP

Following the completion of the ranking of the pesticides, the RPC (1) used these rankings to select those compounds and compound classes that should be included in the 1999 NRP, based purely on their relative public health concern and (2) determined which of these compounds and compound classes actually could be included in the 1999 NRP, based on the availability of laboratory resources.

The consensus of the RPC participants was that those compounds and compound classes ranked tenth or higher represented a potential public health concern sufficient to justify their inclusion in the 1999 FSIS National Residue Program (NRP).

Once these high-priority compounds and compound classes had been identified, it was necessary for the RPC to apply considerations beyond those related to public health to determine the compounds for which FSIS would sample. The principal consideration not related to public health was the availability of laboratory resources, especially the availability of appropriate analytical methods within the FSIS laboratories. Based on these constraints, only the chlorinated hydrocarbon/chlorinated organophosphate (CHC/COP) compound class can currently be included in the NRP. The 39 compounds that will be analyzed in this class are:

HCB, alpha-BHC, lindane, heptachlor, dieldrin, aldrin, endrin, ronnel, linuron, oxychlordane, chlorpyrifos, nonachlor, heptachlor epoxide A, heptachlor epoxide B, endosulfan I, endosulfan I sulfate, endosulfan II, trans-chlordane, cis-chlordane, chlorfenvinphos, p,p'-DDE, p, p'-TDE, o,p'-DDT, p,p'-DDT, carbophenothion, captan, stirofos, kepone, mirex, methoxychlor, phosalone, coumaphos-O, coumaphos-S, toxaphene, famphur, PCB 1242, PCB 1248, PCB 1254, PCB 1260, dicofol*, PBBs*, polybrominated diphenyl ethers*, and deltamethrin* (*identification only; not quantitated)

Table 6.3, *Rank and Status for Pesticides in the 1999 NRP*, lists all of the original candidate pesticides and pesticides classes in rank order. For each compound or compound class, the table specifies if it will be sampled under the 1999 Monitoring Plan or Special Projects, or if it will not be included in the 1999 NRP. For each highly ranked compound or compound class that was not included in the 1999 NRP, a brief explanation of the reason for its exclusion is provided. This table will be used to identify future method development needs for pesticides for the FSIS NRP.

Because a number of highly ranked compound classes could not be included in the 1999 NRP due to methodological limitations, FSIS is currently working with EPA to extend its CHC/COP method to the 63 chlorinated and non-chlorinated organophosphate compounds that were collectively rated as the top priority compound class. FSIS will implement this extended methodology as soon as it becomes available, probably in late 1999. In addition, in 2000 FSIS also plans to work with EPA to attempt to extend this methodology to the 10 triazine and six synthetic pyrethrin compounds that are ranked second and third, respectively. If this is accomplished, FSIS will have in place a single methodology capable of simultaneously identifying and quantitating over 100 compounds from five different chemical classes.

# PHASE III- IDENTIFYING THE COMPOUND/PRODUCTION CLASS (C/PC) PAIRS

The CHC/COP class includes pesticides that are applied to grains. Some of these grains are used as animal feeds, creating the potential for the occurrence of "secondary residues" (i.e., residues that are not the result of direct treatment) in the animals. Other compounds within this class (such as the PCB's) are environmental contaminants. *Since all animals are fed grains, and since environmental contaminants can occur in any food animal, the SAT judged it to be prudent to sample for CHC's and COP's in all production classes*. FSIS also wishes to continue sampling for these compounds in all production classes as a means of monitoring for the occurrence of accidental contamination incidents.

# PHASE IV - ALLOCATION OF SAMPLING RESOURCES

Since only the CHC/COP compound class will be included in the 1999 NRP, this phase is relatively straightforward. FSIS has sufficient analytical capability to implement CHC/COP analysis in all production classes. To establish a relative sampling priority for each C/PC pair, the ranking score for the CHC/COP's (as calculated in Table 6.1) was multiplied by the estimated relative percent of domestic consumption for each production class (presented in Table 4.6). This is identical Equation (4.6), which was used to calculate the relative sampling priorities for the veterinary drugs:

$$(\text{Rel. sampling priority})_{C/PC} = (\text{Ranking score})_{C} \times (\text{Est. rel. \% domestic consumption})_{PC} \qquad (6.4)$$

As stated above for veterinary drugs, Equation (6.4) is analogous to the equation used to estimate risk (Equation (6.1)), in which risk per unit of consumption is multiplied by consumption. While the results of Equation (6.4) do not constitute an estimate of risk, they provide a numerical representation of the relative public health concern represented by each C/PC pair, and thus can be used to prioritize FSIS analytical sampling resources according to the latter. Note that the risk ranking provided by Equation (6.4) is based upon average consumption across the entire U.S. population, rather than upon maximally exposed individuals.

A ranking of the C/PC pairs within this single compound class could be obtained merely using the estimated relative percent of domestic consumption for each production class. In other words, the *rank order and the relative magnitude of the score* assigned to each of the C/PC pairs within this compound class is not changed by multiplying all the relative consumption values by the ranking score, since the ranking score is a constant term. Nevertheless, to maintain a rough parity between the sampling numbers assigned to the veterinary drugs and those assigned to the pesticides, all of the relative consumption figures were multiplied by the ranking score for the CHC/COP compound class. Then, rather than simply dividing the production classes into quartiles, the sampling levels were chosen using the same cutoff numbers employed in Table 4.7 for the veterinary drugs. The cutoff scores are as follows: $\geq$28 = 460 samples; 2.2 - 27 = 300 samples; 0.19 - 2.1 = 230 samples; < 0.19 = 90 samples. The results of this are presented in Table 6.4, *Pesticide Compound/Production Class Pairs, Sorted by Sampling Priority Score, with Adjusted Number of Analyses*. As described in Section 3, above, these sampling levels provide varying probabilities of detecting residue violations. Thus the larger sample sizes, which provide the greater chance of detecting violations, are directed towards those C/PC pairs that have been identified as representing higher levels of relative public health concern.

## ADJUSTING RELATIVE SAMPLING NUMBERS

### Adjusting for historical data on violation rates of individual C/PC pairs

As described above, the RPC used "FSIS Historical Testing Information on Violations" as a critical factor in ranking the various pesticides and pesticide classes according to their relative public health concern. Because this information is available for each production class individually, it can also be used to further refine the relative priority of sampling each C/PC pair. Table 6.4 lists, for the period 1/1/93 -10/15/98 (1/1/96 - 12/31/97 for egg products), the total number of samples analyzed by FSIS under its Monitoring Plan and Special Projects (i.e., random sampling only), the percent of samples found to be violative (i.e., present at a level in excess of the action level or regulatory tolerance; or, for those compounds that are prohibited, present at any detectable level), and the percent of samples found to be positive but not violative ("non-violative

positive," or NVP). Using these data, the following rules were applied to adjust the sampling numbers:

1. C/PC pair never tested: +1 level (i.e., increase by one sampling level, e.g., from 230 samples to 300 samples)
2. At least 300 samples tested, violation rate $\geq$ 0.25%: +1 level
3. The maximum number of samples to be scheduled for testing is 460

The one exception to this system is that geese are never to be scheduled for more than 90 samples (because very few geese are produced, and because virtually all the geese are slaughtered by a very limited number of plants, its is impractical to collect a larger number of samples).

Because the use of the CHC/COP method to test for phenylbutazone did not start until recently, FSIS has limited data on the occurrence of this drug in the production classes of interest. Therefore, all production classes for which phenylbutazone was designated as of potential concern (in Table 4.6, with an "X" *not* surrounded by parentheses) were assigned a minimum of 300 samples.

All of the above adjustments were applied, and the sampling numbers obtained following these adjustments are listed in Table 6.4 under the heading "INITIAL ADJ. #" (initial adjusted number of samples).

**Adjusting for laboratory capacity**

No adjustments for laboratory capacity were necessary. Therefore the final sampling numbers for the pesticides, which are listed in the last column of Table 6.4 under the heading "FINAL ADJ. #" (final adjusted number of samples), are unchanged from those listed under the heading "INITIAL ADJ. #."

# SCORING KEY FOR PESTICIDES
# 1999 FSIS DOMESTIC RESIDUE PROGRAM

**FSIS Historical Testing Information on Violations (1983-1997)**

4 = Violation rate of 0.6% or greater for at least one year in at least one major production class, i.e., one which represents at least 1.5% of the U.S. consumption of meat poultry, and egg products. Based on this definition, the major production classes are: *beef cows, dairy cows, heifers, steers, market hogs, young chickens, young turkeys, and egg products.*

3 = More than two violations detected, but does not qualify for a “4"

2 = Total of one or two violations detected over all years of sampling

1 = No violations detected over all years of sampling

NT = Not tested by FSIS

**Regulatory Concern**

These score were generated by a professional assessment of the extent to which the acute or chronic dietary exposure to this compound may exceed EPA's level of concern. Concern for chronic toxicity is judged by comparing a compound's Reference Dose (RfD) to the estimated level of exposure. The RfD is an estimated daily exposure to an agent that, when sustained over a lifetime, is assumed to be without appreciable risk to the human population.[1]

Concern for acute toxicity is judged by estimating the combined toxicity of all agents sharing the same mechanism of toxicity

4 = Reference Dose (RfD) exceeder, carcinogen, or possible high combined acute toxicity

3 = Close to RfD, or close to acceptable levels for combined acute toxicity

2 = Exposure estimated to be a low percentage of RfD, or to be below acceptable levels for combined acute toxicity

1 = Exposure estimated to be a very low percentage of RfD, or to be far below acceptable levels for combined acute toxicity

**Lack of FSIS Testing Information on Violations**

This represents the extent to which FSIS analytical testing information on a residue is limited, absent or obsolete.

4 = Not tested within the past 6 years

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[1]Klassen, CD, ed. *Casarett and Doull's Toxicology: The Basic Science of Poisons, 5th Ed.* McGraw-Hill: New York, 1996, p. 80.

3 = Tested within the past 5-6 years, but not more recently

2= Tested within the past 4-5 years, but not more recently

1= Tested within the past 3 years.

**Pre-Slaughter Interval**

Pesticides accepted for direct dermal application have a minimum specified pre-slaughter interval. This is the interval between the last dermal application and the time of slaughter.

4 = Dermal application permitted, pre-slaughter interval 1 day or greater

3 = Dermal application permitted, pre-slaughter interval 0 days

2 = No direct dermal application permitted, but treatment of premises (e.g., holding cells, feedlots, barns, etc.) is permitted

1 = No direct dermal application or premise treatment permitted

**Bioconcentration Factor**

This is a measure of the compound's relative affinity for fat, as measured by the $K_{o/w}$. The $K_{o/w}$ is defined as the logarithm of the partition coefficient between octanol and water. Compounds that have a high affinity for octanol (and thus a high $K_{o/w}$) tend to bioaccumulate in body fat.

4 = log $K_{o/w}$ greater than 3

3 = log $K_{o/w}$ between 2 and 3

2 = log $K_{o/w}$ between 1 and 2

1 = log $K_{o/w}$ less than 1

**Endocrine Disruption**

This is a measure of the extent to which the compound changes endocrine function and causes adverse effects to individual organisms and/or their progeny, or to organism populations and subpopulations.

4 = Widely known

3 = Suspected

NT = Not yet tested

**Toxicity**

This represents professional judgment of the toxicity of the compound, including both the dose required to achieve a toxic effect, and the severity of the toxic effect

4 = Highly acutely toxic, cholinesterase inhibitor, carcinogen, or low RfD

3 = Moderately acutely toxic, or higher RfD

2 = Low toxicity concern

1 = Very low toxicity concern or eligible for tolerance exception

**Table 6.1**
**Scored Pesticide Residues, Rated With Various Weighting Formulas**
**1999 FSIS NRP, Monitoring Plan and Special Projects**

| COMPOUND/COMPOUND CLASS | HIST. VIOL. (FSIS) | REG. CON. (R) (EPA) | LACK INFO. (L) (EPA) | PSI (P) (EPA) | BIOCON. (B) (EPA) | ENDO. DISRUP. (EPA) | TOX. (T) (EPA) | (((2*R+P+B)/4)*T) *(((L-1)*0.1)+1) | (((2*R+P+B)/4)*T) *(((L-1)*0.05)+1) | (((3*R+P+B)/5)*T) *(((L-1)*0.05)+1) | (((R+P+B)/3)*T) *(((L-1)*0.05)+1) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **CHC'S and COP'S in FSIS CHC/COP Method** (HCB, alpha-BHC, lindane, heptachlor, dieldrin, aldrin, endrin, ronnel, linuron, oxychlordane, chlorpyrifos, nonachlor, heptachlor epoxide A, heptachlor expoxide B, endosulfan I, endosulfan I sulfate, endosulfan II, trans-chlordane, cis-chlordane, chlorfenvinphos, p,p'-DDE, p, p'-TDE, o,p'-DDT, p,p'-DDT, carbophenothion, captan, stirofos, kepone, mirex, methoxychlor, phosalone, coumaphos-O, coumaphos-S, toxaphene, famphur, PCB 1242, PCB 1248, PCB 1254, PCB 1260, dicofol*, PBBs*, polybrominated diphenyl ethers*, deltamethrin*) (*identification only) | 3 | 4 | 1 | 4 | 4 | | 4 | 16.0 | **16.0** | 16.0 | 16.0 |
| **COP'S and OP'S NOT in IN FSIS CHC/COP Method** (azinphos-methyl, azinphos-methyl oxon, chlorpyrifos, coumaphos, coumaphos oxon, diazinon, diazinon oxon, diazinon met G-27550, dichlorvos, dimethoate, dimethoate oxon, dioxathion, ethion, ethion monooxon, fenthion, fenthion oxon, fenthion oxon sulfone, fenthion oxon sulfoxide, fenthion sulfone, fenthion sulfoxide, malathion, malathion oxon, naled, phosmet, phosmet oxon, pirimiphos-methyl, trichlorfon, tetrachlorvinphos, tetrachlorvinphos-4 metabolites, acephate, methamidophos, chlorpyrifos-methyl, fenamiphos, fenamiphos sulfoxide,fenamiphos sulfone, fenamiphos sulfoxide desisopropyl, fenamiphos sulfone desisopropyl, isofenphos, isofenphos oxon, isofenphos desisopropyl, isofenphos oxon desisopropyl, methidathion, ODM, parathion (ethyl)*, parathion oxon, parathion methyl*, parathion methyl oxon, phorate, phorate oxon, phorate oxon sulfone, phorate oxon sulfoxide, phorate sulfone, phorate sulfoxide, profenofos, sulprofos, sulprofos oxon, sulprofos oxon sulfone, sulprofos oxon sulfoxide, sulprofos sulfone, sulprofos sulfoxide, tribufos (DEF)) | NT | 4 | 4 | 4 | 4 | NT | 4 | 20.8 | **18.4** | 18.4 | 18.4 |
| **Carbamates in FSIS Carbamate Method** (aldicarb, alidcarb sulfoxide, aldicarb sulfone, carbaryl, carbofuran, carbofuran 3-hydroxy) | NA | 4 | 2 | 4 | 2 | 3 | 4 | 15.4 | **14.7** | 15.1 | 14.0 |
| **Carbamates NOT in FSIS Carbamate Method** (carbaryl 5,6-dihydroxy, chlorpropham, propham, thiobencarb, 4-chlorobenzylmethylsulfone,4-chlorobenzylmethylsulfone sulfoxide) | NT | 4 | 4 | 1 | 3 | NT | 4 | 15.6 | **13.8** | 14.7 | 12.3 |
| **Triazines in FSIS Triazine Method** (atrazine, simazine, propazine, terbuthylazine) | 1 | 4 | 2 | 2 | 3 | 4 | 4 | 14.3 | **13.7** | 14.3 | 12.6 |

**Table 6.1 – *Continued***
**Scored Pesticide Residues, Rated With Various Weighting Formulas**
**1999 FSIS NRP, Monitoring Plan and Special Projects**

| COMPOUND/COMPOUND CLASS | HIST. VIOL. (FSIS) | REG. CON. (R) (EPA) | LACK INFO. (L) (EPA) | PSI (P) (EPA) | BIOCON. (B) (EPA) | ENDO. DISRUP. (EPA) | TOX. (T) (EPA) | (((2*R+P+B)/4)*T) *(((L-1)*0.1)+1) | (((2*R+P+B)/4)*T) *(((L-1)*0.05)+1) | (((3*R+P+B)/5)*T) *(((L-1)*0.05)+1) | (((R+P+B)/3)*T) *(((L-1)*0.05)+1) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Triazines NOT in FSIS Triazine Method** (atrazine chloro metabolites, metribuzin, metribuzin DADK, metribuzin DA, metribuzin DK, amitraz, amitraz 2,4-DMA metabs., desdiethyl simazine, desethyl simazine, simazine chloro metabs.) | NT | 4 | 4 | 4 | 3 | 4 | 4 | 19.5 | **17.3** | 17.5 | 16.9 |
| **Synthetic Pyrethrins in FSIS Synthetic Pyrethrin Method** (cypermethrin, cis-permethrin, trans-permethrin, fenvalerate, zeta-cypermethrin) | 1 | 3 | 4 | 4 | 4 | 3 | 4 | 18.2 | **16.1** | 15.6 | 16.9 |
| **Benzimidazole Pesticides in FSIS Benzimidazole Method** (5-hydroxythiabendazole, benomyl (as carbendazim), thiabendazole) | 1 | 3 | 3 | 1 | 4 | 3 | 4 | 13.2 | **12.1** | 12.3 | 11.7 |
| Alachlor | 1 | 4 | 2 | 1 | 3 | 3 | 4 | 13.2 | **12.6** | 13.4 | 11.2 |
| 2-aminobenzimidazole | 1 | 3 | 3 | 1 | 2 | 3 | 4 | 10.8 | **9.9** | 10.6 | 8.8 |
| Triadimenol( for metabolites see triadimefon) | NT | 3 | 4 | 1 | 4 | NT | 4 | 14.3 | **12.7** | 12.9 | 12.3 |
| Bentazon, 6-hydroxy bentazon, 8-hydroxy bentazon | NT | 3 | 4 | 1 | 2 | NT | 3 | 8.8 | **7.8** | 8.3 | 6.9 |
| 2-amino-n-isopropylbenzamide | NT | 3 | 4 | 1 | 2 | NT | 3 | 8.8 | **7.8** | 8.3 | 6.9 |
| Bromoxynil | 1 | 3 | 1 | 1 | 1 | NT | 4 | 8.0 | **8.0** | 8.8 | 6.7 |
| Cacodylic acid | 1 | 3 | 1 | 3 | 3 | 3 | 4 | 12.0 | **12.0** | 12.0 | 12.0 |
| Myclobutanil, myclobutanil alcohol metabolite, myclobutanol dihydroxy metabolite | NT | 3 | 4 | 1 | 2 | NT | 2 | 5.9 | **5.2** | 5.5 | 4.6 |
| Captan epoxide | NT | 3 | 1 | 1 | 4 | NT | 4 | 11.0 | **11.0** | 11.2 | 10.7 |
| Bis(trichloromethyl)disulfide | NT | 3 | 1 | 1 | 4 | NT | 4 | 11.0 | **11.0** | 11.2 | 10.7 |
| THPI | NT | 3 | 1 | 1 | 4 | NT | 4 | 11.0 | **11.0** | 11.2 | 10.7 |
| Dipropyl isocinchomerate | NT | 3 | 1 | 4 | 4 | NT | 2 | 7.0 | **7.0** | 6.8 | 7.3 |
| Ethalfluralin | NT | 3 | 4 | 1 | 2 | NT | 4 | 11.7 | **10.4** | 11.0 | 9.2 |
| Etridiazole . | NT | 3 | 4 | 1 | 4 | NT | 3 | 10.7 | **9.5** | 9.7 | 9.2 |
| 3-carboxy-5-ethoxy-1,2,4-thiadiazole | NT | 3 | 4 | 1 | 4 | NT | 3 | 10.7 | **9.5** | 9.7 | 9.2 |
| Fenoxaprop ethyl | NT | 3 | 4 | 1 | 4 | NT | 4 | 14.3 | **12.7** | 12.9 | 12.3 |
| 2-(4-((6-chloro-2-benzoxazolyl)oxy)phenoxy)propanoic acid | NT | 3 | 4 | 1 | 4 | NT | 4 | 14.3 | **12.7** | 12.9 | 12.3 |
| 6-chloro-2,3-dihydro-benzoxazol-2-one | NT | 3 | 4 | 1 | 4 | NT | 4 | 14.3 | **12.7** | 12.9 | 12.3 |
| Methoxychlor olefin | NT | 3 | 1 | 4 | 4 | 4 | 4 | 14.0 | **14.0** | 13.6 | 14.7 |

**Table 6.1 – *Continued***
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**1999 FSIS NRP, Monitoring Plan and Special Projects**

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|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,1-(2,2-dichloroethylidene)bis(4-methoxybenzene) | NT | 3 | 1 | 4 | 4 | NT | 4 | 14.0 | **14.0** | 13.6 | 14.7 |
| 1-methoxy-4-(1,2,2,2-tetrachloroethyl)benzene) | NT | 3 | 1 | 4 | 4 | NT | 4 | 14.0 | **14.0** | 13.6 | 14.7 |
| Oxadiazon | NT | 3 | 4 | 1 | 4 | NT | 4 | 14.3 | **12.7** | 12.9 | 12.3 |
| 2-carboxyisopropyl-4-(4-dichloro)-5-isopropoxyphenyl)-1,3,4-oxadiazolin-5-one | NT | 3 | 4 | 1 | 4 | NT | 4 | 14.3 | **12.7** | 12.9 | 12.3 |
| 2-t-butyl-4-(2,4-chloro-5-hydroxyphenyl)-delta 2-1,3,4-oxadiazolin-5-one | NT | 3 | 4 | 1 | 4 | NT | 4 | 14.3 | **12.7** | 12.9 | 12.3 |
| Oxyfluorfen | NT | 3 | 4 | 1 | 4 | NT | 4 | 14.3 | **12.7** | 12.9 | 12.3 |
| Paraquat dichloride | NT | 3 | 4 | 1 | 1 | NT | 4 | 10.4 | **9.2** | 10.1 | 7.7 |
| Propargite | NT | 3 | 4 | 1 | 2 | NT | 3 | 8.8 | **7.8** | 8.3 | 6.9 |
| Thiophanate methyl | NT | 3 | 4 | 1 | 2 | NT | 4 | 11.7 | **10.4** | 11.0 | 9.2 |
| Allophanate | NT | 3 | 4 | 1 | 2 | NT | 4 | 11.7 | **10.4** | 11.0 | 9.2 |
| Triadimefon | NT | 3 | 4 | 1 | 4 | NT | 4 | 14.3 | **12.7** | 12.9 | 12.3 |
| Triadimefon metabolite KWG 1323 | NT | 3 | 4 | 1 | 4 | NT | 4 | 14.3 | **12.7** | 12.9 | 12.3 |
| Triadimefon metabolite KWG 1732 | NT | 3 | 4 | 1 | 4 | NT | 4 | 14.3 | **12.7** | 12.9 | 12.3 |
| Triadimefon metabolite KWG 1342 | NT | 3 | 4 | 1 | 4 | NT | 4 | 14.3 | **12.7** | 12.9 | 12.3 |
| Triclopyr | NT | 3 | 4 | 2 | 1 | NT | 4 | 11.7 | **10.4** | 11.0 | 9.2 |
| TCP=3,5,6-trichloro-2-pyridinol | NT | 3 | 4 | 2 | 1 | NT | 4 | 11.7 | **10.4** | 11.0 | 9.2 |
| Quizalofop-ethyl | NT | 3 | 4 | 1 | 2 | NT | 4 | 11.7 | **10.4** | 11.0 | 9.2 |
| Propyzamide | NT | 3 | 4 | 1 | 4 | NT | 3 | 10.7 | **9.5** | 9.7 | 9.2 |
| Methyl 3,5-dichlorobenzoate | NT | 3 | 4 | 1 | 4 | NT | 3 | 10.7 | **9.5** | 9.7 | 9.2 |
| 2,4-d | NT | 3 | 4 | 2 | 1 | 3 | 2 | 5.9 | **5.2** | 5.5 | 4.6 |
| Difenoconazole | NT | 3 | 4 | 1 | 3 | NT | 4 | 13.0 | **11.5** | 12.0 | 10.7 |
| Propiconazole | NT | 3 | 4 | 1 | 3 | NT | 4 | 13.0 | **11.5** | 12.0 | 10.7 |
| Propiconazole metabolite 1,2,4-triazole | NT | 3 | 4 | 1 | 3 | NT | 4 | 13.0 | **11.5** | 12.0 | 10.7 |
| Propiconazole metabolite CGA 118244 | NT | 3 | 4 | 1 | 3 | NT | 4 | 13.0 | **11.5** | 12.0 | 10.7 |
| Propiconazole metabolite CGA 91305 | NT | 3 | 4 | 1 | 3 | NT | 4 | 13.0 | **11.5** | 12.0 | 10.7 |
| Iprodione | NT | 3 | 4 | 1 | 3 | NT | 4 | 13.0 | **11.5** | 12.0 | 10.7 |

**Table 6.1 – *Continued***
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**1999 FSIS NRP, Monitoring Plan and Special Projects**

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|---|---|---|---|---|---|---|---|---|---|---|---|
| Iprodione isomer | NT | 3 | 4 | 1 | 3 | NT | 4 | 13.0 | **11.5** | 12.0 | 10.7 |
| Iprodione metabolite | NT | 3 | 4 | 1 | 3 | NT | 4 | 13.0 | **11.5** | 12.0 | 10.7 |
| Iprodione metabolite 2 | NT | 3 | 4 | 1 | 3 | NT | 4 | 13.0 | **11.5** | 12.0 | 10.7 |
| Clofentezine | NT | 3 | 4 | 1 | 1 | NT | 4 | 10.4 | **9.2** | 10.1 | 7.7 |
| 3-(2-chloro-4-hydroxyphenyl)-6-(2-chlorophenyl)-1,2,4,5-tetrazine | NT | 3 | 4 | 1 | 1 | NT | 4 | 10.4 | **9.2** | 10.1 | 7.7 |
| Dicamba | NT | 3 | 4 | 2 | 3 | NT | 4 | 14.3 | **12.7** | 12.9 | 12.3 |
| Diflubenzuron | NT | 3 | 4 | 4 | 4 | NT | 2 | 9.1 | **8.1** | 7.8 | 8.4 |
| Mepiquat chloride | NT | 3 | 4 | 1 | 1 | NT | 4 | 10.4 | **9.2** | 10.1 | 7.7 |
| Diphenamid | NT | 3 | 4 | 1 | 1 | NT | 3 | 7.8 | **6.9** | 7.6 | 5.8 |
| Diphenamid, desmethyl | NT | 3 | 4 | 1 | 1 | NT | 3 | 7.8 | **6.9** | 7.6 | 5.8 |
| Diphenylamine | NT | 3 | 4 | 3 | 1 | NT | 3 | 9.8 | **8.6** | 9.0 | 8.1 |
| Imazalil | NT | 3 | 4 | 4 | 4 | NT | 4 | 18.2 | **16.1** | 15.6 | 16.9 |
| 1-(2,4-dichlorophenyl)-2-(1H-imidazole-1-yl)-1-ethanol | NT | 3 | 4 | 4 | 4 | NT | 4 | 18.2 | **16.1** | 15.6 | 16.9 |
| 3-(1-(2,4-dichlorophenyl)-2-(1H-imidazole-1-yl)ethoxy)-1,2-propane diol | NT | 3 | 4 | 4 | 4 | NT | 4 | 18.2 | **16.1** | 15.6 | 16.9 |
| Maleic hydrazide | NT | 3 | 4 | 1 | 4 | NT | 1 | 3.6 | **3.2** | 3.2 | 3.1 |
| Oxythioquinox | NT | 3 | 4 | 1 | 1 | NT | 4 | 10.4 | **9.2** | 10.1 | 7.7 |
| 6-methyl-2,3-quinoxalinedithiol | NT | 3 | 4 | 1 | 2 | NT | 4 | 11.7 | **10.4** | 11.0 | 9.2 |
| Sodium acifluorfen | NT | 3 | 4 | 1 | 2 | NT | 3 | 8.8 | **7.8** | 8.3 | 6.9 |
| Acifluorfen, amino analog | NT | 3 | 4 | 1 | 2 | NT | 3 | 8.8 | **7.8** | 8.3 | 6.9 |
| Triflumazole | NT | 3 | 4 | 1 | 4 | NT | 3 | 10.7 | **9.5** | 9.7 | 9.2 |
| 4-chloro-2-trifluoromethylaniline | NT | 3 | 4 | 1 | 4 | NT | 3 | 10.7 | **9.5** | 9.7 | 9.2 |
| N-(4-chloro-2-trifluoromethylphenyl)-propoxyacetamide | NT | 3 | 4 | 1 | 4 | NT | 3 | 10.7 | **9.5** | 9.7 | 9.2 |
| 2,6-diethylaniline | NT | 4 | 4 | 1 | 3 | 3 | 4 | 15.6 | **13.8** | 14.7 | 12.3 |
| 2-(1-hydroxyethyl)-6-ethylaniline | NT | 4 | 4 | 1 | 3 | 3 | 4 | 15.6 | **13.8** | 14.7 | 12.3 |
| CP 101394 | NT | 4 | 4 | 1 | 3 | 3 | 4 | 15.6 | **13.8** | 14.7 | 12.3 |
| CP 108064 | NT | 4 | 4 | 1 | 3 | 3 | 4 | 15.6 | **13.8** | 14.7 | 12.3 |

**Table 6.1 – *Continued***
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|---|---|---|---|---|---|---|---|---|---|---|---|
| CP 108065 | NT | 4 | 4 | 1 | 3 | 3 | 4 | 15.6 | **13.8** | 14.7 | 12.3 |
| CP 108267 | NT | 4 | 4 | 1 | 3 | 3 | 4 | 15.6 | **13.8** | 14.7 | 12.3 |
| CP 51214 | NT | 4 | 4 | 1 | 3 | 3 | 4 | 15.6 | **13.8** | 14.7 | 12.3 |
| Abamectin | NT | 2 | 4 | 1 | 4 | NT | 4 | 11.7 | **10.4** | 10.1 | 10.7 |
| Abamectin delta 8,9 geometric isomer | NT | 2 | 4 | 1 | 4 | NT | 4 | 11.7 | **10.4** | 10.1 | 10.7 |
| Azoxystrobin | NT | 1 | 4 | 1 | 3 | NT | 2 | 3.9 | **3.5** | 3.2 | 3.8 |
| Azoxystrobin Z isomer | NT | 1 | 4 | 1 | 3 | NT | 2 | 3.9 | **3.5** | 3.2 | 3.8 |
| Benoxacor | NT | 1 | 4 | 1 | 3 | NT | 4 | 7.8 | **6.9** | 6.4 | 7.7 |
| Bensulfuron methyl ester | NT | | 4 | 1 | 1 | NT | 2 | 1.3 | **1.2** | 0.9 | 1.5 |
| Bifenthrin | NT | 3 | 4 | 1 | 4 | NT | 4 | 14.3 | **12.7** | 12.9 | 12.3 |
| Bifenthrin, 4'-hydroxy | NT | 3 | 4 | 1 | 4 | NT | 4 | 14.3 | **12.7** | 12.9 | 12.3 |
| Buprofezin | NT | 2 | 4 | 1 | 2 | NT | 4 | 9.1 | **8.1** | 8.3 | 7.7 |
| Butylamine, sec- | NT | 2 | 4 | 1 | 2 | NT | 2 | 4.6 | **4.0** | 4.1 | 3.8 |
| Carboxin | NT | 3 | 4 | 1 | 2 | NT | 4 | 11.7 | **10.4** | 11.0 | 9.2 |
| Carboxin sulfoxide | NT | 3 | 4 | 1 | 2 | NT | 4 | 11.7 | **10.4** | 11.0 | 9.2 |
| Chlorfenapyr | NT | 1 | 4 | 1 | 2 | NT | 4 | 6.5 | **5.8** | 5.5 | 6.1 |
| Chlorobenzilate | NT | 3 | 4 | 1 | 4 | NT | 3 | 10.7 | **9.5** | 9.7 | 9.2 |
| Chloroneb | NT | 1 | 4 | 1 | 2 | NT | 3 | 4.9 | **4.3** | 4.1 | 4.6 |
| Chloroneb, hydroxy- | NT | 1 | 4 | 1 | 2 | NT | 3 | 4.9 | **4.3** | 4.1 | 4.6 |
| 2,5-dichloro-4-methoxyphenol | NT | 1 | 4 | 1 | 2 | NT | 3 | 4.9 | **4.3** | 4.1 | 4.6 |
| Chlorsulfuron | NT | 3 | 4 | 1 | 2 | NT | 3 | 8.8 | **7.8** | 8.3 | 6.9 |
| Chlorsulfuron, 5-hydroxy- | NT | 3 | 4 | 1 | 2 | NT | 3 | 8.8 | **7.8** | 8.3 | 6.9 |
| Clethodim | NT | | 4 | 1 | 2 | NT | 3 | 2.9 | **2.6** | 2.1 | 3.5 |
| Clofencet | NT | 1 | 4 | 1 | 2 | NT | 3 | 4.9 | **4.3** | 4.1 | 4.6 |
| Cloprop | NT | 1 | 4 | 1 | 1 | NT | 3 | 3.9 | **3.5** | 3.5 | 3.5 |
| Clopyralid | NT | 1 | 4 | 2 | 1 | NT | 2 | 3.3 | **2.9** | 2.8 | 3.1 |

**Table 6.1 – *Continued***
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|---|---|---|---|---|---|---|---|---|---|---|---|
| Cyclanilide | NT | 3 | 4 | 1 | 4 | NT | 4 | 14.3 | **12.7** | 12.9 | 12.3 |
| Cyfluthrin | NT | 3 | 4 | 4 | 2 | NT | 3 | 11.7 | **10.4** | 10.4 | 10.4 |
| Cyhalothrin, lambda- | NT | 3 | 4 | 4 | 2 | NT | 4 | 15.6 | **13.8** | 13.8 | 13.8 |
| PP 890 | NT | 3 | 4 | 4 | 2 | NT | 4 | 15.6 | **13.8** | 13.8 | 13.8 |
| Cyhexatin | NT | 2 | 4 | 1 | 2 | NT | 4 | 9.1 | **8.1** | 8.3 | 7.7 |
| Cyclohexylstannoic acid | NT | 2 | 4 | 1 | 2 | NT | 4 | 9.1 | **8.1** | 8.3 | 7.7 |
| Dicyclohexyltin oxide | NT | 2 | 4 | 1 | 2 | NT | 4 | 9.1 | **8.1** | 8.3 | 7.7 |
| Cyromazine | 1 | 3 | 4 | 4 | 2 | NT | 4 | 15.6 | **13.8** | 13.8 | 13.8 |
| 1-methyl cyromazine | NT | 3 | 4 | 4 | 2 | NT | 4 | 15.6 | **13.8** | 13.8 | 13.8 |
| Dalapon | NT | 2 | 4 | 2 | 2 | NT | 3 | 7.8 | **6.9** | 6.9 | 6.9 |
| Dialifor | NT | 3 | 4 | 1 | 4 | NT | 4 | 14.3 | **12.7** | 12.9 | 12.3 |
| Dialifor oxon | NT | 3 | 4 | 1 | 4 | NT | 4 | 14.3 | **12.7** | 12.9 | 12.3 |
| Difenoconazole | NT | 3 | 4 | 1 | 4 | NT | 3 | 10.7 | **9.5** | 9.7 | 9.2 |
| Difenzoquat | NT | 1 | 4 | 1 | 1 | NT | 4 | 5.2 | **4.6** | 4.6 | 4.6 |
| Dimethipin | NT | 1 | 4 | 1 | 1 | NT | 3 | 3.9 | **3.5** | 3.5 | 3.5 |
| Dioxathion | 1 | 3 | 4 | 1 | 3 | NT | 4 | 13.0 | **11.5** | 12.0 | 10.7 |
| Diphenamid | NT | 2 | 4 | 1 | 1 | NT | 3 | 5.9 | **5.2** | 5.5 | 4.6 |
| Diphenamid, desmethyl- | NT | 2 | 4 | 1 | 1 | NT | 3 | 5.9 | **5.2** | 5.5 | 4.6 |
| Diphenylamine | NT | 2 | 4 | 4 | 4 | NT | 3 | 11.7 | **10.4** | 9.7 | 11.5 |
| Diquat dibromide | NT | 1 | 4 | 1 | 3 | NT | 4 | 7.8 | **6.9** | 6.4 | 7.7 |
| Diuron | NT | 3 | 4 | 2 | 3 | NT | 4 | 14.3 | **12.7** | 12.9 | 12.3 |
| 3-(3,4-dichlorophenyl)-1-methoxyurea | NT | 3 | 4 | 2 | 3 | NT | 4 | 14.3 | **12.7** | 12.9 | 12.3 |
| 3,4-dichloroaniline | NT | 3 | 4 | 2 | 3 | NT | 4 | 14.3 | **12.7** | 12.9 | 12.3 |
| 3,4-dichlorophenylurea | NT | 3 | 4 | 2 | 3 | NT | 4 | 14.3 | **12.7** | 12.9 | 12.3 |
| N-(3,4-dichlorophenyl)-N'-methylurea | NT | 3 | 4 | 2 | 3 | NT | 4 | 14.3 | **12.7** | 12.9 | 12.3 |
| Dodine | NT | 2 | 4 | 1 | 1 | NT | 3 | 5.9 | **5.2** | 5.5 | 4.6 |

**Table 6.1 – *Continued***
**Scored Pesticide Residues, Rated With Various Weighting Formulas**
**1999 FSIS NRP, Monitoring Plan and Special Projects**

| COMPOUND/COMPOUND CLASS | HIST. VIOL. (FSIS) | REG. CON. (R) (EPA) | LACK INFO. (L) (EPA) | PSI (P) (EPA) | BIOCON. (B) (EPA) | ENDO. DISRUP. (EPA) | TOX. (T) (EPA) | (((2*R+P+B)/4)*T) *(((L-1)*0.1)+1) | (((2*R+P+B)/4)*T) *(((L-1)*0.05)+1) | (((3*R+P+B)/5)*T) *(((L-1)*0.05)+1) | (((R+P+B)/3)*T) *(((L-1)*0.05)+1) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ethephon | NT | 3 | 4 | 1 | 1 | NT | 2 | 5.2 | **4.6** | 5.1 | 3.8 |
| Ethofumesate | NT | 2 | 4 | 1 | 2 | NT | 2 | 4.6 | **4.0** | 4.1 | 3.8 |
| 2,3-dihydro-3,3-methyl-2-oxo-5-benzofuranyl methyl sulfonate | NT | 2 | 4 | 1 | 2 | NT | 2 | 4.6 | **4.0** | 4.1 | 3.8 |
| 2-hydroxy-2,3-dihydro-3,3-methyl-5-benzofuranyl methyl sulfonate | NT | 2 | 4 | 1 | 2 | NT | 2 | 4.6 | **4.0** | 4.1 | 3.8 |
| Fenarimol | NT | 1 | 4 | 1 | 4 | NT | 3 | 6.8 | **6.0** | 5.5 | 6.9 |
| Fenarimol metabolite B | NT | 1 | 4 | 1 | 4 | NT | 3 | 6.8 | **6.0** | 5.5 | 6.9 |
| Fenarimol metabolite C | NT | 1 | 4 | 1 | 4 | NT | 3 | 6.8 | **6.0** | 5.5 | 6.9 |
| Fenbutatin Oxide | NT | 2 | 4 | 1 | 4 | NT | 3 | 8.8 | **7.8** | 7.6 | 8.1 |
| 1,1,3,3,-tetrakis(2-methyl-2-phenylpropyl)-1,3-dihydroxydistannoxane | NT | 2 | 4 | 1 | 4 | NT | 3 | 8.8 | **7.8** | 7.6 | 8.1 |
| SD 31723 | NT | 2 | 4 | 1 | 4 | NT | 3 | 8.8 | **7.8** | 7.6 | 8.1 |
| SD 33608 | NT | 2 | 4 | 1 | 4 | NT | 3 | 8.8 | **7.8** | 7.6 | 8.1 |
| Fenpropathrin | NT | 2 | 4 | 1 | 1 | NT | 3 | 5.9 | **5.2** | 5.5 | 4.6 |
| Fenridazon | NT | 2 | 4 | 1 | 2 | NT | 3 | 6.8 | **6.0** | 6.2 | 5.8 |
| Esfenvalerate | NT | 3 | 4 | 4 | 3 | NT | 3 | 12.7 | **11.2** | 11.0 | 11.5 |
| SD 54597 | NT | 3 | 4 | 4 | 3 | NT | 3 | 12.7 | **11.2** | 11.0 | 11.5 |
| Fipronil | NT | 3 | 4 | 4 | 4 | NT | 4 | 18.2 | **16.1** | 15.6 | 16.9 |
| MB 46513 | NT | 3 | 4 | 4 | 4 | NT | 4 | 18.2 | **16.1** | 15.6 | 16.9 |
| MB 45950 | NT | 3 | 4 | 4 | 4 | NT | 4 | 18.2 | **16.1** | 15.6 | 16.9 |
| MB 46136 | NT | 3 | 4 | 4 | 4 | NT | 3 | 13.7 | **12.1** | 11.7 | 12.7 |
| Fluazifop-butyl | NT | 3 | 4 | 1 | 2 | NT | 3 | 8.8 | **7.8** | 8.3 | 6.9 |
| Fluridone | NT | 2 | 4 | 1 | 2 | NT | 3 | 6.8 | **6.0** | 6.2 | 5.8 |
| Compound 125670 | NT | 2 | 4 | 1 | 2 | NT | 2 | 4.6 | **4.0** | 4.1 | 3.8 |
| Flutolanil | NT | 2 | 4 | 1 | 4 | NT | 2 | 5.9 | **5.2** | 5.1 | 5.4 |
| Fluvalinate | NT | 3 | 4 | 1 | 4 | NT | 3 | 10.7 | **9.5** | 9.7 | 9.2 |
| Glufosinate-Ammonium | NT | 1 | 4 | 2 | 1 | NT | 3 | 4.9 | **4.3** | 4.1 | 4.6 |
| HOE-061517 | NT | 1 | 4 | 2 | 1 | NT | 3 | 4.9 | **4.3** | 4.1 | 4.6 |

**Table 6.1 – *Continued***
**Scored Pesticide Residues, Rated With Various Weighting Formulas**
**1999 FSIS NRP, Monitoring Plan and Special Projects**

| COMPOUND/COMPOUND CLASS | HIST. VIOL. (FSIS) | REG. CON. (R) (EPA) | LACK INFO. (L) (EPA) | PSI (P) (EPA) | BIOCON. (B) (EPA) | ENDO. DISRUP. (EPA) | TOX. (T) (EPA) | (((2*R+P+B)/4)*T) *(((L-1)*0.1)+1) | (((2*R+P+B)/4)*T) *(((L-1)*0.05)+1) | (((3*R+P+B)/5)*T) *(((L-1)*0.05)+1) | (((R+P+B)/3)*T) *(((L-1)*0.05)+1) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| HOE-099730 | NT | 1 | 4 | 2 | 1 | NT | 3 | 4.9 | **4.3** | 4.1 | 4.6 |
| Glyphosate | NT | 1 | 4 | 2 | 1 | NT | 1 | 1.6 | **1.4** | 1.4 | 1.5 |
| Aminomethylphosphonic acid | NT | 1 | 4 | 2 | 1 | NT | 1 | 1.6 | **1.4** | 1.4 | 1.5 |
| Glyphosate-Trimesium | NT | 1 | 4 | 1 | 1 | NT | 2 | 2.6 | **2.3** | 2.3 | 2.3 |
| Halosulfuron | NT | 1 | 4 | 1 | 2 | NT | 2 | 3.3 | **2.9** | 2.8 | 3.1 |
| Hexazinone | NT | 3 | 4 | 1 | 2 | NT | 3 | 8.8 | **7.8** | 8.3 | 6.9 |
| IN-A3928 | NT | 3 | 4 | 1 | 2 | NT | 3 | 8.8 | **7.8** | 8.3 | 6.9 |
| IN-B2838 | NT | 3 | 4 | 1 | 2 | NT | 3 | 8.8 | **7.8** | 8.3 | 6.9 |
| IN-T3935 | NT | 3 | 4 | 1 | 2 | NT | 3 | 8.8 | **7.8** | 8.3 | 6.9 |
| IN-T3936 | NT | 3 | 4 | 1 | 2 | NT | 3 | 8.8 | **7.8** | 8.3 | 6.9 |
| IN-T3937 | NT | 3 | 4 | 1 | 2 | NT | 3 | 8.8 | **7.8** | 8.3 | 6.9 |
| Imidacloprid | NT | 3 | 4 | 1 | 1 | NT | 3 | 7.8 | **6.9** | 7.6 | 5.8 |
| 6-chloronicotinic acid | NT | 3 | 4 | 1 | 1 | NT | 3 | 7.8 | **6.9** | 7.6 | 5.8 |
| NTN33823 | NT | 3 | 4 | 1 | 1 | NT | 3 | 7.8 | **6.9** | 7.6 | 5.8 |
| NTN35884 | NT | 3 | 4 | 1 | 1 | NT | 3 | 7.8 | **6.9** | 7.6 | 5.8 |
| WAK4103 | NT | 3 | 4 | 1 | 1 | NT | 3 | 7.8 | **6.9** | 7.6 | 5.8 |
| Mancozeb | NT | 3 | 4 | 1 | 2 | 3 | 4 | 11.7 | **10.4** | 11.0 | 9.2 |
| ETU* | NT | 3 | 4 | 1 | 2 | 3 | 4 | 11.7 | **10.4** | 11.0 | 9.2 |
| Maneb | NT | 3 | 4 | 1 | 2 | 3 | 4 | 11.7 | **10.4** | 11.0 | 9.2 |
| MCPA | NT | 1 | 4 | 1 | 1 | NT | 4 | 5.2 | **4.6** | 4.6 | 4.6 |
| Methoprene | NT | 2 | 4 | 1 | 3 | NT | 2 | 5.2 | **4.6** | 4.6 | 4.6 |
| Metiram | NT | 3 | 4 | 1 | 2 | 3 | 4 | 11.7 | **10.4** | 11.0 | 9.2 |
| Metolachlor | NT | 3 | 4 | 1 | 3 | 3 | 4 | 13.0 | **11.5** | 12.0 | 10.7 |
| 2-((2-ethyl-6-methylphenyl)-amino)-1-propanol | NT | 3 | 4 | 1 | 3 | 3 | 4 | 13.0 | **11.5** | 12.0 | 10.7 |
| 4-(2-ethyl-6-methylphenyl)-2-hydroxy-5-methyl-3-morpholinone | NT | 3 | 4 | 1 | 3 | 3 | 4 | 13.0 | **11.5** | 12.0 | 10.7 |
| Metsulfuron Methyl | NT | 1 | 4 | 1 | 1 | NT | 2 | 2.6 | **2.3** | 2.3 | 2.3 |

**Table 6.1 – *Continued***
**Scored Pesticide Residues, Rated With Various Weighting Formulas**
**1999 FSIS NRP, Monitoring Plan and Special Projects**

| COMPOUND/COMPOUND CLASS | HIST. VIOL. (FSIS) | REG. CON. (R) (EPA) | LACK INFO. (L) (EPA) | PSI (P) (EPA) | BIOCON. (B) (EPA) | ENDO. DISRUP. (EPA) | TOX. (T) (EPA) | (((2*R+P+B)/4)*T) *(((L-1)*0.1)+1) | (((2*R+P+B)/4)*T) *(((L-1)*0.05)+1) | (((3*R+P+B)/5)*T) *(((L-1)*0.05)+1) | (((R+P+B)/3)*T) *(((L-1)*0.05)+1) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Nicotine | NT | 1 | 4 | 1 | 3 | NT | 4 | 7.8 | **6.9** | 6.4 | 7.7 |
| Nitrapyrin | NT | 1 | 4 | 1 | 4 | NT | 3 | 6.8 | **6.0** | 5.5 | 6.9 |
| 6-chloropicolinic acid | NT | 1 | 4 | 1 | 4 | NT | 3 | 6.8 | **6.0** | 5.5 | 6.9 |
| Norflurazon | NT | 3 | 4 | 1 | 1 | NT | 4 | 10.4 | **9.2** | 10.1 | 7.7 |
| Norfluraxon, desmethyl- | NT | 3 | 4 | 1 | 1 | NT | 4 | 10.4 | **9.2** | 10.1 | 7.7 |
| Octyl bicycloheptene dicarboximide (MGK-264) | NT | 3 | 4 | 4 | 4 | NT | 3 | 13.7 | **12.1** | 11.7 | 12.7 |
| Phosalone oxon | NT | 4 | 4 | 1 | 3 | NT | 4 | 15.6 | **13.8** | 14.7 | 12.3 |
| Picloram | NT | 1 | 4 | 2 | 1 | NT | 2 | 3.3 | **2.9** | 2.8 | 3.1 |
| Piperonyl butoxide | NT | 3 | 4 | 4 | 2 | NT | 3 | 11.7 | **10.4** | 10.4 | 10.4 |
| Primisulfuron-methyl | NT | 2 | 4 | 1 | 1 | NT | 4 | 7.8 | **6.9** | 7.4 | 6.1 |
| CGA 150829 | NT | 2 | 4 | 1 | 1 | NT | 4 | 7.8 | **6.9** | 7.4 | 6.1 |
| CGA 171683 | NT | 2 | 4 | 1 | 1 | NT | 4 | 7.8 | **6.9** | 7.4 | 6.1 |
| Propanil | NT | 1 | 4 | 1 | 3 | NT | 4 | 7.8 | **6.9** | 6.4 | 7.7 |
| Propargite | NT | 3 | 4 | 1 | 2 | NT | 3 | 8.8 | **7.8** | 8.3 | 6.9 |
| Prosulfuron | NT | 1 | 4 | 1 | 3 | NT | 3 | 5.9 | **5.2** | 4.8 | 5.8 |
| Pyrazon | NT | 3 | 4 | 1 | 1 | NT | 4 | 10.4 | **9.2** | 10.1 | 7.7 |
| Pyrazon metabolite A | NT | 3 | 4 | 1 | 2 | NT | 4 | 11.7 | **10.4** | 11.0 | 9.2 |
| Pyrazon metabolite B | NT | 3 | 4 | 1 | 2 | NT | 4 | 11.7 | **10.4** | 11.0 | 9.2 |
| Pyrethrin I | NT | 2 | 4 | 4 | 4 | NT | 3 | 11.7 | **10.4** | 9.7 | 11.5 |
| Pyridaben | NT | 2 | 4 | 1 | 2 | NT | 4 | 9.1 | **8.1** | 8.3 | 7.7 |
| PB-7 | NT | 2 | 4 | 1 | 1 | NT | 4 | 7.8 | **6.9** | 7.4 | 6.1 |
| PB-9 | NT | 2 | 4 | 1 | 2 | NT | 4 | 9.1 | **8.1** | 8.3 | 7.7 |
| Quinclorac | NT | 2 | 4 | 1 | 2 | NT | 2 | 4.6 | **4.0** | 4.1 | 3.8 |
| Sethoxydim | NT | 2 | 4 | 1 | 2 | NT | 2 | 4.6 | **4.0** | 4.1 | 3.8 |
| Sethoxydim hydroxylate sulfone | NT | 2 | 4 | 1 | 2 | NT | 2 | 4.6 | **4.0** | 4.1 | 3.8 |
| Sethoxydim sulfoxide | NT | 2 | 4 | 1 | 2 | NT | 2 | 4.6 | **4.0** | 4.1 | 3.8 |

**Table 6.1 – *Continued***
**Scored Pesticide Residues, Rated With Various Weighting Formulas**
**1999 FSIS NRP, Monitoring Plan and Special Projects**

| COMPOUND/COMPOUND CLASS | HIST. VIOL. (FSIS) | REG. CON. (R) (EPA) | LACK INFO. (L) (EPA) | PSI (P) (EPA) | BIOCON. (B) (EPA) | ENDO. DISRUP. (EPA) | TOX. (T) (EPA) | (((2*R+P+B)/4)*T) *(((L-1)*0.1)+1) | (((2*R+P+B)/4)*T) *(((L-1)*0.05)+1) | (((3*R+P+B)/5)*T) *(((L-1)*0.05)+1) | (((R+P+B)/3)*T) *(((L-1)*0.05)+1) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tebuconazole | NT | 3 | 4 | 1 | 2 | NT | 3 | 8.8 | **7.8** | 8.3 | 6.9 |
| Tebufenozide | NT | 3 | 4 | 1 | 4 | NT | 3 | 10.7 | **9.5** | 9.7 | 9.2 |
| Tebuthiuron | NT | 2 | 4 | 1 | 2 | NT | 3 | 6.8 | **6.0** | 6.2 | 5.8 |
| Terbacil | NT | 1 | 4 | 1 | 1 | NT | 3 | 3.9 | **3.5** | 3.5 | 3.5 |
| 3-t-butyl-5-chloro-6-hydroxymethyluracil | NT | 1 | 4 | 1 | 1 | NT | 3 | 3.9 | **3.5** | 3.5 | 3.5 |
| 6-chloro-2,3-dihydro-3,3,7-methyl-5H-oxazolo(3,2a)pyrimidin-5-one | NT | 1 | 4 | 1 | 1 | NT | 3 | 3.9 | **3.5** | 3.5 | 3.5 |
| 6-chloro-2,3-dihydro-7-hydroxymethyl-3,3-methyl-5H-oxazolo(3,2-a)pyrimidin-5-one | NT | 1 | 4 | 1 | 1 | NT | 3 | 3.9 | **3.5** | 3.5 | 3.5 |
| Tetradifon | NT | 1 | 4 | 1 | 2 | NT | 4 | 6.5 | **5.8** | 5.5 | 6.1 |
| Thidiazuron | NT | 2 | 4 | 1 | 2 | NT | 4 | 9.1 | **8.1** | 8.3 | 7.7 |
| 4-hydrocythidiazuron | NT | 2 | 4 | 1 | 2 | NT | 4 | 9.1 | **8.1** | 8.3 | 7.7 |
| N-phenylurea | NT | 2 | 4 | 1 | 2 | NT | 4 | 9.1 | **8.1** | 8.3 | 7.7 |
| Triasulfuron | NT | 1 | 4 | 1 | 1 | NT | 3 | 3.9 | **3.5** | 3.5 | 3.5 |
| CGA 150829 | NT | 1 | 4 | 1 | 1 | NT | 3 | 3.9 | **3.5** | 3.5 | 3.5 |
| CGA 161149 | NT | 1 | 4 | 1 | 1 | NT | 3 | 3.9 | **3.5** | 3.5 | 3.5 |
| CGA 195654 | NT | 1 | 4 | 1 | 1 | NT | 3 | 3.9 | **3.5** | 3.5 | 3.5 |
| Triphenyltin hydroxide | NT | 1 | 4 | 1 | 4 | NT | 4 | 9.1 | **8.1** | 7.4 | 9.2 |

**Key:**
NT = Not Tested by FSIS (1983-1998)
NA = Compound has been tested by FSIS (1983-1998), but the information is Not Applicable (e.g., compound has not been tested in the appropriate matrix)
(FSIS) = Scores in this column supplied by FSIS
(EPA) = Scores in this column supplied by EPA
HIST. VIOL. = FSIS Historical Testing Information on Violations
REG. CON. (R) = Regulatory Concern
LACK INFO. (L) = Lack of FSIS Testing Information on Violations
PSI (P) = Pre-slaughter Interval
BIOCON. (B) = Bioconcentration Factor
ENDO. DISRUP. = Endocrine Disruption
TOX. (T) = Toxicity

**Table 6.2**
**Pesticide Residues Rated with the Selected Weighting Formula, Sorted by Rating**
**1999 FSIS NRP, Monitoring Plan and Special Projects**

| RANK | COMPOUND/COMPOUND CLASS | RATING {[(2*R+P+B)/4]*T} *{[(L-1)*0.05]+1} |
|---|---|---|
| 1 | **COP'S and OP'S NOT in FSIS CHC/COP Method** (azinphos-methyl, azinphos-methyl oxon, chlorpyrifos, coumaphos, coumaphos oxon, diazinon, diazinon oxon, diazinon met G-27550, dichlorvos, dimethoate, dimethoate oxon, dioxathion, ethion, ethion monooxon, fenthion, fenthion oxon, fenthion oxon sulfone, fenthion oxon sulfoxide, fenthion sulfone, fenthion sulfoxide, malathion, malathion oxon, naled, phosmet, phosmet oxon, pirimiphos-methyl, trichlorfon, tetrachlorvinphos, tetrachlorvinphos-4 metabolites, acephate, methamidophos, chlorpyrifos-methyl, fenamiphos, fenamiphos sulfoxide,fenamiphos sulfone, fenamiphos sulfoxide desisopropyl, fenamiphos sulfone desisopropyl, isofenphos, isofenphos oxon, isofenphos desisopropyl, isofenphos oxon desisopropyl, methidathion, ODM, parathion ethyl, parathion oxon, parathion methyl, parathion methyl oxon, phorate, phorate oxon, phorate oxon sulfone, phorate oxon sulfoxide, phorate sulfone, phorate sulfoxide, profenofos, sulprofos, sulprofos oxon, sulprofos oxon sulfone, sulprofos oxon sulfoxide, sulprofos sulfone, sulprofos sulfoxide, tribufos (DEF)) | 18.4 |
| 2 | **Triazines NOT in FSIS Triazine Method** (atrazine chloro metabolites, metribuzin, metribuzin DADK, metribuzin DA, metribuzin DK, amitraz, amitraz 2,4-DMA metabs., desdiethyl simazine, desethyl simazine, simazine chloro metabs.) | 17.3 |
| 3 | **Synthetic Pyrethrins in FSIS Synthetic Pyrethrin Method** (cypermethrin, cis-permethrin, trans-permethrin, fenvalerate, zeta-cypermethrin) | 16.1 |
| 4 | Imazalil | 16.1 |
| 5 | 1-(2,4-dichlorophenyl)-2-(1H-imidazole-1-yl)-1-ethanol | 16.1 |
| 6 | 3-(1-(2,4-dichlorophenyl)-2-(1H-imidazole-1-yl)ethoxy)-1,2-propane diol | 16.1 |
| 7 | Fipronil | 16.1 |
| 8 | MB 46513 | 16.1 |
| 9 | MB 45950 | 16.1 |
| 10 | **CHC'S and COP'S in FSIS CHC/COP Method** (HCB, alpha-BHC, lindane, heptachlor, dieldrin, aldrin, endrin, ronnel, linuron, oxychlordane, chlorpyrifos, nonachlor, heptachlor epoxide A, heptachlor expoxide B, endosulfan I, endosulfan I sulfate, endosulfan II, trans-chlordane, cis-chlordane, chlorfenvinphos, p,p'-DDE, p, p'-TDE, o,p'-DDT, p,p'-DDT, carbophenothion, captan, stirofos, kepone, mirex, methoxychlor, phosalone, coumaphos-O, coumaphos-S, toxaphene, famphur, PCB 1242, PCB 1248, PCB 1254, PCB 1260, dicofol*, PBBs*, polybrominated diphenyl ethers*, deltamethrin*) (*identification only) | 16.0 |
| 11 | **Carbamates in FSIS Carbamate Method** (aldicarb, alidcarb sulfoxide, aldicarb sulfone, carbaryl, carbofuran, carbofuran 3-hydroxy) | 14.7 |
| 12 | Methoxychlor olefin | 14.0 |
| 13 | 1,1-(2,2-dichloroethylidene)bis(4-methoxybenzene) | 14.0 |
| 14 | 1-methoxy-4-(1,2,2,2-tetrachloroethyl)benzene) | 14.0 |
| 15 | **Carbamates NOT in FSIS Carbamate Method** (carbaryl 5,6-dihydroxy, chlorpropham, propham, thiobencarb, 4-chlorobenzylmethylsulfone,4-chlorobenzylmethylsulfone sulfoxide) | 13.8 |
| 16 | Alachlor | 13.8 |
| 17 | 2,6-diethylaniline | 13.8 |
| 18 | 2-(1-hydroxyethyl)-6-ethylaniline | 13.8 |
| 19 | CP 101394 | 13.8 |

**Table 6.2 - *Continued***
**Pesticide Residues Rated with the Selected Weighting Formula, Sorted by Rating**
**1999 FSIS NRP, Monitoring Plan and Special Projects**

| | | |
|---|---|---|
| **20** | CP 108064 | 13.8 |
| **21** | CP 108065 | 13.8 |
| **22** | CP 108267 | 13.8 |
| **23** | CP 51214 | 13.8 |
| **24** | Cyhalothrin, lambda- | 13.8 |
| **25** | PP 890 | 13.8 |
| **26** | Cyromazine | 13.8 |
| **27** | 1-methyl cyromazine | 13.8 |
| **28** | Phosalone oxon | 13.8 |
| **29** | **Triazines in FSIS Triazine Method** (atrazine, simazine, propazine, terbuthylazine) | 13.7 |
| **30** | Triadimenol( for metabolites see triadimefon) | 12.7 |
| **31** | Fenoxaprop ethyl | 12.7 |
| **32** | 2-(4-((6-chloro-2-benzoxazolyl)oxy)phenoxy)propanoic acid | 12.7 |
| **33** | 6-chloro-2,3-dihydro-benzoxazol-2-one | 12.7 |
| **34** | Oxadiazon | 12.7 |
| **35** | 2-carboxyisopropyl-4-(4-dichloro)-5-isopropoxyphenyl)-1,3,4-oxadiazolin-5-one | 12.7 |
| **36** | 2-t-butyl-4-(2,4-chloro-5-hydroxyphenyl)-delta 2-1,3,4-oxadiazolin-5-one | 12.7 |
| **37** | Oxyfluorfen | 12.7 |
| **38** | Triadimefon | 12.7 |
| **39** | Triadimefon metabolite KWG 1323 | 12.7 |
| **40** | Triadimefon metabolite KWG 1732 | 12.7 |
| **41** | Triadimefon metabolite KWG 1342 | 12.7 |
| **42** | Dicamba | 12.7 |
| **43** | Bifenthrin | 12.7 |
| **44** | Bifenthrin, 4'-hydroxy | 12.7 |
| **45** | Cyclanilide | 12.7 |
| **46** | Dialifor | 12.7 |
| **47** | Dialifor oxon | 12.7 |
| **48** | Diuron | 12.7 |
| **49** | 3-(3,4-dichlorophenyl)-1-methoxyurea | 12.7 |
| **50** | 3,4-dichloroaniline | 12.7 |
| **51** | 3,4-dichlorophenylurea | 12.7 |
| **52** | N-(3,4-dichlorophenyl)-N'-methylurea | 12.7 |
| **53** | **Benzimidazole Pesticides in FSIS Benzimidazole Method** (5-hydroxythiabendazole, benomyl (as carbendazim), thiabendazole) | 12.1 |
| **54** | MB 46136 | 12.1 |
| **55** | Octyl bicycloheptene dicarboximide (MGK-264) | 12.1 |
| **56** | Cacodylic acid | 12.0 |
| **57** | Difenoconazole | 11.5 |
| **58** | Propiconazole | 11.5 |
| **59** | Propiconazole metabolite 1,2,4-triazole | 11.5 |
| **60** | Propiconazole metabolite CGA 118244 | 11.5 |
| **61** | Propiconazole metabolite CGA 91305 | 11.5 |
| **62** | Iprodione | 11.5 |

**Table 6.2 - *Continued***
**Pesticide Residues Rated with the Selected Weighting Formula, Sorted by Rating**
**1999 FSIS NRP, Monitoring Plan and Special Projects**

| | | |
|---|---|---|
| **63** | Iprodione isomer | 11.5 |
| **64** | Iprodione metabolite | 11.5 |
| **65** | Iprodione metabolite 2 | 11.5 |
| **66** | Dioxathion | 11.5 |
| **67** | Metolachlor | 11.5 |
| **68** | 2-((2-ethyl-6-methylphenyl)-amino)-1-propanol | 11.5 |
| **69** | 4-(2-ethyl-6-methylphenyl)-2-hydroxy-5-methyl-3-morpholinone | 11.5 |
| **70** | Esfenvalerate | 11.2 |
| **71** | SD 54597 | 11.2 |
| **72** | Captan epoxide | 11.0 |
| **73** | Bis(trichloromethyl)disulfide | 11.0 |
| **74** | THPI | 11.0 |
| **75** | Ethalfluralin | 10.4 |
| **76** | Thiophanate methyl | 10.4 |
| **77** | Allophanate | 10.4 |
| **78** | Triclopyr | 10.4 |
| **79** | TCP=3,5,6-trichloro-2-pyridinol | 10.4 |
| **80** | Quizalofop-ethyl | 10.4 |
| **81** | 6-methyl-2,3-quinoxalinedithiol | 10.4 |
| **82** | Abamectin | 10.4 |
| **83** | Abamectin delta 8,9 geometric isomer | 10.4 |
| **84** | Carboxin | 10.4 |
| **85** | Carboxin sulfoxide | 10.4 |
| **86** | Cyfluthrin | 10.4 |
| **87** | Diphenylamine | 10.4 |
| **88** | Mancozeb | 10.4 |
| **89** | ETU* | 10.4 |
| **90** | Maneb | 10.4 |
| **91** | Metiram | 10.4 |
| **92** | Piperonyl butoxide | 10.4 |
| **93** | Pyrazon metabolite A | 10.4 |
| **94** | Pyrazon metabolite B | 10.4 |
| **95** | Pyrethrin I | 10.4 |
| **96** | 2-aminobenzimidazole | 9.9 |
| **97** | Etridiazole . | 9.5 |
| **98** | 3-carboxy-5-ethoxy-1,2,4-thiadiazole | 9.5 |
| **99** | Propyzamide | 9.5 |
| **100** | Methyl 3,5-dichlorobenzoate | 9.5 |
| **101** | Triflumazole | 9.5 |
| **102** | 4-chloro-2-trifluoromethylaniline | 9.5 |
| **103** | N-(4-chloro-2-trifluoromethylphenyl)-propoxyacetamide | 9.5 |
| **104** | Chlorobenzilate | 9.5 |
| **105** | Difenoconazole | 9.5 |
| **106** | Fluvalinate | 9.5 |
| **107** | Tebufenozide | 9.5 |

**Table 6.2 - *Continued***
**Pesticide Residues Rated with the Selected Weighting Formula, Sorted by Rating**
**1999 FSIS NRP, Monitoring Plan and Special Projects**

| | | |
|---|---|---|
| **108** | Paraquat dichloride | 9.2 |
| **109** | Clofentezine | 9.2 |
| **110** | 3-(2-chloro-4-hydroxyphenyl)-6-(2-chlorophenyl)-1,2,4,5-tetrazine | 9.2 |
| **111** | Mepiquat chloride | 9.2 |
| **112** | Oxythioquinox | 9.2 |
| **113** | Norflurazon | 9.2 |
| **114** | Norfluraxon, desmethyl- | 9.2 |
| **115** | Pyrazon | 9.2 |
| **116** | Diphenylamine | 8.6 |
| **117** | Diflubenzuron | 8.1 |
| **118** | Buprofezin | 8.1 |
| **119** | Cyhexatin | 8.1 |
| **120** | Cyclohexylstannoic acid | 8.1 |
| **121** | Dicyclohexyltin oxide | 8.1 |
| **122** | Pyridaben | 8.1 |
| **123** | PB-9 | 8.1 |
| **124** | Thidiazuron | 8.1 |
| **125** | 4-hydrocythidiazuron | 8.1 |
| **126** | N-phenylurea | 8.1 |
| **127** | Triphenyltin hydroxide | 8.1 |
| **128** | Bromoxynil | 8.0 |
| **129** | Bentazon, 6-hydroxy bentazon, 8-hydroxy bentazon | 7.8 |
| **130** | 2-amino-n-isopropylbenzamide | 7.8 |
| **131** | Propargite | 7.8 |
| **132** | Sodium acifluorfen | 7.8 |
| **133** | Acifluorfen, amino analog | 7.8 |
| **134** | Chlorsulfuron | 7.8 |
| **135** | Chlorsulfuron, 5-hydroxy- | 7.8 |
| **136** | Fenbutatin Oxide | 7.8 |
| **137** | 1,1,3,3,-tetrakis(2-methyl-2-phenylpropyl)-1,3-dihydroxydistannoxane | 7.8 |
| **138** | SD 31723 | 7.8 |
| **139** | SD 33608 | 7.8 |
| **140** | Fluazifop-butyl | 7.8 |
| **141** | Hexazinone | 7.8 |
| **142** | IN-A3928 | 7.8 |
| **143** | IN-B2838 | 7.8 |
| **144** | IN-T3935 | 7.8 |
| **145** | IN-T3936 | 7.8 |
| **146** | IN-T3937 | 7.8 |
| **147** | Propargite | 7.8 |
| **148** | Tebuconazole | 7.8 |
| **149** | Dipropyl isocinchomerate | 7.0 |
| **150** | Diphenamid | 6.9 |
| **151** | Diphenamid, desmethyl | 6.9 |
| **152** | Benoxacor | 6.9 |

**Table 6.2 - *Continued***
**Pesticide Residues Rated with the Selected Weighting Formula, Sorted by Rating**
**1999 FSIS NRP, Monitoring Plan and Special Projects**

| | | |
|---|---|---|
| **153** | Dalapon | 6.9 |
| **154** | Diquat dibromide | 6.9 |
| **155** | Imidacloprid | 6.9 |
| **156** | 6-chloronicotinic acid | 6.9 |
| **157** | NTN33823 | 6.9 |
| **158** | NTN35884 | 6.9 |
| **159** | WAK4103 | 6.9 |
| **160** | Nicotine | 6.9 |
| **161** | Primisulfuron-methyl | 6.9 |
| **162** | CGA 150829 | 6.9 |
| **163** | CGA 171683 | 6.9 |
| **164** | Propanil | 6.9 |
| **165** | PB-7 | 6.9 |
| **166** | Fenarimol | 6.0 |
| **167** | Fenarimol metabolite B | 6.0 |
| **168** | Fenarimol metabolite C | 6.0 |
| **169** | Fenridazon | 6.0 |
| **170** | Fluridone | 6.0 |
| **171** | Nitrapyrin | 6.0 |
| **172** | 6-chloropicolinic acid | 6.0 |
| **173** | Tebuthiuron | 6.0 |
| **174** | Chlorfenapyr | 5.8 |
| **175** | Tetradifon | 5.8 |
| **176** | Myclobutanil, myclobutanil alcohol metabolite, myclobutanol dihydroxy metabolite | 5.2 |
| **177** | 2,4-D | 5.2 |
| **178** | Diphenamid | 5.2 |
| **179** | Diphenamid, desmethyl- | 5.2 |
| **180** | Dodine | 5.2 |
| **181** | Fenpropathrin | 5.2 |
| **182** | Flutolanil | 5.2 |
| **183** | Prosulfuron | 5.2 |
| **184** | Difenzoquat | 4.6 |
| **185** | Ethephon | 4.6 |
| **186** | MCPA | 4.6 |
| **187** | Methoprene | 4.6 |
| **188** | Chloroneb | 4.3 |
| **189** | Chloroneb, hydroxy- | 4.3 |
| **190** | 2,5-dichloro-4-methoxyphenol | 4.3 |
| **191** | Clofencet | 4.3 |
| **192** | Glufosinate-Ammonium | 4.3 |
| **193** | HOE-061517 | 4.3 |
| **194** | HOE-099730 | 4.3 |
| **195** | Butylamine, sec- | 4.0 |
| **196** | Ethofumesate | 4.0 |
| **197** | 2,3-dihydro-3,3-methyl-2-oxo-5-benzofuranyl methyl sulfonate | 4.0 |

**Table 6.2 - *Continued***
**Pesticide Residues Rated with the Selected Weighting Formula, Sorted by Rating**
**1999 FSIS NRP, Monitoring Plan and Special Projects**

| | | |
|---|---|---|
| **198** | 2-hydroxy-2,3-dihydro-3,3-methyl-5-benzofuranyl methyl sulfonate | 4.0 |
| **199** | Compound 125670 | 4.0 |
| **200** | Quinclorac | 4.0 |
| **201** | Sethoxydim | 4.0 |
| **202** | Sethoxydim hydroxylate sulfone | 4.0 |
| **203** | Sethoxydim sulfoxide | 4.0 |
| **204** | Azoxystrobin | 3.5 |
| **205** | Azoxystrobin Z isomer | 3.5 |
| **206** | Cloprop | 3.5 |
| **207** | Dimethipin | 3.5 |
| **208** | Terbacil | 3.5 |
| **209** | 3-t-butyl-5-chloro-6-hydroxymethyluracil | 3.5 |
| **210** | 6-chloro-2,3-dihydro-3,3,7-methyl-5H-oxazolo(3,2a)pyrimidin-5-one | 3.5 |
| **211** | 6-chloro-2,3-dihydro-7-hydroxymethyl-3,3-methyl-5H-oxazolo(3,2-a)pyrimidin-5-one | 3.5 |
| **212** | Triasulfuron | 3.5 |
| **213** | CGA 150829 | 3.5 |
| **214** | CGA 161149 | 3.5 |
| **215** | CGA 195654 | 3.5 |
| **216** | Maleic hydrazide | 3.2 |
| **217** | Clopyralid | 2.9 |
| **218** | Halosulfuron | 2.9 |
| **219** | Picloram | 2.9 |
| **220** | Clethodim | 2.6 |
| **221** | Glyphosate-Trimesium | 2.3 |
| **222** | Metsulfuron Methyl | 2.3 |
| **223** | Glyphosate | 1.4 |
| **224** | Aminomethylphosphonic acid | 1.4 |
| **225** | Bensulfuron methyl ester | 1.2 |

**Key:**
(R) = Regulatory Concern
(L) = Lack of FSIS Testing Information on Violations
(P) = Pre-slaughter Interval
(B) = Bioconcentration Factor
(T) = Toxicity

## Table 6.3
## Rank and Status for Pesticides
## 1999 FSIS NRP, Monitoring Plan and Special Projects

| RANK | COMPOUND/COMPOUND CLASS | RAT-ING | STATUS IN 1999 NRP |
|---|---|---|---|
| **1** | **COP'S and OP'S NOT in FSIS CHC/COP Method** (azinphos-methyl, azinphos-methyl oxon, chlorpyrifos, coumaphos, coumaphos oxon, diazinon, diazinon oxon, diazinon met G-27550, dichlorvos, dimethoate, dimethoate oxon, dioxathion, ethion, ethion monooxon, fenthion, fenthion oxon, fenthion oxon sulfone, fenthion oxon sulfoxide, fenthion sulfone, fenthion sulfoxide, malathion, malathion oxon, naled, phosmet, phosmet oxon, pirimiphos-methyl, trichlorfon, tetrachlorvinphos, tetrachlorvinphos-4 metabolites, acephate, methamidophos, chlorpyrifos-methyl, fenamiphos, fenamiphos sulfoxide,fenamiphos sulfone, fenamiphos sulfoxide desisopropyl, fenamiphos sulfone desisopropyl, isofenphos, isofenphos oxon, isofenphos desisopropyl, isofenphos oxon desisopropyl, methidathion, ODM, parathion ethyl, parathion oxon, parathion methyl, parathion methyl oxon, phorate, phorate oxon, phorate oxon sulfone, phorate oxon sulfoxide, phorate sulfone, phorate sulfoxide, profenofos, sulprofos, sulprofos oxon, sulprofos oxon sulfone, sulprofos oxon sulfoxide, sulprofos sulfone, sulprofos sulfoxide, tribufos (DEF)) | 18.4 | NIP, currently extending the FSIS CHC3 method to include many of these compounds; anticipate this method extension will be completed in late 1999, at which time these compounds will be added to the NRP |
| **2** | **Triazines NOT in FSIS Triazine Method** (atrazine chloro metabolites, metribuzin, metribuzin DADK, metribuzin DA, metribuzin DK, amitraz, amitraz 2,4-DMA metabs., desdiethyl simazine, desethyl simazine, simazine chloro metabs.) | 17.3 | NIP, possible extension of FSIS CHC3 method to these compounds in 2000 |
| **3** | **Synthetic Pyrethrins in FSIS Synthetic Pyrethrin Method** (cypermethrin, cis-permethrin, trans-permethrin, fenvalerate, zeta-cypermethrin) | 16.1 | NIP, possible extension of FSIS CHC3 method to these compounds in 2000 |
| **4** | Imazalil | 16.1 | NIP, no FSIS regulatory method available |
| **5** | 1-(2,4-dichlorophenyl)-2-(1H-imidazole-1-yl)-1-ethanol | 16.1 | NIP, no FSIS regulatory method available |
| **6** | 3-(1-(2,4-dichlorophenyl)-2-(1H-imidazole-1-yl)ethoxy)-1,2-propane diol | 16.1 | NIP, no FSIS regulatory method available |
| **7** | Fipronil | 16.1 | NIP, no FSIS regulatory method available |
| **8** | MB 46513 | 16.1 | NIP, no FSIS regulatory method available |
| **9** | MB 45950 | 16.1 | NIP, no FSIS regulatory method available |
| **10** | **CHC'S and COP'S in FSIS CHC/COP Method** (HCB, alpha-BHC, lindane, heptachlor, dieldrin, aldrin, endrin, ronnel, linuron, oxychlordane, chlorpyrifos, nonachlor, heptachlor epoxide A, heptachlor expoxide B, endosulfan I, endosulfan I sulfate, endosulfan II, trans-chlordane, cis-chlordane, chlorfenvinphos, p,p'-DDE, p, p'-TDE, o,p'-DDT, p,p'-DDT, carbophenothion, captan, stirofos, kepone, mirex, methoxychlor, phosalone, coumaphos-O, coumaphos-S, toxaphene, famphur, PCB 1242, PCB 1248, PCB 1254, PCB 1260, dicofol*, PBBs*, polybrominated diphenyl ethers*, deltamethrin*) (*identification only) | 16.0 | Monitoring Plan, MRM, all production classes |
| **11** | **Carbamates in FSIS Carbamate Method** (aldicarb, alidcarb sulfoxide, aldicarb sulfone, carbaryl, carbofuran, carbofuran 3-hydroxy) | 14.7 | NIP, low priority, method available |
| **12** | Methoxychlor olefin | 14.0 | NIP, low priority |
| **13** | 1,1-(2,2-dichloroethylidene)bis(4-methoxybenzene) | 14.0 | NIP, low priority |
| **14** | 1-methoxy-4-(1,2,2,2-tetrachloroethyl)benzene) | 14.0 | NIP, low priority |

**Table 6.3 - *Continued***
**Rank and Status for Pesticides**
**1999 FSIS NRP, Monitoring Plan and Special Projects**

| RANK | COMPOUND/COMPOUND CLASS | RAT-ING | STATUS IN 1999 NRP |
|---|---|---|---|
| **15** | **Carbamates NOT in FSIS Carbamate Method** (carbaryl 5,6-dihydroxy, chlorpropham, propham, thiobencarb, 4-chlorobenzylmethylsulfone,4-chlorobenzylmethylsulfone sulfoxide) | 13.8 | NIP, low priority |
| **16** | Alachlor | 13.8 | NIP, low priority, method available |
| **17** | 2,6-diethylaniline | 13.8 | NIP, low priority |
| **18** | 2-(1-hydroxyethyl)-6-ethylaniline | 13.8 | NIP, low priority |
| **19** | CP 101394 | 13.8 | NIP, low priority |
| **20** | CP 108064 | 13.8 | NIP, low priority |
| **21** | CP 108065 | 13.8 | NIP, low priority |
| **22** | CP 108267 | 13.8 | NIP, low priority |
| **23** | CP 51214 | 13.8 | NIP, low priority |
| **24** | Cyhalothrin, lambda- | 13.8 | NIP, low priority |
| **25** | PP 890 | 13.8 | NIP, low priority |
| **26** | Cyromazine | 13.8 | NIP, low priority, method available |
| **27** | 1-methyl cyromazine | 13.8 | NIP, low priority |
| **28** | Phosalone oxon | 13.8 | NIP, low priority |
| **29** | **Triazines in FSIS Triazine Method** (atrazine, simazine, propazine, terbuthylazine) | 13.7 | NIP, possible extension of FSIS CHC3 method to these compounds in 2000 |
| **30** | Triadimenol( for metabolites see triadimefon) | 12.7 | NIP, low priority |
| **31** | Fenoxaprop ethyl | 12.7 | NIP, low priority |
| **32** | 2-(4-((6-chloro-2-benzoxazolyl)oxy)phenoxy)propanoic acid | 12.7 | NIP, low priority |
| **33** | 6-chloro-2,3-dihydro-benzoxazol-2-one | 12.7 | NIP, low priority |
| **34** | Oxadiazon | 12.7 | NIP, low priority |
| **35** | 2-carboxyisopropyl-4-(4-dichloro)-5-isopropoxyphenyl)-1,3,4-oxadiazolin-5-one | 12.7 | NIP, low priority |
| **36** | 2-t-butyl-4-(2,4-chloro-5-hydroxyphenyl)-delta 2-1,3,4-oxadiazolin-5-one | 12.7 | NIP, low priority |
| **37** | Oxyfluorfen | 12.7 | NIP, low priority |
| **38** | Triadimefon | 12.7 | NIP, low priority |
| **39** | Triadimefon metabolite KWG 1323 | 12.7 | NIP, low priority |
| **40** | Triadimefon metabolite KWG 1732 | 12.7 | NIP, low priority |
| **41** | Triadimefon metabolite KWG 1342 | 12.7 | NIP, low priority |
| **42** | Dicamba | 12.7 | NIP, low priority |
| **43** | Bifenthrin | 12.7 | NIP, low priority |

**Table 6.3 - *Continued***
**Rank and Status for Pesticides**
**1999 FSIS NRP, Monitoring Plan and Special Projects**

| RANK | COMPOUND/COMPOUND CLASS | RAT-ING | STATUS IN 1999 NRP |
|---|---|---|---|
| **44** | Bifenthrin, 4'-hydroxy | 12.7 | NIP, low priority |
| **45** | Cyclanilide | 12.7 | NIP, low priority |
| **46** | Dialifor | 12.7 | NIP, low priority |
| **47** | Dialifor oxon | 12.7 | NIP, low priority |
| **48** | Diuron | 12.7 | NIP, low priority |
| **49** | 3-(3,4-dichlorophenyl)-1-methoxyurea | 12.7 | NIP, low priority |
| **50** | 3,4-dichloroaniline | 12.7 | NIP, low priority |
| **51** | 3,4-dichlorophenylurea | 12.7 | NIP, low priority |
| **52** | N-(3,4-dichlorophenyl)-N'-methylurea | 12.7 | NIP, low priority |
| **53** | **Benzimidazole Pesticides in FSIS Benzimidazole Method** (5-hydroxythiabendazole, benomyl (as carbendazim), thiabendazole) | 12.1 | NIP, low priority, method available |
| **54** | MB 46136 | 12.1 | NIP, low priority |
| **55** | Octyl bicycloheptene dicarboximide (MGK-264) | 12.1 | NIP, low priority |
| **56** | Cacodylic acid | 12.0 | NIP, low priority |
| **57** | Difenoconazole | 11.5 | NIP, low priority |
| **58** | Propiconazole | 11.5 | NIP, low priority |
| **59** | Propiconazole metabolite 1,2,4-triazole | 11.5 | NIP, low priority |
| **60** | Propiconazole metabolite CGA 118244 | 11.5 | NIP, low priority |
| **61** | Propiconazole metabolite CGA 91305 | 11.5 | NIP, low priority |
| **62** | Iprodione | 11.5 | NIP, low priority |
| **63** | Iprodione isomer | 11.5 | NIP, low priority |
| **64** | Iprodione metabolite | 11.5 | NIP, low priority |
| **65** | Iprodione metabolite 2 | 11.5 | NIP, low priority |
| **66** | Dioxathion | 11.5 | NIP, low priority |
| **67** | Metolachlor | 11.5 | NIP, low priority |
| **68** | 2-((2-ethyl-6-methylphenyl)-amino)-1-propanol | 11.5 | NIP, low priority |
| **69** | 4-(2-ethyl-6-methylphenyl)-2-hydroxy-5-methyl-3-morpholinone | 11.5 | NIP, low priority |
| **70** | Esfenvalerate | 11.2 | NIP, low priority |
| **71** | SD 54597 | 11.2 | NIP, low priority |
| **72** | Captan epoxide | 11.0 | NIP, low priority |
| **73** | Bis(trichloromethyl)disulfide | 11.0 | NIP, low priority |

**Table 6.3 - *Continued***
**Rank and Status for Pesticides**
**1999 FSIS NRP, Monitoring Plan and Special Projects**

| RANK | COMPOUND/COMPOUND CLASS | RAT-ING | STATUS IN 1999 NRP |
|---|---|---|---|
| **74** | THPI | 11.0 | NIP, low priority |
| **75** | Ethalfluralin | 10.4 | NIP, low priority |
| **76** | Thiophanate methyl | 10.4 | NIP, low priority |
| **77** | Allophanate | 10.4 | NIP, low priority |
| **78** | Triclopyr | 10.4 | NIP, low priority |
| **79** | TCP=3,5,6-trichloro-2-pyridinol | 10.4 | NIP, low priority |
| **80** | Quizalofop-ethyl | 10.4 | NIP, low priority |
| **81** | 6-methyl-2,3-quinoxalinedithiol | 10.4 | NIP, low priority |
| **82** | Abamectin | 10.4 | NIP, low priority |
| **83** | Abamectin delta 8,9 geometric isomer | 10.4 | NIP, low priority |
| **84** | Carboxin | 10.4 | NIP, low priority |
| **85** | Carboxin sulfoxide | 10.4 | NIP, low priority |
| **86** | Cyfluthrin | 10.4 | NIP, low priority |
| **87** | Diphenylamine | 10.4 | NIP, low priority |
| **88** | Mancozeb | 10.4 | NIP, low priority |
| **89** | ETU* | 10.4 | NIP, low priority |
| **90** | Maneb | 10.4 | NIP, low priority |
| **91** | Metiram | 10.4 | NIP, low priority |
| **92** | Piperonyl butoxide | 10.4 | NIP, low priority |
| **93** | Pyrazon metabolite A | 10.4 | NIP, low priority |
| **94** | Pyrazon metabolite B | 10.4 | NIP, low priority |
| **95** | Pyrethrin I | 10.4 | NIP, low priority |
| **96** | 2-aminobenzimidazole | 9.9 | NIP, low priority |
| **97** | Etridiazole . | 9.5 | NIP, low priority |
| **98** | 3-carboxy-5-ethoxy-1,2,4-thiadiazole | 9.5 | NIP, low priority |
| **99** | Propyzamide | 9.5 | NIP, low priority |
| **100** | Methyl 3,5-dichlorobenzoate | 9.5 | NIP, low priority |
| **101** | Triflumazole | 9.5 | NIP, low priority |
| **102** | 4-chloro-2-trifluoromethylaniline | 9.5 | NIP, low priority |
| **103** | N-(4-chloro-2-trifluoromethylphenyl)-propoxyacetamide | 9.5 | NIP, low priority |
| **104** | Chlorobenzilate | 9.5 | NIP, low priority |

**Table 6.3 - *Continued***
**Rank and Status for Pesticides**
**1999 FSIS NRP, Monitoring Plan and Special Projects**

| RANK | COMPOUND/COMPOUND CLASS | RAT-ING | STATUS IN 1999 NRP |
|---|---|---|---|
| **105** | Difenoconazole | 9.5 | NIP, low priority |
| **106** | Fluvalinate | 9.5 | NIP, low priority |
| **107** | Tebufenozide | 9.5 | NIP, low priority |
| **108** | Paraquat dichloride | 9.2 | NIP, low priority |
| **109** | Clofentezine | 9.2 | NIP, low priority |
| **110** | 3-(2-chloro-4-hydroxyphenyl)-6-(2-chlorophenyl)-1,2,4,5-tetrazine | 9.2 | NIP, low priority |
| **111** | Mepiquat chloride | 9.2 | NIP, low priority |
| **112** | Oxythioquinox | 9.2 | NIP, low priority |
| **113** | Norflurazon | 9.2 | NIP, low priority |
| **114** | Norfluraxon, desmethyl- | 9.2 | NIP, low priority |
| **115** | Pyrazon | 9.2 | NIP, low priority |
| **116** | Diphenylamine | 8.6 | NIP, low priority |
| **117** | Diflubenzuron | 8.1 | NIP, low priority |
| **118** | Buprofezin | 8.1 | NIP, low priority |
| **119** | Cyhexatin | 8.1 | NIP, low priority |
| **120** | Cyclohexylstannoic acid | 8.1 | NIP, low priority |
| **121** | Dicyclohexyltin oxide | 8.1 | NIP, low priority |
| **122** | Pyridaben | 8.1 | NIP, low priority |
| **123** | PB-9 | 8.1 | NIP, low priority |
| **124** | Thidiazuron | 8.1 | NIP, low priority |
| **125** | 4-hydrocythidiazuron | 8.1 | NIP, low priority |
| **126** | N-phenylurea | 8.1 | NIP, low priority |
| **127** | Triphenyltin hydroxide | 8.1 | NIP, low priority |
| **128** | Bromoxynil | 8.0 | NIP, low priority |
| **129** | Bentazon, 6-hydroxy bentazon, 8-hydroxy bentazon | 7.8 | NIP, low priority |
| **130** | 2-amino-n-isopropylbenzamide | 7.8 | NIP, low priority |
| **131** | Propargite | 7.8 | NIP, low priority |
| **132** | Sodium acifluorfen | 7.8 | NIP, low priority |
| **133** | Acifluorfen, amino analog | 7.8 | NIP, low priority |
| **134** | Chlorsulfuron | 7.8 | NIP, low priority |
| **135** | Chlorsulfuron, 5-hydroxy- | 7.8 | NIP, low priority |

**Table 6.3 - *Continued***
**Rank and Status for Pesticides**
**1999 FSIS NRP, Monitoring Plan and Special Projects**

| RANK | COMPOUND/COMPOUND CLASS | RAT-ING | STATUS IN 1999 NRP |
|---|---|---|---|
| **136** | Fenbutatin Oxide | 7.8 | NIP, low priority |
| **137** | 1,1,3,3,-tetrakis(2-methyl-2-phenylpropyl)-1,3-dihydroxydistannoxane | 7.8 | NIP, low priority |
| **138** | SD 31723 | 7.8 | NIP, low priority |
| **139** | SD 33608 | 7.8 | NIP, low priority |
| **140** | Fluazifop-butyl | 7.8 | NIP, low priority |
| **141** | Hexazinone | 7.8 | NIP, low priority |
| **142** | IN-A3928 | 7.8 | NIP, low priority |
| **143** | IN-B2838 | 7.8 | NIP, low priority |
| **144** | IN-T3935 | 7.8 | NIP, low priority |
| **145** | IN-T3936 | 7.8 | NIP, low priority |
| **146** | IN-T3937 | 7.8 | NIP, low priority |
| **147** | Propargite | 7.8 | NIP, low priority |
| **148** | Tebuconazole | 7.8 | NIP, low priority |
| **149** | Dipropyl isocinchomerate | 7.0 | NIP, low priority |
| **150** | Diphenamid | 6.9 | NIP, low priority |
| **151** | Diphenamid, desmethyl | 6.9 | NIP, low priority |
| **152** | Benoxacor | 6.9 | NIP, low priority |
| **153** | Dalapon | 6.9 | NIP, low priority |
| **154** | Diquat dibromide | 6.9 | NIP, low priority |
| **155** | Imidacloprid | 6.9 | NIP, low priority |
| **156** | 6-chloronicotinic acid | 6.9 | NIP, low priority |
| **157** | NTN33823 | 6.9 | NIP, low priority |
| **158** | NTN35884 | 6.9 | NIP, low priority |
| **159** | WAK4103 | 6.9 | NIP, low priority |
| **160** | Nicotine | 6.9 | NIP, low priority |
| **161** | Primisulfuron-methyl | 6.9 | NIP, low priority |
| **162** | CGA 150829 | 6.9 | NIP, low priority |
| **163** | CGA 171683 | 6.9 | NIP, low priority |
| **164** | Propanil | 6.9 | NIP, low priority |
| **165** | PB-7 | 6.9 | NIP, low priority |
| **166** | Fenarimol | 6.0 | NIP, low priority |

**Table 6.3 - *Continued***
**Rank and Status for Pesticides**
**1999 FSIS NRP, Monitoring Plan and Special Projects**

| RANK | COMPOUND/COMPOUND CLASS | RAT-ING | STATUS IN 1999 NRP |
|---|---|---|---|
| **167** | Fenarimol metabolite B | 6.0 | NIP, low priority |
| **168** | Fenarimol metabolite C | 6.0 | NIP, low priority |
| **169** | Fenridazon | 6.0 | NIP, low priority |
| **170** | Fluridone | 6.0 | NIP, low priority |
| **171** | Nitrapyrin | 6.0 | NIP, low priority |
| **172** | 6-chloropicolinic acid | 6.0 | NIP, low priority |
| **173** | Tebuthiuron | 6.0 | NIP, low priority |
| **174** | Chlorfenapyr | 5.8 | NIP, low priority |
| **175** | Tetradifon | 5.8 | NIP, low priority |
| **176** | Myclobutanil, myclobutanil alcohol metabolite, myclobutanol dihydroxy metabolite | 5.2 | NIP, low priority |
| **177** | 2,4-D | 5.2 | NIP, low priority |
| **178** | Diphenamid | 5.2 | NIP, low priority |
| **179** | Diphenamid, desmethyl- | 5.2 | NIP, low priority |
| **180** | Dodine | 5.2 | NIP, low priority |
| **181** | Fenpropathrin | 5.2 | NIP, low priority |
| **182** | Flutolanil | 5.2 | NIP, low priority |
| **183** | Prosulfuron | 5.2 | NIP, low priority |
| **184** | Difenzoquat | 4.6 | NIP, low priority |
| **185** | Ethephon | 4.6 | NIP, low priority |
| **186** | MCPA | 4.6 | NIP, low priority |
| **187** | Methoprene | 4.6 | NIP, low priority |
| **188** | Chloroneb | 4.3 | NIP, low priority |
| **189** | Chloroneb, hydroxy- | 4.3 | NIP, low priority |
| **190** | 2,5-dichloro-4-methoxyphenol | 4.3 | NIP, low priority |
| **191** | Clofencet | 4.3 | NIP, low priority |
| **192** | Glufosinate-Ammonium | 4.3 | NIP, low priority |
| **193** | HOE-061517 | 4.3 | NIP, low priority |
| **194** | HOE-099730 | 4.3 | NIP, low priority |
| **195** | Butylamine, sec- | 4.0 | NIP, low priority |
| **196** | Ethofumesate | 4.0 | NIP, low priority |
| **197** | 2,3-dihydro-3,3-methyl-2-oxo-5-benzofuranyl methyl sulfonate | 4.0 | NIP, low priority |

**Table 6.3 - *Continued***
**Rank and Status for Pesticides**
**1999 FSIS NRP, Monitoring Plan and Special Projects**

| RANK | COMPOUND/COMPOUND CLASS | RAT-ING | STATUS IN 1999 NRP |
|---|---|---|---|
| **198** | 2-hydroxy-2,3-dihydro-3,3-methyl-5-benzofuranyl methyl sulfonate | 4.0 | NIP, low priority |
| **199** | Compound 125670 | 4.0 | NIP, low priority |
| **200** | Quinclorac | 4.0 | NIP, low priority |
| **201** | Sethoxydim | 4.0 | NIP, low priority |
| **202** | Sethoxydim hydroxylate sulfone | 4.0 | NIP, low priority |
| **203** | Sethoxydim sulfoxide | 4.0 | NIP, low priority |
| **204** | Azoxystrobin | 3.5 | NIP, low priority |
| **205** | Azoxystrobin Z isomer | 3.5 | NIP, low priority |
| **206** | Cloprop | 3.5 | NIP, low priority |
| **207** | Dimethipin | 3.5 | NIP, low priority |
| **208** | Terbacil | 3.5 | NIP, low priority |
| **209** | 3-t-butyl-5-chloro-6-hydroxymethyluracil | 3.5 | NIP, low priority |
| **210** | 6-chloro-2,3-dihydro-3,3,7-methyl-5H-oxazolo(3,2a)pyrimidin-5-one | 3.5 | NIP, low priority |
| **211** | 6-chloro-2,3-dihydro-7-hydroxymethyl-3,3-methyl-5H-oxazolo(3,2-a)pyrimidin-5-one | 3.5 | NIP, low priority |
| **212** | Triasulfuron | 3.5 | NIP, low priority |
| **213** | CGA 150829 | 3.5 | NIP, low priority |
| **214** | CGA 161149 | 3.5 | NIP, low priority |
| **215** | CGA 195654 | 3.5 | NIP, low priority |
| **216** | Maleic hydrazide | 3.2 | NIP, low priority |
| **217** | Clopyralid | 2.9 | NIP, low priority |
| **218** | Halosulfuron | 2.9 | NIP, low priority |
| **219** | Picloram | 2.9 | NIP, low priority |
| **220** | Clethodim | 2.6 | NIP, low priority |
| **221** | Glyphosate-Trimesium | 2.3 | NIP, low priority |
| **222** | Metsulfuron Methyl | 2.3 | NIP, low priority |
| **223** | Glyphosate | 1.4 | NIP, low priority |
| **224** | Aminomethylphosphonic acid | 1.4 | NIP, low priority |
| **225** | Bensulfuron methyl ester | 1.2 | NIP, low priority |

**Key:**
MRM = Multi-Residue Method
NIP = Not Included in 1999 FSIS National Residue Program

## Table 6.4
## Pesticide Compound/Production Class Pairs, Sorted by Sampling Priority Score, with Adjusted Number of Analyses
## 1999 FSIS NRP, Monitoring Plan and Special Projects

| DRUG CLASS | PRODUCTION CLASS | SCORE | # SAMP. | %VIOL. | %NVP | UNADJ. # | ADJUST-MENT | INITIAL ADJ.# | ADJUST-MENT | FINAL ADJ.# |
|---|---|---|---|---|---|---|---|---|---|---|
| CHC's/COP's | Young Chickens | 673.33 | 2165 | 0.00 | 1.06 | 460 | | 460 | | 460 |
| CHC's/COP's | Market hogs | 302.46 | 2737 | 0.00 | 3.29 | 460 | | 460 | | 460 |
| CHC's/COP's | Steers | 215.70 | 2329 | 0.09 | 5.24 | 460 | | 460 | | 460 |
| CHC's/COP's | Heifers | 129.71 | 2296 | 0.00 | 5.31 | 460 | | 460 | | 460 |
| CHC's/COP's | Young Turkeys | 121.27 | 2326 | 0.00 | 3.40 | 460 | | 460 | | 460 |
| CHC's/COP's | Egg products | 53.25 | 640 | 0.00 | 0.00 | 460 | | 460 | | 460 |
| CHC's/COP's | Dairy cows | 30.50 | 2200 | 0.00 | 14.73 | 460 | | 460 | | 460 |
| CHC's/COP's | Beef cows | 25.42 | 2815 | 0.11 | 11.55 | 300 | | 300 | | 300 |
| CHC's/COP's | Sows | 16.84 | 2729 | 0.15 | 6.89 | 300 | | 300 | | 300 |
| CHC's/COP's | Bulls | 9.29 | 2396 | 0.08 | 13.27 | 300 | | 300 | | 300 |
| CHC's/COP's | Mature Chickens | 6.42 | 1884 | 0.00 | 2.02 | 300 | | 300 | | 300 |
| CHC's/COP's | Lambs | 3.83 | 2847 | 0.04 | 14.96 | 300 | | 300 | | 300 |
| CHC's/COP's | Formula-fed | 3.04 | 2238 | 0.00 | 2.23 | 300 | | 300 | | 300 |
| CHC's/COP's | Ducks | 2.80 | 1673 | 0.00 | 1.02 | 300 | | 300 | | 300 |
| CHC's/COP's | Boars/Stags | 2.68 | 2380 | 0.29 | 9.58 | 300 | +1 level | 460 | | 460 |
| CHC's/COP's | Mature Turkeys | 0.92 | 1062 | 0.09 | 4.61 | 230 | | 230 | | 230 |
| CHC's/COP's | Bob calves | 0.91 | 1063 | 0.00 | 19.19 | 230 | P, min.300 | 300 | | 300 |
| CHC's/COP's | Horses | 0.59 | 2549 | 0.39 | 13.38 | 230 | +1 level | 300 | | 300 |
| CHC's/COP's | Goats | 0.35 | 2802 | 0.32 | 13.24 | 230 | +1 level | 300 | | 300 |
| CHC's/COP's | Heavy calves | 0.27 | 2389 | 0.17 | 21.10 | 230 | P, min.300 | 300 | | 300 |
| CHC's/COP's | Sheep | 0.21 | 2457 | 0.08 | 15.30 | 230 | P, min.300 | 300 | | 300 |
| CHC's/COP's | Non-formula | 0.13 | 1993 | 0.10 | 11.39 | 90 | P, min.300 | 230 | | 230 |
| CHC's/COP's | Geese | 0.04 | 144 | 0.00 | 11.11 | 90 | | 90 | | 90 |
| CHC's/COP's | Rabbits | 0.03 | 642 | 0.00 | 6.23 | 90 | | 90 | | 90 |
| **TOTAL # SAMPLES** | | | | | | **7270** | | **7920** | | **7920** |

**Key:** #SAMP. = Total number of samples analyzed by the FSIS Monitoring Plan and/or Special Projects (i.e., random sampling only), 1/1/93 - 10/15/98
%VIOL. = Percent violative, i.e., the percent of samples with residue concentrations exceeding the tolerance or action level (or, for a drug whose use was not permitted in the production class in which it was detected, the percent of samples with any detectable residue)
%NVP = Percent non-violative positive, i.e., the percent of samples in which the drug was detected at a level below the tolerance or action level
UNADJ. # = Unadjusted number of samples, obtained from last column of Table 4.7
INITIAL ADJ.# = Number of samples proposed following adjustment for historical violation rate information or lack of testing information
FINAL ADJ.# = Final sample numbers, obtained following any adjustments needed to match sample volume to laboratory capacity *(note that no adjustments for laboratory capacity were necessary for the CHC/COP samples*)
+1 level = Increase by one sampling level, e.g., from 300 to 460
P, min 300 = Because the official inclusion of phenylbutazone in the FSIS CHC/COP method did not begin until recently, FSIS has limited data on the occurrence of this drug in the production classes of interest. Therefore, all production classes in which phenylbutazone was designated as of potential concern (in Table 4.6, with a "●") were assigned a minimum of 300 samples.

# SECTION 7
# PLANNING THE 1999 FSIS IMPORT RESIDUE PLAN: PESTICIDES

# SECTION 7. PLANNING THE 1999 FSIS IMPORT RESIDUE PLAN: PESTICIDES

## PHASE I - GENERATING AND RANKING LIST OF CANDIDATE COMPOUNDS

The Food Safety and Inspection Service (FSIS) asked the Environmental Protection Agency (EPA) to generate a list of candidate compounds for the 1999 Import Residue Plan. EPA's list of compounds of concern for the Import Residue Plan was identical to that for the Domestic Residue Plan (see Section 6, Table 6.1). Furthermore, in ranking pesticides for inclusion in the Import Residue Plan, FSIS chose to employ to the ranking scores generated for the Domestic Residue Plan (see Section 6), because FSIS does not have sufficient historical data on pesticides in imported products to predict their violation rates.

## PHASE II - SELECTING PESTICIDES FOR INCLUSION IN THE 1999 IMPORT RESIDUE PLAN

The list of high priority compounds chosen for the Import Residue Plan by the Residue Prioritization Committee (RPC) was the same as that for the domestic plan. Once the high-priority compounds and compound classes had been identified, it was necessary for the RPC to apply non public health considerations to determine the compounds for which FSIS would actually sample. The principal non public health consideration was the availability of laboratory resources, especially the availability of appropriate analytical methods within the FSIS laboratories. Based on these constraints, only the chlorinated hydrocarbon/chlorinated organophosphate (CHC/COP)[1] compound class can currently be included in the NRP. The compounds that can be identified by this multiresidue method are listed in Section 6, Phase II, p. 6-4.

## PHASE III- IDENTIFYING THE COMPOUND/PRODUCT CLASS PAIRS

As with the domestic program, the Surveillance Advisory Team (SAT) decided to sample for CHC's and COP's in all product classes. FSIS also continues sampling for these compounds in all production classes as a means of monitoring for the occurrence of accidental contamination incidents.

## PHASE IV - ALLOCATION OF SAMPLING RESOURCES

### ALLOCATION OF SAMPLING RESOURCES AMONG DIFFERENT PRODUCTION CLASSES

The samples for residue analysis for imported egg products are selected in a different manner than the other product classes.

**EGG PRODUCTS**

[1]Phenylbutazone is also detected by this method.

As stated in Section 2, for egg products, the first ten shipments from individual foreign establishments are subjected to 100 % reinspection, to establish a history of compliance with the U.S. requirements for each egg product category. This rate is reduced to a random selection of one reinspection out of eight shipments from each foreign establishment, which will continue as long as the product is in compliance

**ANIMAL PRODUCT CLASSES**

Table 5.7**,** *Estimated Annual Amount of Product Imported*, lists the estimated amounts of all product classes imported into the U.S. and the percentage of each of the product classes. The percentage of each product class imported annually is calculated using the following formula:

$$\% \text{ Product Class Imported } (P_C) = \frac{\text{Amount Product Class Imported}}{\text{Total Product Imported}} \times 100 \qquad (7.1)$$

The relative sampling priority is obtained by multiplying the percent product class imported ($P_C$) by the pesticide scores obtained in Phase I, using the following equation:

$$\text{Relative Sampling Priority} = (P_C) \times \text{Pesticide Score} \qquad (7.2)$$

Based on the scores, four different sampling options were chosen: very high regulatory concern (460 analyses/year); high regulatory concern (300 analyses/year); moderate regulatory concern (230 samples/year); low regulatory concern (90 samples/year). This is indicated in Table 7.1, *Number of Pesticide Samples/Product Class*, in the column labeled "Unadjusted Number of Samples."

As stated in Section 5, if a product class represents less than one percent (by weight) of total combined U.S. imports of meat, poultry and egg products, then the total number of samples analyzed for any compound or compound class is eight times the number of countries from which that product is imported. For example, processed turkey is imported from only three countries. The amount imported is 0.07% relative to total U.S. imports. Therefore, 24 samples of processed turkey would be taken for each analysis, eight from each country.

The adjusted number of samples is listed in Table 7.1, *Number of Pesticide Samples/Product Class*, in the column labeled "Minimum Number of Samples." The final number of samples for a compound/product class is obtained after the allocation of samples among different countries is completed. The final number of samples is listed in Table 7.1 in the column labeled "Final Number of Samples." The numbers in columns labeled "Adjusted Number of Samples" and "Final Number of Samples" may vary slightly because of the rounding upwards or downwards of the samples.

**Allocation of Samples Among Different Countries**

The total number of samples was chosen for each compound/product class pair, was subdivided among the different countries. The number of samples for each country was based on the relative amount of total product class imported: less than one percent and greater than one percent.

**Allocation of Samples in Product Classes Whose Total Volume Imported Is Less Than 1%**

As stated above, if the amount of an import product class was less than 1%, eight samples per compound/compound class were taken from each country. The relative amounts of fresh chicken, beef/pork processed, turkey fresh and processed, other fowl fresh and processed, lamb/mutton processed, and veal processed was less than 1%.[2] The numbers of samples per country per product class for each compound/compound class are listed in Tables 7.2 - 7.10.

**Allocation if Samples in Product Classes Whose Total Volume Imported Is Greater Than 1%**

For major product classes (including fresh goat), the number of samples was allocated to each country depending upon the relative amount of product imported from that country. Table 5.8, *Estimated Annual Volume of Import Product/Country*, lists the amount of product imported from each country. The percent of a product class imported from a country was calculated as follows and is in Table 5.9, *Relative Annual Amount of Import Product /Country.*

$$\text{Percent Product Class Imported per Country } (P_{C/C}) = \frac{\text{Amount of Product Class from Country}}{\text{Total Amount of Product Class}} \times 100 \quad (7.3)$$

Based upon the relative amount of product class imported per country, the number of samples that should be taken at the port of entry was calculated using the following formula:

$$\text{Unadjusted Number of Samples per Country } (U_{C/S}) = \text{Total Number of Samples} \times \frac{(P_{C/C})}{100} \quad (7.4)$$

This is indicated in the column labeled "Unadjusted Number of Samples ($U_{C/S}$)," in Tables 7.11to 7.18.

After the determination of the number of samples from each country, each country with less than eight samples was assigned a minimum of eight samples. This is indicated in the column labeled "Adjustment # 1" in Tables 7.11 to 7.18. The results of this adjustment are in the column labeled "Initial Adj#." After this adjustment the total number of samples for a compound/product class resulted in more than the total number of samples allocated to that compound/product class pair. A second adjustment then had to be made so that the total number of samples would be within an allocated number. This adjustment was made only to those countries from which greater than eight samples were to be taken. This was done using the following equation:

$$\text{Number of Samples after Adjustment \# 2} = (U_{C/S}) - \frac{[N \times (P_{C/C})]}{(P_{T/C})} \quad (7.5)$$

where,
$N = (N_1) - (N_T)$
$N_1 =$ Total Number of Samples after Adjustment #1

[2]The number of samples of fresh goat for CHC/COP analysis was raised form sixteen to thirty because of the potential of greater than normal exposure to environmental contaminants. The number of samples was allocated among the different countries in the same way as the product classes whose total volume imported is greater than 1%. The number of samples of fresh goat for CHC/COP from each country is listed in Table 7.18

$N_T$ = Total Number of Samples Allocated
$P_{T/C}$ = Total Percent of Product Class from the Countries That Had Greater Than Eight Samples
$P_{C/C}$ = Percent Product Class Imported per Country
$U_{C/S}$ = Unadjusted Number of Samples

The final numbers of product sampled are indicated in Tables 7.11 - 7.18, in the column labeled "Final Number of Samples."

**Table 7.1**
**Number of Pesticide Samples/Product Class**
**1999 Import Residue Plan**

| No. Countries | Product | Pesticide | Pesticide Score | Percent Product | Relative Sampling Priority | Unadjusted Number Of Samples | Minimum Number Of Samples | Final Number Of Samples |
|---|---|---|---|---|---|---|---|---|
| 12 | Beef, Fresh | CHC's/COP's | 16.0 | 63.37 | 1013.95 | 460 | 460 | 459 |
| 8 | Pork, Fresh | CHC's/COP's | 16.0 | 17.13 | 274.11 | 460 | 460 | 461 |
| 17 | Pork, Processed | CHC's/COP's | 16.0 | 6.22 | 99.57 | 300 | 300 | 301 |
| 13 | Beef, Processed | CHC's/COP's | 16.0 | 5.74 | 91.78 | 300 | 300 | 300 |
| 5 | Mutton/Lamb, Fresh | CHC's/COP's | 16.0 | 3.41 | 54.52 | 300 | 300 | 300 |
| 6 | Veal, Fresh | CHC's/COP's | 16.0 | 1.48 | 23.73 | 230 | 230 | 229 |
| 4 | Chicken, Processed | CHC's/COP's | 16.0 | 1.31 | 20.96 | 230 | 230 | 230 |
| 2 | Goat, Fresh | CHC's/COP's | 16.0 | 0.30 | 4.77 | 90 | 30* | 30 |
| 1 | Chicken, Fresh | CHC's/COP's | 16.0 | 0.25 | 4.00 | 90 | 8 | 8 |
| 11 | Beef/Pork, Processed | CHC's/COP's | 16.0 | 0.24 | 3.81 | 90 | 88 | 88 |
| 3 | Turkey, Processed | CHC's/COP's | 16.0 | 0.07 | 1.16 | 90 | 24 | 24 |
| 1 | Other Fowl, Fresh | CHC's/COP's | 16.0 | 0.07 | 1.15 | 90 | 8 | 8 |
| 1 | Turkey, Fresh | CHC's/COP's | 16.0 | 0.07 | 1.10 | 90 | 8 | 8 |
| 3 | Other Fowl, Processed | CHC's/COP's | 16.0 | 0.04 | 0.67 | 90 | 24 | 24 |
| 5 | Mutton/Lamb, Processed | CHC's/COP's | 16.0 | 0.02 | 0.36 | 90 | 40 | 40 |
| 1 | Veal, Processed | CHC's/COP's | 16.0 | 0.00 | 0.04 | 90 | 8 | 8 |
| | Total | | | 99.72 | | 3180 | 2518 | 2518 |

*Because goats present a greater than normal potential for exposure to environmental contaminants, the minimum number of samples for this product class has been increased from 16 to 30.

**Table 7.2**
**Number of Samples/Product Class-Chicken, Fresh**
**1999 Import Residue Plan**

| CHICKEN, FRESH/CHC's/COP's | PERCENT PRODUCT | FINAL NUMBER OF SAMPLES |
|---|---|---|
| Canada | 100.00 | 8 |
| Total | 100.00 | 8 |

**Table 7.3**
**Number of Samples/Product Class-Turkey, Fresh**
**1999 Import Residue Plan**

| TURKEY, FRESH/CHC's/COP's | PERCENT PRODUCT | FINAL NUMBER OF SAMPLES |
|---|---|---|
| Canada | 100.00 | 8 |
| Total | 100.00 | 8 |

**Table 7.4**
**Number of Samples/Product Class-Turkey, Processed**
**1999 Import Residue Plan**

| TURKEY, PROCESSED/CHC's/COP's | PERCENT PRODUCT | FINAL NUMBER OF SAMPLES |
|---|---|---|
| Canada | 41.68 | 8 |
| Hong Kong | 39.93 | 8 |
| Israel | 18.40 | 8 |
| Total | 100.00 | 24 |

**Table 7.5**
**Number of Samples/Product Class-Other Fowl, Fresh**
**1999 Import Residue Plan**

| OTHER FOWL, FRESH/CHC's/COP's | PERCENT PRODUCT | FINAL NUMBER OF SAMPLES |
|---|---|---|
| Canada | 100.00 | 8 |
| Total | 100.00 | 8 |

**Table 7.6**
**Number of Samples/Product Class-Other Fowl, Processed**
**1999 Import Residue Plan**

| OTHER, FOWL, PROCESSED/CHC's/COP's | PERCENT PRODUCT | FINAL NUMBER OF SAMPLES |
|---|---|---|
| Canada | 96.64 | 8 |
| France | 3.16 | 8 |
| Israel | 0.20 | 8 |
| Total | 100.00 | 24 |

**Table 7.7**
**Number of Samples/Product Class-Veal, Processed**
**1999 Import Residue Plan**

| VEAL, PROCESSED/CHC's/COP's | PERCENT PRODUCT | FINAL NUMBER OF SAMPLES |
|---|---|---|
| Canada | 100.00 | 8 |
| Total | 100.00 | 8 |

**Table 7.8**
**Number of Samples/Product Class-Beef/Pork, Processed**
**1999 Import Residue Plan**

| BEEF/PORK, PROCESSED/CHC's/COP's | PERCENT PRODUCT | FINAL NUMBER OF SAMPLES |
|---|---|---|
| Australia | 0.22 | 8 |
| Austria | 0.29 | 8 |
| Canada | 41.67 | 8 |
| Croatia | 0.03 | 8 |
| Denmark | 38.87 | 8 |
| Dominican Republic | 9.34 | 8 |
| Germany | 0.04 | 8 |
| Netherlands | 9.17 | 8 |
| Poland | 0.13 | 8 |
| Spain | 0.08 | 8 |
| Sweden | 0.17 | 8 |
| Total | 100.00 | 88 |

**Table 7.9**
**Number of Samples/Product Class-Lamb/Mutton, Processed**
**1999 Import Residue Plan**

| LAMB/MUTTON, PROCESSED/CHC's/COP's | PERCENT PRODUCT | FINAL NUMBER OF SAMPLES |
|---|---|---|
| Australia | 16.12 | 8 |
| Brazil | 0.87 | 8 |
| Canada | 48.79 | 8 |
| New Zealand | 20.07 | 8 |
| Uruguay | 14.14 | 8 |
| Total | 99.99 | 40 |

**Table 7.10**
**Number of Samples /Product Class-Egg, Processed**
**1999 Import Residue Plan**

| EGG, FRESH/CHC's/COP's | PERCENT PRODUCT | FINAL NUMBER OF SAMPLES |
|---|---|---|
| Canada | 100.00 | 8 |
| Total | 100.00 | 8 |

**Table 7.11**
**Number of Samples/Product Class-Beef, Fresh**
**1999 Import Residue Plan**

| BEEF, FRESH/ CHC's/COP's | PERCENT PRODUCT ($P_{C/C}$) | UNADJUSTED NUMBER OF SAMPLES (U) = 460*(($P_{C/C}$)/100) | ADJUSTMENT #1 (8 MINIMUM/ COUNTRY) | INITIAL ADJ.# | ADJUSTMENT # 2 | FINAL ADJ.# |
|---|---|---|---|---|---|---|
| Argentina | 1.10 | 5 | 8 | 8 | | 8 |
| Australia | 29.25 | 135 | | 135 | 121 | 121 |
| Canada | 39.75 | 183 | | 183 | 164 | 164 |
| Costa Rica | 1.27 | 6 | 8 | 8 | | 8 |
| Denmark | 0.00 | 0 | 8 | 8 | | 8 |
| Honduras | 0.46 | 2 | 8 | 8 | | 8 |
| Japan | 0.00 | 0 | 8 | 8 | | 8 |
| Mexico | 0.30 | 1 | 8 | 8 | | 8 |
| Netherlands | 0.00 | 0 | 8 | 8 | | 8 |
| New Zealand | 24.71 | 114 | | 114 | 102 | 102 |
| Nicaragua | 1.40 | 6 | 8 | 8 | | 8 |
| Uruguay | 1.77 | 8 | 8 | 8 | | 8 |
| Total | 100.00 | 460 | | | | 459 |

**Table 7.12**
**Number of Samples /Product Class-Beef, Processed**
**1999 Import Residue Plan**

| BEEF, PROCESSED CHC's/COP's | PERCENT PRODUCT ($P_{C/C}$) | UNADJUSTED NUMBER OF SAMPLES (U) = 300*(($P_{C/C}$)/100) | ADJUSTMENT #1 (8 MINIMUM/ COUNTRY) | INITIAL ADJ.# | ADJUSTMENT # 2 | FINAL ADJ.# |
|---|---|---|---|---|---|---|
| Argentina | 36.96 | 111 | 111 | 111 | 88 | 88 |
| Australia | 0.97 | 3 | 8 | 8 | | 8 |
| Brazil | 35.63 | 107 | | 107 | 84 | 84 |
| Canada | 19.58 | 59 | | 59 | 47 | 47 |
| Costa Rica | 0.09 | 0 | 8 | 8 | | 8 |
| Croatia | 0.23 | 1 | 8 | 8 | | 8 |
| Italy | 0.08 | 0 | 8 | 8 | | 8 |
| Mexico | 1.58 | 5 | 8 | 8 | | 8 |
| New Zealand | 0.81 | 2 | 8 | 8 | | 8 |
| Poland | 0.01 | 0 | 8 | 8 | | 8 |
| Sweden | 0.01 | 0 | 8 | 8 | | 8 |
| Switzerland | 0.02 | 0 | 8 | 8 | | 8 |
| Uruguay | 4.04 | 12 | | 12 | 9 | 9 |
| Total | 100.00 | 300 | | | | 300 |

**Table 7.13**
**Number of Samples/Product Class-Pork, Processed**
**1999 Import Residue Plan**

| PORK, PROCESSED/ CHC's/COP's | PERCENT PRODUCT ($P_{C/C}$) | UNADJUSTED NUMBER OF SAMPLES (U) = 230*(($P_{C/C}$)/100) | ADJUSTMENT #1 (8 MINIMUM/ COUNTRY) | INITIAL ADJ.# | ADJUSTMENT # 2 | FINAL ADJ.# |
|---|---|---|---|---|---|---|
| Australia | 0.02 | 0 | 8 | 8 | | 8 |
| Austria | 0.03 | 0 | 8 | 8 | 8 | 8 |
| Belgium | 7.20 | 22 | | 22 | 16 | 16 |
| Canada | 49.80 | 149 | | 150 | 109 | 109 |
| Croatia | 1.02 | 3 | 8 | 8 | | 8 |
| Denmark | 23.23 | 70 | | 70 | 51 | 51 |
| France | 0.25 | 1 | 8 | 8 | | 8 |
| Germany | 0.13 | 0 | 8 | 8 | | 8 |
| Hungary | 3.10 | 9 | 9 | 9 | | 8 |
| Ireland | 0.50 | 2 | 8 | 8 | | 8 |
| Italy | 1.55 | 5 | 8 | 8 | | 8 |
| Mexico | 0.12 | 0 | 8 | 8 | | 8 |
| Netherlands | 6.29 | 19 | | 19 | 14 | 14 |
| Poland | 6.65 | 20 | | 20 | 15 | 15 |
| Slovenia | 0.00003 | 0 | 8 | 8 | | 8 |
| Spain | 0.09 | 0 | 8 | 8 | | 8 |
| Switzerland | 0.01 | 0 | 8 | 8 | | 8 |
| Total | 99.99 | 300 | | | | 301 |

**Table 7.14**
**Number of Samples /Product Class-Pork, Fresh**
**1999 Import Residue Plan**

| PORK, FRESH/ CHC's/COP's | PERCENT PRODUCT ($P_{C/C}$) | UNADJUSTED NUMBER OF SAMPLES (U) = 230*(($P_{C/C}$)/100) | ADJUSTMENT #1 (8 MINIMUM/ COUNTRY) | INITIAL ADJ.# | ADJUSTMENT # 2 | FINAL ADJ.# |
|---|---|---|---|---|---|---|
| Australia | 0.02 | 0 | 8 | 8 | | 8 |
| Canada | 84.13 | 387 | | 387 | 358 | 358 |
| Denmark | 12.76 | 59 | | 59 | 55 | 55 |
| Finland | 0.19 | 1 | 8 | 8 | | 8 |
| Ireland | 0.84 | 4 | 8 | 8 | | 8 |
| Mexico | 0.01 | 0 | 8 | 8 | | 8 |
| Sweden | 0.25 | 1 | 8 | 8 | | 8 |
| UK | 1.80 | 8 | 8 | 8 | | 8 |
| Total | 100.00 | 460 | | | | 461 |

**Table 7.15**
**Number of Samples/Product Class-Chicken, Processed**
**1999 Import Residue Plan**

| CHICKEN, PROCESSED/ CHC's/COP's | PERCENT PRODUCT ($P_{C/C}$) | UNADJUSTED NUMBER OF SAMPLES (U)= 230*(% PRODUCT/100 ) | ADJUSTMENT #1 (8 MINIMUM/ COUNTRY) | INITIAL ADJ.# | ADJUSTMENT # 2 | FINAL ADJ.# |
|---|---|---|---|---|---|---|
| Canada | 98.71 | 227 | | 227 | 206 | 206 |
| France | 0.00 | 0 | 8 | 8 | | 8 |
| Hong Kong | 0.31 | 1 | 8 | 8 | | 8 |
| Israel | 0.99 | 2 | 8 | 8 | | 8 |
| | 100.00 | 230 | | | | 230 |

**Table 7.16**
**Number of Samples /Product Class-Veal, Fresh**
**1999 Import Residue Plan**

| VEAL, FRESH/ CHC's/COP's | PERCENT PRODUCT ($P_{C/C}$) | UNADJUSTED NUMBER OF SAMPLES (U)= 230*(% PRODUCT/100) | ADJUSTMENT #1 (8 MINIMUM/ COUNTRY) | INITIAL ADJ.# | ADJUSTMENT # 2 = ($P_{C/C}$)-[(U-N)/$P_{C/T}$] | FINAL ADJ.# |
|---|---|---|---|---|---|---|
| Australia | 6.77 | 16 | 16 | 16 | 14 | 14 |
| Canada | 38.29 | 88 | 88 | 88 | 79 | 79 |
| Costa Rica | 0.004 | 0 | 8 | 8 | 8 | 8 |
| Iceland | 0.005 | 0 | 8 | 8 | 8 | 8 |
| Netherlands | 0.59 | 1 | 8 | 8 | 8 | 8 |
| New Zealand | 54.33 | 125 | 125 | 125 | 112 | 112 |
| Total | 99.99 | 230 | | | | 229 |

**Table 7.17**
**Number of Samples /Product Class-Lamb/Mutton, Fresh**
**1999 Import Residue Plan**

| LAMB/ MUTTON, FRESH/ CHC's/COP's | PERCENT PRODUCT ($P_{C/C}$) | UNADJUSTED NUMBER OF SAMPLES (U)= 300*(% PRODUCT/100) | ADJUSTMENT #1 (8 MINIMUM/ COUNTRY) | INITIAL ADJ.# | ADJUSTMENT # 2 = ($P_{C/C}$)-[(U-N)/$P_{C/T}$] | FINAL ADJ.# |
|---|---|---|---|---|---|---|
| Australia | 62.39 | 187 | 187 | 187 | 174 | 174 |
| Canada | 0.62 | 2 | 8 | 8 | 8 | 8 |
| Iceland | 0.05 | 0 | 8 | 8 | 8 | 8 |
| New Zealand | 36.45 | 109 | 109 | 109 | 102 | 102 |
| Uruguay | 0.49 | 2 | 8 | 8 | 8 | 8 |
| Total | 100.00 | 300 | | | | 300 |

**Table 7.18**
**Number of Samples /Product Class-Goat, Fresh**
**1999 Import Residue Plan**

| GOAT, FRESH/ CHC's/COP's | PERCENT PRODUCT ($P_{C/C}$) | UNADJUSTED NUMBER OF SAMPLES (U)= 30*(% PRODUCT/100) | ADJUSTMENT #1 (8 MINIMUM/ COUNTRY) | INITIAL ADJ.# | ADJUSTMENT # 2 = ($P_{C/C}$)-[(U-N)/$P_{C/T}$] | FINAL ADJ.# |
|---|---|---|---|---|---|---|
| Australia | 96.34 | 29 | | 29 | 22 | 22 |
| New Zealand | 3.66 | 1 | 8 | 8 | | 8 |
| Total | 100.00 | 30 | | | | 30 |

# SECTION 8
# PLANNING THE 1999 FSIS DOMESTIC MONITORING PLAN AND SPECIAL PROJECTS, AND IMPORT RESIDUE PLAN: ENVIRONMENTAL CONTAMINANTS

# SECTION 8. PLANNING THE 1999 FSIS DOMESTIC MONITORING PLAN AND SPECIAL PROJECTS, AND IMPORT RESIDUE PLAN: ENVIRONMENTAL CONTAMINANTS

The candidate environmental and processing contaminants of concern selected by members of the Surveillance Advisory Team (SAT) were as follows:

--*Environmental Contaminants:*

- dioxins
- heavy metals
- mycotoxins

--*Processing Contaminants:*

- nitrosamines
- maillard reaction products (from charring)
- compounds migrating from packaging
- polyaromatic hydrocarbons
- breakdown products of oils used in deep frying

Following discussion by the SAT, it was decided that none of the processing contaminants were appropriate for inclusion in the 1999 Food Safety and Inspection Service (FSIS) National Residue Program (NRP). If required, processing contaminants can be analyzed as part of an FSIS Emergency Response Project. FSIS will initiate Special Projects to analyze for environmental contaminants, as needed. Projects currently under consideration include a baseline study for levels of heavy metals in meat and poultry, and a Special Project to analyze for lead in raw meat products used in baby food, and in baby food containing vegetable root material.

# SECTION 9
# THE 1999 FSIS NATIONAL RESIDUE PROGRAM: DOMESTIC MONITORING PLAN AND SPECIAL PROJECTS, AND IMPORT RESIDUE PLAN

# SECTION 9. THE 1999 FSIS NATIONAL RESIDUE PROGRAM: DOMESTIC MONITORING PLAN AND SPECIAL PROJECTS, AND IMPORT RESIDUE PLAN

The Food Safety and Inspection Service (FSIS), working with its partner agencies, has developed sampling allocation systems for compound/production class pairs (domestic residue sampling plans) and compound/product class pairs (import residue sampling plan) that are founded on a public health-based prioritization process. These systems each incorporate a structured planning process that employs risk assessment formulas and uses the best available data to develop relative rankings within these formulas. These systems do not, and were not intended to, generate formal absolute estimates of risk that can be interpreted in an actuarial sense. Nevertheless, their relative risk-based rankings are sufficient to develop sound and internally consistent allocations of sampling resources. These rankings help FSIS to manage the public health concerns presented by a comprehensive range of veterinary drugs and pesticides in the egg product, meat and poultry production classes for which FSIS has regulatory authority.

The final detailed domestic plan sample numbers for veterinary drugs (last column, Table 4.8) and pesticides (last column, Table 6.4), in all production classes, are listed Table 9.1, *1999 FSIS National Residue Program, Domestic Monitoring Plan and Special Projects*. The Monitoring Plan samples are listed first, followed by the Special Projects.[1]

The final detailed import plan sample numbers for all compounds (veterinary drugs and pesticides), in all product classes and all countries, are listed in Table 9.2, *1999 FSIS National Residue Program, Import Residue Plan*.

An overall summary of the Domestic Monitoring Plan and Special Projects and the Import Residue Plan is provided in Table 9.3, *Summary, 1999 FSIS National Residue Program, Domestic Monitoring Plan and Special Projects, and Import Residue Plan*.

[1]Table 4.8 designates that FSIS will carry out analyses for antibiotics, arsenicals and sulfonamides in egg products. FSIS is currently extending these methods to cover egg products, and plans to add them to the NRP later in 1999. Since these analyses will not be distributed over all 12 months of 1999, they cannot be included in the Monitoring Plan, and have thus been listed as special projects.

**Table 9.1**
**1999 FSIS National Residue Program**
**Domestic Monitoring Plan and Special Projects**

| ANALYSIS | LAB | PROD. CLASS | #SAMP. | TYPE | COLL. DATES |
|---|---|---|---|---|---|
| Antibiotics by Bioassay | MWL | Young chickens | 460 | Mon. | 1/1/99-12/31/99 |
| Antibiotics by Bioassay | MWL | Market hogs | 460 | Mon. | 1/1/99-12/31/99 |
| Antibiotics by Bioassay | MWL | Steers | 460 | Mon. | 1/1/99-12/31/99 |
| Antibiotics by Bioassay | MWL | Heifers | 460 | Mon. | 1/1/99-12/31/99 |
| Antibiotics by Bioassay | MWL | Young turkeys | 460 | Mon. | 1/1/99-12/31/99 |
| Antibiotics by Bioassay | MWL | Dairy cows | 460 | Mon. | 1/1/99-12/31/99 |
| Antibiotics by Bioassay | MWL | Beef cows | 300 | Mon. | 1/1/99-12/31/99 |
| Antibiotics by Bioassay | MWL | Sows | 300 | Mon. | 1/1/99-12/31/99 |
| Antibiotics by Bioassay | MWL | Bulls | 300 | Mon. | 1/1/99-12/31/99 |
| Antibiotics by Bioassay | MWL | Mature chickens | 300 | Mon. | 1/1/99-12/31/99 |
| Antibiotics by Bioassay | MWL | Lambs | 300 | Mon. | 1/1/99-12/31/99 |
| Antibiotics by Bioassay | MWL | Formula-fed veal | 300 | Mon. | 1/1/99-12/31/99 |
| Antibiotics by Bioassay | MWL | Ducks | 300 | Mon. | 1/1/99-12/31/99 |
| Antibiotics by Bioassay | MWL | Boars/Stags | 300 | Mon. | 1/1/99-12/31/99 |
| Antibiotics by Bioassay | MWL | Mature turkeys | 300 | Mon. | 1/1/99-12/31/99 |
| Antibiotics by Bioassay | MWL | Bob veal calves | 460 | Mon. | 1/1/99-12/31/99 |
| Antibiotics by Bioassay | MWL | Horses | 460 | Mon. | 1/1/99-12/31/99 |
| Antibiotics by Bioassay | MWL | Goats | 300 | Mon. | 1/1/99-12/31/99 |
| Antibiotics by Bioassay | MWL | Heavy calves | 300 | Mon. | 1/1/99-12/31/99 |
| Antibiotics by Bioassay | MWL | Sheep | 300 | Mon. | 1/1/99-12/31/99 |
| Antibiotics by Bioassay | MWL | Roaster pigs | 460 | Mon. | 1/1/99-12/31/99 |
| Antibiotics by Bioassay | MWL | Non-formula-fed veal | 300 | Mon. | 1/1/99-12/31/99 |
| Antibiotics by Bioassay | MWL | Geese | 90 | Mon. | 1/1/99-12/31/99 |
| Antibiotics by Bioassay | MWL | Rabbits | 300 | Mon. | 1/1/99-12/31/99 |
| Antibiotics by Bioassay | MWL | Egg products | 460 | Sp. Prj. | TBD |
| **Total Antibiotics by Bioassay** | | | **8890** | | |
| | | | | | |
| Arsenicals | EL | Young chickens | 460 | Mon. | 1/1/99-12/31/99 |
| Arsenicals | EL | Market hogs | 300 | Mon. | 1/1/99-12/31/99 |
| Arsenicals | EL | Steers | 300 | Mon. | 1/1/99-12/31/99 |
| Arsenicals | EL | Heifers | 300 | Mon. | 1/1/99-12/31/99 |
| Arsenicals | EL | Young turkeys | 300 | Mon. | 1/1/99-12/31/99 |
| Arsenicals | EL | Sows | 230 | Mon. | 1/1/99-12/31/99 |
| Arsenicals | EL | Mature chickens | 230 | Mon. | 1/1/99-12/31/99 |
| Arsenicals | EL | Formula-fed veal | 230 | Mon. | 1/1/99-12/31/99 |
| Arsenicals | EL | Ducks | 230 | Mon. | 1/1/99-12/31/99 |
| Arsenicals | EL | Boars/Stags | 90 | Mon. | 1/1/99-12/31/99 |
| Arsenicals | EL | Mature turkeys | 90 | Mon. | 1/1/99-12/31/99 |
| Arsenicals | EL | Bob veal calves | 230 | Mon. | 1/1/99-12/31/99 |
| Arsenicals | EL | Goats | 0 | Mon. | 1/1/99-12/31/99 |
| Arsenicals | EL | Roaster pigs | 230 | Mon. | 1/1/99-12/31/99 |
| Arsenicals | EL | Geese | 90 | Mon. | 1/1/99-12/31/99 |
| Arsenicals | EL | Egg products | 300 | Sp. Prj. | TBD |
| **Total Arsenicals** | **EL** | | **3610** | | |

**Table 9.1 - *Continued***
**1999 FSIS National Residue Program**
**Domestic Monitoring Plan and Special Projects**

| ANALYSIS | LAB | PROD. CLASS | #SAMP. | TYPE | COLL. DATES |
|---|---|---|---|---|---|
| Avermectins | EL | Market hogs | 460 | Mon. | 1/1/99-12/31/99 |
| Avermectins | EL | Steers | 460 | Mon. | 1/1/99-12/31/99 |
| Avermectins | EL | Heifers | 460 | Mon. | 1/1/99-12/31/99 |
| Avermectins | EL | Dairy cows | 300 | Mon. | 1/1/99-12/31/99 |
| Avermectins | EL | Beef cows | 300 | Mon. | 1/1/99-12/31/99 |
| Avermectins | EL | Sows | 300 | Mon. | 1/1/99-12/31/99 |
| Avermectins | EL | Bulls | 300 | Mon. | 1/1/99-12/31/99 |
| Avermectins | EL | Lambs | 230 | Mon. | 1/1/99-12/31/99 |
| Avermectins | EL | Formula-fed veal | 230 | Mon. | 1/1/99-12/31/99 |
| Avermectins | EL | Boars/Stags | 230 | Mon. | 1/1/99-12/31/99 |
| Avermectins | EL | Horses | 230 | Mon. | 1/1/99-12/31/99 |
| Avermectins | EL | Goats | 230 | Mon. | 1/1/99-12/31/99 |
| Avermectins | EL | Heavy calves | 90 | Mon. | 1/1/99-12/31/99 |
| Avermectins | EL | Sheep | 90 | Mon. | 1/1/99-12/31/99 |
| Avermectins | EL | Roaster pigs | 230 | Mon. | 1/1/99-12/31/99 |
| Avermectins | EL | Non-formula-fed veal | 90 | Mon. | 1/1/99-12/31/99 |
| Avermectins | EL | Rabbits | 230 | Mon. | 1/1/99-12/31/99 |
| **Total Avermectins** | **EL** | | **4460** | | |
| | | | | | |
| CHC's/COP's/Phenylbutazone | WL | Young chickens | 460 | Mon. | 1/1/99-12/31/99 |
| CHC's/COP's/Phenylbutazone | WL | Market hogs | 460 | Mon. | 1/1/99-12/31/99 |
| CHC's/COP's/Phenylbutazone | WL | Steers | 460 | Mon. | 1/1/99-12/31/99 |
| CHC's/COP's/Phenylbutazone | WL | Heifers | 460 | Mon. | 1/1/99-12/31/99 |
| CHC's/COP's/Phenylbutazone | WL | Young turkeys | 460 | Mon. | 1/1/99-12/31/99 |
| CHC's/COP's/Phenylbutazone | WL | Egg products | 460 | Mon. | 1/1/99-12/31/99 |
| CHC's/COP's/Phenylbutazone | WL | Dairy cows | 460 | Mon. | 1/1/99-12/31/99 |
| CHC's/COP's/Phenylbutazone | WL | Beef cows | 300 | Mon. | 1/1/99-12/31/99 |
| CHC's/COP's/Phenylbutazone | WL | Sows | 300 | Mon. | 1/1/99-12/31/99 |
| CHC's/COP's/Phenylbutazone | WL | Bulls | 300 | Mon. | 1/1/99-12/31/99 |
| CHC's/COP's/Phenylbutazone | WL | Mature chickens | 300 | Mon. | 1/1/99-12/31/99 |
| CHC's/COP's/Phenylbutazone | WL | Lambs | 300 | Mon. | 1/1/99-12/31/99 |
| CHC's/COP's/Phenylbutazone | WL | Formula-fed veal | 300 | Mon. | 1/1/99-12/31/99 |
| CHC's/COP's/Phenylbutazone | WL | Ducks | 300 | Mon. | 1/1/99-12/31/99 |
| CHC's/COP's/Phenylbutazone | WL | Boars/Stags | 460 | Mon. | 1/1/99-12/31/99 |
| CHC's/COP's/Phenylbutazone | WL | Mature turkeys | 230 | Mon. | 1/1/99-12/31/99 |
| CHC's/COP's/Phenylbutazone | WL | Bob veal calves | 300 | Mon. | 1/1/99-12/31/99 |
| CHC's/COP's/Phenylbutazone | WL | Horses | 300 | Mon. | 1/1/99-12/31/99 |
| CHC's/COP's/Phenylbutazone | WL | Goats | 300 | Mon. | 1/1/99-12/31/99 |
| CHC's/COP's/Phenylbutazone | WL | Heavy calves | 300 | Mon. | 1/1/99-12/31/99 |
| CHC's/COP's/Phenylbutazone | WL | Sheep | 300 | Mon. | 1/1/99-12/31/99 |
| CHC's/COP's/Phenylbutazone | WL | Non-formula-fed veal | 230 | Mon. | 1/1/99-12/31/99 |
| CHC's/COP's/Phenylbutazone | WL | Geese | 90 | Mon. | 1/1/99-12/31/99 |
| CHC's/COP's/Phenylbutazone | WL | Rabbits | 90 | Mon. | 1/1/99-12/31/99 |
| **Total CHC's/COP's/Phenylbut.** | **WL** | | **7920** | | |

**Table 9.1 - *Continued***
**1999 FSIS National Residue Program**
**Domestic Monitoring Plan and Special Projects**

| ANALYSIS | LAB | PROD. CLASS | #SAMP. | TYPE | COLL. DATES |
|---|---|---|---|---|---|
| Sulfonamides | MWL or EL | Young chickens | 460 | Mon. | 1/1/99-12/31/99 |
| Sulfonamides | MWL or EL | Market hogs | 460 | Mon. | 1/1/99-12/31/99 |
| Sulfonamides | MWL or EL | Steers | 460 | Mon. | 1/1/99-12/31/99 |
| Sulfonamides | MWL or EL | Heifers | 300 | Mon. | 1/1/99-12/31/99 |
| Sulfonamides | MWL or EL | Young turkeys | 460 | Mon. | 1/1/99-12/31/99 |
| Sulfonamides | MWL or EL | Dairy cows | 300 | Mon. | 1/1/99-12/31/99 |
| Sulfonamides | MWL or EL | Beef cows | 300 | Mon. | 1/1/99-12/31/99 |
| Sulfonamides | MWL or EL | Sows | 460 | Mon. | 1/1/99-12/31/99 |
| Sulfonamides | MWL or EL | Bulls | 300 | Mon. | 1/1/99-12/31/99 |
| Sulfonamides | MWL or EL | Mature chickens | 230 | Mon. | 1/1/99-12/31/99 |
| Sulfonamides | MWL or EL | Lambs | 300 | Mon. | 1/1/99-12/31/99 |
| Sulfonamides | MWL or EL | Formula-fed veal | 300 | Mon. | 1/1/99-12/31/99 |
| Sulfonamides | MWL or EL | Ducks | 230 | Mon. | 1/1/99-12/31/99 |
| Sulfonamides | MWL or EL | Boars/Stags | 460 | Mon. | 1/1/99-12/31/99 |
| Sulfonamides | MWL or EL | Mature turkeys | 230 | Mon. | 1/1/99-12/31/99 |
| Sulfonamides | MWL or EL | Bob veal calves | 460 | Mon. | 1/1/99-12/31/99 |
| Sulfonamides | MWL or EL | Horses | 300 | Mon. | 1/1/99-12/31/99 |
| Sulfonamides | MWL or EL | Goats | 230 | Mon. | 1/1/99-12/31/99 |
| Sulfonamides | MWL or EL | Heavy calves | 230 | Mon. | 1/1/99-12/31/99 |
| Sulfonamides | MWL or EL | Sheep | 0 | Mon. | 1/1/99-12/31/99 |
| Sulfonamides | MWL or EL | Roaster pigs | 230 | Mon. | 1/1/99-12/31/99 |
| Sulfonamides | MWL or EL | Non-formula-fed veal | 230 | Mon. | 1/1/99-12/31/99 |
| Sulfonamides | MWL or EL | Geese | 90 | Mon. | 1/1/99-12/31/99 |
| Sulfonamides | MWL or EL | Rabbits | 0 | Mon. | 1/1/99-12/31/99 |
| Sulfonamides | EL | Egg products | 460 | Sp. Prj. | TBD |
| **Total Sulfonamides, MWL** | **MWL** | | **4869** | | |
| **Total Sulfonamides, EL** | **EL** | | **2611** | | |
| **Total Sulfonamides** | **MWL + EL** | | **7480** | | |
| | | | | | |
| Tilmicosin | MWL | Dairy cattle | 420 | Mon. | 1/1/99-12/31/99 |
| Tilmicosin | MWL | Formula-fed veal | 420 | Mon. | 1/1/99-12/31/99 |
| **Total Tilmicosin** | **MWL** | | **840** | | |
| | | | | | |
| Carbadox | MWL | Market hogs | 300 | Mon. | 1/1/99-12/31/99 |
| Carbadox | MWL | Roaster pigs | 300 | Sp. Prj. | 1/1/99-12/31/99 |
| **Total Carbadox** | **MWL** | | **600** | | |
| | | | | | |
| Beta agonists* | FDA+MWL | Market hogs | 300 | Sp. Prj. | 1/1/99-6/30/99 |
| Beta agonists* | FDA+MWL | Formula-fed veal | 300 | Sp. Prj. | 1/1/99-6/30/99 |
| **Total Beta agonists** | **FDA+MWL** | | **600** | | |

*A total of 600 samples (containing both eyeball and liver) will be collected and sent to the FDA laboratories. FDA will first screen for beta agonists in the eyeballs (following treatment, the beta agonists will remain in the eyeballs long after they have depleted from edible tissue). If the sample is positive, FDA will implement a confirmatory method using mass spectrometry, and will ship the liver from the positive animal to MWL for analysis.

**Table 9.1 - *Continued***
**1999 FSIS National Residue Program**
**Domestic Monitoring Plan and Special Projects**

| ANALYSIS | LAB | PROD. CLASS | #SAMP. | TYPE | COLL. DATES |
|---|---|---|---|---|---|
| Dexamethasone | MWL | Dairy cattle | 300 | Sp. Prj. | 2/1/99-5/31/99 |
| **Total Dexamethasone** | **MWL** | | **300** | | |
| | | | | | |
| Flunixin | MWL | Dairy cattle | 320 | Sp. Prj. | 2/1/99-5/31/99 |
| **Total Flunixin** | **MWL** | | **320** | | |
| | | | | | |
| Nitroimidazoles | MWL | Formula-fed veal** | 300 | Sp. Prj. | 3/1/99-9/30/99 |
| **Total Nitroimidazoles** | **MWL** | | **300** | | |
| | | | | | |
| Fluoroquinolones | MWL | Young chicken | 300 | Sp. Prj. | 4/1/99-12/31/99† |
| Fluoroquinolones | MWL | Dairy cattle | 300 | Sp. Prj. | 4/1/99-12/31/99† |
| Fluoroquinolones | MWL | Young turkey | 300 | Sp. Prj. | 4/1/99-12/31/99† |
| **Total Fluorquinolones** | **MWL** | | **900** | | |
| | | | | | |
| Spectinomycin | MWL | Dairy cattle | 360 | Sp. Prj. | 7/1/99-12/31/99 |
| **Total Spectinomycin** | **MWL** | | **360** | | |
| | | | | | |
| DES | MWL | Formula-fed veal | 300 | Sp. Prj. | 10/1/99-12/31/99† |
| **Total DES** | **MWL** | | **300** | | |
| | | | | | |
| Veterinary Tranquilizers | MWL | Market hogs | 300 | Sp. Prj. | 10/1/99-12/31/99† |
| **Total Veterinary Tranquilizers** | **MWL** | | **300** | | |
| | | | | | |
| Lead | EL | Beef | 300 | Sp. Prj. | TBD |
| Lead | EL | Swine | 300 | Sp. Prj. | TBD |
| Lead | EL | Poultry | 300 | Sp. Prj. | TBD |
| Lead | EL | Baby food | 300 | Sp. Prj. | TBD |
| **Total Lead** | **EL** | | **1200** | | |
| | | | | | |
| Organophosphates (OP's) | WL | ALL | TBD | Sp. Prj. | TBD |
| **Total Organophosphates (OP's)** | **WL** | | **TBD** | | |

**Key:**
PROD. CLASS = Production class
COLL. DATES = Sample collection dates
Mon. = Monitoring Plan
Sp. Proj. = Special Project
TBD = To be determined
CHC's = Chlorinated hydrocarbon compounds
COP's = Chlorinated organophosphate compounds
EL = FSIS Eastern Laboratory, Athens, GA
MWL = FSIS Midwestern Laboratory, St. Louis, MO
WL = FSIS Western Laboratory, Alameda, CA

**FSIS will attempt to collect samples from *pen-raised* formula-fed veal, since higher nitroimidazole use thought likely with this production practice.
†For fluoroquinolones, DES, and veterinary tranquilizers, while sample collection will be completed by 12/31/99, laboratory analysis may carry over into the beginning of 2000.
‡OP's will be analyzed by the CHC/COP method, following its extension to these compounds.

**Table 9.2**
**1999 FSIS National Residue Program**
**Import Residue Plan**

| COUNTRY | PRODUCT | COMPOUND | NO. SAMPLES |
|---|---|---|---|
| Argentina | Beef, Fresh | Antibiotics | 8 |
| Argentina | Beef, Fresh | Avermectins | 8 |
| Argentina | Beef, Fresh | CHC's/COP's/Phenylbutazone | 8 |
| Argentina | Beef, Fresh | Sulfonamides | 8 |
| Argentina | Beef, Processed | CHC's/COP's/Phenylbutazone | 88 |
| Argentina | Beef, Processed | Sulfonamides | 8 |
| Argentina | Pork, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Australia | Beef, Fresh | Antibiotics | 121 |
| Australia | Beef, Fresh | Avermectins | 121 |
| Australia | Beef, Fresh | CHC's/COP's/Phenylbutazone | 121 |
| Australia | Beef, Fresh | Sulfonamides | 121 |
| Australia | Beef, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Australia | Beef, Processed | Sulfonamides | 88 |
| Australia | Beef/Pork, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Australia | Beef/Pork, Processed | Sulfonamides | 8 |
| Australia | Goat, Fresh | CHC's/COP's/Phenylbutazone | 22 |
| Australia | Lamb/Mutton, Fresh | Antibiotics | 174 |
| Australia | Lamb/Mutton, Fresh | Avermectins | 131 |
| Australia | Lamb/Mutton, Fresh | CHC's/COP's/Phenylbutazone | 174 |
| Australia | Lamb/Mutton, Fresh | Sulfonamides | 131 |
| Australia | Lamb/Mutton, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Australia | Lamb/Mutton, Processed | Sulfonamides | 8 |
| Australia | Pork, Fresh | Antibiotics | 8 |
| Australia | Pork, Fresh | Arsenicals | 8 |
| Australia | Pork, Fresh | Avermectins | 8 |
| Australia | Pork, Fresh | Carbadox | 8 |
| Australia | Pork, Fresh | CHC's/COP's/Phenylbutazone | 8 |
| Australia | Pork, Fresh | Nitroimidazoles | 8 |
| Australia | Pork, Fresh | Sulfonamides | 8 |
| Australia | Pork, Processed | Arsenicals | 8 |
| Australia | Pork, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Australia | Pork, Processed | Sulfonamides | 8 |
| Australia | Veal, Fresh | Antibiotics | 14 |
| Australia | Veal, Fresh | Avermectins | 14 |
| Australia | Veal, Fresh | CHC's/COP's/Phenylbutazone | 14 |
| Australia | Veal, Fresh | Sulfonamides | 14 |
| Austria | Beef/Pork, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Austria | Beef/Pork, Processed | Sulfonamides | 8 |
| Austria | Pork, Processed | Arsenicals | 8 |
| Austria | Pork, Processed | Sulfonamides | 8 |
| Belgium | Pork, Processed | Arsenicals | 10 |
| Belgium | Pork, Processed | CHC's/COP's/Phenylbutazone | 16 |
| Belgium | Pork, Processed | Sulfonamides | 16 |
| Brazil | Beef, Processed | CHC's/COP's/Phenylbutazone | 84 |
| Brazil | Lamb/Mutton, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Brazil | Lamb/Mutton, Processed | Sulfonamides | 8 |
| Canada | Beef, Fresh | Antibiotics | 164 |
| Canada | Beef, Fresh | Avermectins | 164 |
| Canada | Beef, Fresh | CHC's/COP's/Phenylbutazone | 164 |
| Canada | Beef, Fresh | Sulfonamides | 164 |
| Canada | Beef, Processed | CHC's/COP's/Phenylbutazone | 47 |

**Table 9.2 - *Continued***
**1999 FSIS National Residue Program**
**Import Residue Plan**

| COUNTRY | PRODUCT | COMPOUND | NO. SAMPLES |
|---|---|---|---|
| Canada | Beef, Processed | Sulfonamides | 8 |
| Canada | Beef/Pork, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Canada | Beef/Pork, Processed | Sulfonamides | 8 |
| Canada | Chicken, Fresh | Antibiotics | 8 |
| Canada | Chicken, Fresh | Arsenicals | 8 |
| Canada | Chicken, Fresh | CHC's/COP's/Phenylbutazone | 8 |
| Canada | Chicken, Fresh | Sulfonamides | 8 |
| Canada | Chicken, Processed | Arsenicals | 66 |
| Canada | Chicken, Processed | CHC's/COP's/Phenylbutazone | 206 |
| Canada | Chicken, Processed | Sulfonamides | 206 |
| Canada | Lamb/Mutton, Fresh | Antibiotics | 8 |
| Canada | Lamb/Mutton, Fresh | Avermectins | 8 |
| Canada | Lamb/Mutton, Fresh | CHC's/COP's/Phenylbutazone | 8 |
| Canada | Lamb/Mutton, Fresh | Sulfonamides | 8 |
| Canada | Lamb/Mutton, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Canada | Lamb/Mutton, Processed | Sulfonamides | 8 |
| Canada | Other Fowl, Fresh | CHC's/COP's/Phenylbutazone | 8 |
| Canada | Other Fowl, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Canada | Other, Fowl, Fresh | Antibiotics | 8 |
| Canada | Other, Fowl, Fresh | Arsenicals | 8 |
| Canada | Other, Fowl, Fresh | Sulfonamides | 8 |
| Canada | Other, Fowl, Processed | Arsenicals | 8 |
| Canada | Other, Fowl, Processed | Sulfonamides | 8 |
| Canada | Pork, Fresh | Antibiotics | 358 |
| Canada | Pork, Fresh | Arsenicals | 219 |
| Canada | Pork, Fresh | Avermectins | 219 |
| Canada | Pork, Fresh | Carbadox | 166 |
| Canada | Pork, Fresh | CHC's/COP's/Phenylbutazone | 358 |
| Canada | Pork, Fresh | Nitroimidazoles | 133 |
| Canada | Pork, Fresh | Sulfonamides | 219 |
| Canada | Pork, Processed | Arsenicals | 72 |
| Canada | Pork, Processed | CHC's/COP's/Phenylbutazone | 109 |
| Canada | Pork, Processed | Sulfonamides | 109 |
| Canada | Turkey, Fresh | Antibiotics | 8 |
| Canada | Turkey, Fresh | Arsenicals | 8 |
| Canada | Turkey, Fresh | CHC's/COP's/Phenylbutazone | 8 |
| Canada | Turkey, Fresh | Sulfonamides | 8 |
| Canada | Turkey, Processed | Arsenicals | 8 |
| Canada | Turkey, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Canada | Turkey, Processed | Sulfonamides | 8 |
| Canada | Veal, Fresh | Antibiotics | 79 |
| Canada | Veal, Fresh | Avermectins | 79 |
| Canada | Veal, Fresh | CHC's/COP's/Phenylbutazone | 79 |
| Canada | Veal, Fresh | Sulfonamides | 79 |
| Canada | Veal, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Canada | Veal, Processed | Sulfonamides | 8 |
| Costa Rica | Beef, Fresh | Antibiotics | 8 |
| Costa Rica | Beef, Fresh | Avermectins | 8 |
| Costa Rica | Beef, Fresh | CHC's/COP's/Phenylbutazone | 8 |
| Costa Rica | Beef, Fresh | Sulfonamides | 8 |
| Costa Rica | Beef, Processed | CHC's/COP's/Phenylbutazone | 8 |

**Table 9.2 - *Continued***
**1999 FSIS National Residue Program**
**Import Residue Plan**

| COUNTRY | PRODUCT | COMPOUND | NO. SAMPLES |
|---|---|---|---|
| Costa Rica | Beef, Processed | Sulfonamides | 84 |
| Costa Rica | Veal, Fresh | Antibiotics | 8 |
| Costa Rica | Veal, Fresh | Avermectins | 8 |
| Costa Rica | Veal, Fresh | CHC's/COP's/Phenylbutazone | 8 |
| Costa Rica | Veal, Fresh | Sulfonamides | 8 |
| Croatia | Beef, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Croatia | Beef/Pork, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Croatia | Beef/Pork, Processed | Sulfonamides | 8 |
| Croatia | Pork, Processed | Arsenicals | 8 |
| Croatia | Pork, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Croatia | Pork, Processed | Sulfonamides | 8 |
| Denmark | Beef, Fresh | Antibiotics | 8 |
| Denmark | Beef, Fresh | Avermectins | 8 |
| Denmark | Beef, Fresh | CHC's/COP's/Phenylbutazone | 8 |
| Denmark | Beef, Fresh | Sulfonamides | 8 |
| Denmark | Beef, Processed | Sulfonamides | 47 |
| Denmark | Beef/Pork, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Denmark | Beef/Pork, Processed | Sulfonamides | 8 |
| Denmark | Pork, Fresh | Antibiotics | 55 |
| Denmark | Pork, Fresh | Arsenicals | 26 |
| Denmark | Pork, Fresh | Avermectins | 26 |
| Denmark | Pork, Fresh | Carbadox | 26 |
| Denmark | Pork, Fresh | CHC's/COP's/Phenylbutazone | 55 |
| Denmark | Pork, Fresh | Nitroimidazoles | 20 |
| Denmark | Pork, Fresh | Sulfonamides | 26 |
| Denmark | Pork, Processed | Arsenicals | 33 |
| Denmark | Pork, Processed | CHC's/COP's/Phenylbutazone | 51 |
| Denmark | Pork, Processed | Sulfonamides | 51 |
| Dominican Republic | Beef/Pork, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Dominican Republic | Beef/Pork, Processed | Sulfonamides | 8 |
| Finland | Pork, Fresh | Antibiotics | 8 |
| Finland | Pork, Fresh | Arsenicals | 8 |
| Finland | Pork, Fresh | Avermectins | 8 |
| Finland | Pork, Fresh | Carbadox | 8 |
| Finland | Pork, Fresh | CHC's/COP's/Phenylbutazone | 8 |
| Finland | Pork, Fresh | Nitroimidazoles | 8 |
| Finland | Pork, Fresh | Sulfonamides | 8 |
| France | Chicken, Processed | Arsenicals | 8 |
| France | Chicken, Processed | CHC's/COP's/Phenylbutazone | 8 |
| France | Chicken, Processed | Sulfonamides | 8 |
| France | Other Fowl, Processed | CHC's/COP's/Phenylbutazone | 8 |
| France | Other, Fowl, Processed | Arsenicals | 8 |
| France | Other, Fowl, Processed | Sulfonamides | 8 |
| France | Pork, Processed | Arsenicals | 8 |
| France | Pork, Processed | CHC's/COP's/Phenylbutazone | 8 |
| France | Pork, Processed | Sulfonamides | 8 |
| Germany | Beef/Pork, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Germany | Beef/Pork, Processed | Sulfonamides | 8 |
| Germany | Pork, Processed | Arsenicals | 8 |
| Germany | Pork, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Germany | Pork, Processed | Sulfonamides | 8 |

**Table 9.2 - *Continued***
**1999 FSIS National Residue Program**
**Import Residue Plan**

| COUNTRY | PRODUCT | COMPOUND | NO. SAMPLES |
|---|---|---|---|
| Honduras | Beef, Fresh | Antibiotics | 8 |
| Honduras | Beef, Fresh | Avermectins | 8 |
| Honduras | Beef, Fresh | CHC's/COP's/Phenylbutazone | 8 |
| Honduras | Beef, Fresh | Sulfonamides | 8 |
| Honduras | Beef, Processed | Sulfonamides | 8 |
| Hong Kong | Chicken, Processed | Arsenicals | 8 |
| Hong Kong | Chicken, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Hong Kong | Chicken, Processed | Sulfonamides | 8 |
| Hong Kong | Turkey, Processed | Arsenicals | 8 |
| Hong Kong | Turkey, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Hong Kong | Turkey, Processed | Sulfonamides | 8 |
| Hungary | Pork, Processed | Arsenicals | 8 |
| Hungary | Pork, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Hungary | Pork, Processed | Sulfonamides | 8 |
| Iceland | Lamb/Mutton, Fresh | Antibiotics | 8 |
| Iceland | Lamb/Mutton, Fresh | Avermectins | 8 |
| Iceland | Lamb/Mutton, Fresh | CHC's/COP's/Phenylbutazone | 8 |
| Iceland | Lamb/Mutton, Fresh | Sulfonamides | 8 |
| Iceland | Veal, Fresh | Antibiotics | 8 |
| Iceland | Veal, Fresh | Avermectins | 8 |
| Iceland | Veal, Fresh | CHC's/COP's/Phenylbutazone | 8 |
| Iceland | Veal, Fresh | Sulfonamides | 8 |
| Ireland | Pork, Fresh | Antibiotics | 8 |
| Ireland | Pork, Fresh | Arsenicals | 8 |
| Ireland | Pork, Fresh | Avermectins | 8 |
| Ireland | Pork, Fresh | Carbadox | 8 |
| Ireland | Pork, Fresh | CHC's/COP's/Phenylbutazone | 8 |
| Ireland | Pork, Fresh | Nitroimidazoles | 8 |
| Ireland | Pork, Fresh | Sulfonamides | 8 |
| Ireland | Pork, Processed | Arsenicals | 8 |
| Ireland | Pork, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Ireland | Pork, Processed | Sulfonamides | 8 |
| Israel | Chicken, Processed | Arsenicals | 8 |
| Israel | Chicken, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Israel | Chicken, Processed | Sulfonamides | 8 |
| Israel | Other Fowl, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Israel | Other, Fowl, Processed | Arsenicals | 8 |
| Israel | Other, Fowl, Processed | Sulfonamides | 8 |
| Israel | Turkey, Processed | Arsenicals | 8 |
| Israel | Turkey, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Israel | Turkey, Processed | Sulfonamides | 8 |
| Italy | Beef, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Italy | Pork, Processed | Arsenicals | 8 |
| Italy | Pork, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Italy | Pork, Processed | Sulfonamides | 8 |
| Japan | Beef, Fresh | Antibiotics | 8 |
| Japan | Beef, Fresh | Avermectins | 8 |
| Japan | Beef, Fresh | CHC's/COP's/Phenylbutazone | 8 |
| Japan | Beef, Fresh | Sulfonamides | 8 |
| Japan | Beef, Processed | Sulfonamides | 8 |
| Mexico | Beef, Fresh | Antibiotics | 8 |

**Table 9.2 - *Continued***
**1999 FSIS National Residue Program**
**Import Residue Plan**

| COUNTRY | PRODUCT | COMPOUND | NO. SAMPLES |
|---|---|---|---|
| Mexico | Beef, Fresh | Avermectins | 8 |
| Mexico | Beef, Fresh | CHC's/COP's/Phenylbutazone | 8 |
| Mexico | Beef, Fresh | Sulfonamides | 8 |
| Mexico | Beef, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Mexico | Beef, Processed | Sulfonamides | 8 |
| Mexico | Pork, Fresh | Antibiotics | 8 |
| Mexico | Pork, Fresh | Arsenicals | 8 |
| Mexico | Pork, Fresh | Avermectins | 8 |
| Mexico | Pork, Fresh | Carbadox | 8 |
| Mexico | Pork, Fresh | CHC's/COP's/Phenylbutazone | 8 |
| Mexico | Pork, Fresh | Nitroimidazoles | 8 |
| Mexico | Pork, Fresh | Sulfonamides | 8 |
| Mexico | Pork, Processed | Arsenicals | 8 |
| Mexico | Pork, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Mexico | Pork, Processed | Sulfonamides | 8 |
| Netherlands | Beef, Fresh | Antibiotics | 8 |
| Netherlands | Beef, Fresh | Avermectins | 8 |
| Netherlands | Beef, Fresh | CHC's/COP's/Phenylbutazone | 8 |
| Netherlands | Beef, Fresh | Sulfonamides | 8 |
| Netherlands | Beef, Processed | Sulfonamides | 8 |
| Netherlands | Beef/Pork, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Netherlands | Beef/Pork, Processed | Sulfonamides | 8 |
| Netherlands | Pork, Processed | Arsenicals | 10 |
| Netherlands | Pork, Processed | CHC's/COP's/Phenylbutazone | 14 |
| Netherlands | Pork, Processed | Sulfonamides | 14 |
| Netherlands | Veal, Fresh | Antibiotics | 8 |
| Netherlands | Veal, Fresh | Avermectins | 8 |
| Netherlands | Veal, Fresh | CHC's/COP's/Phenylbutazone | 8 |
| Netherlands | Veal, Fresh | Sulfonamides | 8 |
| New Zealand | Beef, Fresh | Antibiotics | 102 |
| New Zealand | Beef, Fresh | Avermectins | 102 |
| New Zealand | Beef, Fresh | CHC's/COP's/Phenylbutazone | 102 |
| New Zealand | Beef, Fresh | Sulfonamides | 102 |
| New Zealand | Beef, Processed | CHC's/COP's/Phenylbutazone | 8 |
| New Zealand | Beef, Processed | Sulfonamides | 8 |
| New Zealand | Goat, Fresh | CHC's/COP's/Phenylbutazone | 8 |
| New Zealand | Lamb/Mutton, Fresh | Antibiotics | 102 |
| New Zealand | Lamb/Mutton, Fresh | Avermectins | 77 |
| New Zealand | Lamb/Mutton, Fresh | CHC's/COP's/Phenylbutazone | 102 |
| New Zealand | Lamb/Mutton, Fresh | Sulfonamides | 77 |
| New Zealand | Lamb/Mutton, Processed | CHC's/COP's/Phenylbutazone | 8 |
| New Zealand | Lamb/Mutton, Processed | Sulfonamides | 8 |
| New Zealand | Veal, Fresh | Antibiotics | 112 |
| New Zealand | Veal, Fresh | Avermectins | 112 |
| New Zealand | Veal, Fresh | CHC's/COP's/Phenylbutazone | 112 |
| New Zealand | Veal, Fresh | Sulfonamides | 112 |
| Nicaragua | Beef, Fresh | Antibiotics | 8 |
| Nicaragua | Beef, Fresh | Avermectins | 8 |
| Nicaragua | Beef, Fresh | CHC's/COP's/Phenylbutazone | 8 |
| Nicaragua | Beef, Fresh | Sulfonamides | 8 |
| Nicaragua | Beef, Processed | Sulfonamides | 8 |

**Table 9.2 - *Continued***
**1999 FSIS National Residue Program**
**Import Residue Plan**

| COUNTRY | PRODUCT | COMPOUND | NO. SAMPLES |
|---|---|---|---|
| Poland | Beef, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Poland | Beef/Pork, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Poland | Beef/Pork, Processed | Sulfonamides | 8 |
| Poland | Pork, Processed | Arsenicals | 9 |
| Poland | Pork, Processed | CHC's/COP's/Phenylbutazone | 15 |
| Poland | Pork, Processed | Sulfonamides | 15 |
| Slovenia | Pork, Processed | Arsenicals | 8 |
| Slovenia | Pork, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Slovenia | Pork, Processed | Sulfonamides | 8 |
| Spain | Beef/Pork, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Spain | Beef/Pork, Processed | Sulfonamides | 8 |
| Spain | Pork, Processed | Arsenicals | 8 |
| Spain | Pork, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Spain | Pork, Processed | Sulfonamides | 8 |
| Sweden | Beef, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Sweden | Beef/Pork, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Sweden | Beef/Pork, Processed | Sulfonamides | 8 |
| Sweden | Pork, Fresh | Antibiotics | 8 |
| Sweden | Pork, Fresh | Arsenicals | 8 |
| Sweden | Pork, Fresh | Avermectins | 8 |
| Sweden | Pork, Fresh | Carbadox | 8 |
| Sweden | Pork, Fresh | CHC's/COP's/Phenylbutazone | 8 |
| Sweden | Pork, Fresh | Nitroimidazoles | 8 |
| Sweden | Pork, Fresh | Sulfonamides | 8 |
| Switzerland | Beef, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Switzerland | Pork, Processed | Arsenicals | 8 |
| Switzerland | Pork, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Switzerland | Pork, Processed | Sulfonamides | 8 |
| UK | Pork, Fresh | Antibiotics | 8 |
| UK | Pork, Fresh | Arsenicals | 8 |
| UK | Pork, Fresh | Avermectins | 8 |
| UK | Pork, Fresh | Carbadox | 8 |
| UK | Pork, Fresh | CHC's/COP's/Phenylbutazone | 8 |
| UK | Pork, Fresh | Nitroimidazoles | 8 |
| UK | Pork, Fresh | Sulfonamides | 8 |
| Uruguay | Beef, Fresh | Antibiotics | 8 |
| Uruguay | Beef, Fresh | Avermectins | 8 |
| Uruguay | Beef, Fresh | CHC's/COP's/Phenylbutazone | 8 |
| Uruguay | Beef, Fresh | Sulfonamides | 8 |
| Uruguay | Beef, Processed | CHC's/COP's/Phenylbutazone | 9 |
| Uruguay | Beef, Processed | Sulfonamides | 9 |
| Uruguay | Lamb/Mutton, Fresh | Antibiotics | 8 |
| Uruguay | Lamb/Mutton, Fresh | Avermectins | 8 |
| Uruguay | Lamb/Mutton, Fresh | CHC's/COP's/Phenylbutazone | 8 |
| Uruguay | Lamb/Mutton, Fresh | Sulfonamides | 8 |
| Uruguay | Lamb/Mutton, Processed | CHC's/COP's/Phenylbutazone | 8 |
| Uruguay | Lamb/Mutton, Processed | Sulfonamides | 8 |

## Table 9.3
## Summary, 1999 FSIS National Residue Program
## Domestic Monitoring Plan and Special Projects and Import Residue Plan

| =LAB | ANALYSIS | COLL. DATES | #DOMESTIC | #IMPORT | TOTAL #SAMP. | NOTES |
|---|---|---|---|---|---|---|
| **MONITORING PLAN** | | | | | | |
| EL | Arsenicals | 1/1/99 - 12/31/99 | 3310 | 692 | 4002 | |
| EL | Avermectins | 1/1/99 - 12/31/99 | 4460 | 1236 | 5696 | |
| EL | Sulfonamides | 1/1/99 - 12/31/99 | 2151 | 2275 | 4426 | |
| MWL | Sulfonamides | 1/1/99 - 12/31/99 | 4869 | 0 | 4869 | |
| MWL | Antibiotics By Bioassay | 1/1/99 - 12/31/99 | 8430 | 1489 | 9919 | |
| MWL | Carbadox | 1/1/99 - 12/31/99 | 300 | 240 | 540 | 300 market hogs, 240 imported pork samples |
| MWL | Tilmicosin | 1/1/99 - 12/31/99 | 840 | 0 | 840 | 420 dairy cows, 420 formula-fed veal |
| WL | CHC's/COP's/Phenylbutazone | 1/1/99 - 12/31/99 | 7920 | 2518 | 10438 | |
| **Total Monitoring** | | | **32280** | **8450** | **40730** | |
| **SPECIAL PROJECTS BEGINNING 1/1/99** | | | | | | |
| MWL | Carbadox in roaster pigs | 1/1/99 - 12/31/99 | 300 | 0 | 300 | |
| * | Beta agonists | 1/1/99 - 6/30/99 | 600 | 0 | 600 | 300 formula-fed veal, 300 market hogs |
| **SPECIAL PROJECTS BEGINNING AFTER 1/1/99** | | | | | | |
| EL | Arsenicals in eggs | TBD(after met. | 300 | 0 | 300 | |
| EL | Sulfonamides in eggs | TBD(after met. | 460 | 0 | 460 | |
| EL | Lead in raw meat products | TBD | 900 | 0 | 900 | 300 beef, 300 swine, 300 poultry |
| EL | Lead in baby food containing | TBD | 300 | 0 | 300 | |
| | root vegetables or meat | | | | | |
| MWL | DES in formula-fed veal | 10/1/99 - 12/31/99 | 300 | 0 | 300 | 300 formula-fed veal |
| MWL | Flunixin in dairy cows | 2/1/99 - 5/31/99 | 320 | 0 | 320 | 320 dairy cows, peak usage in February |
| MWL | Fluoroquinolones | 4/1/99 - 12/31/99† | 900 | 0 | 900 | 300 y.chickens, 300 dairy cows, 300 y. turkeys |
| MWL | Nitroimidazoles | 3/1/99 - 9/30/99 | 300 | 230 | 530 | 300 f.f. veal (pen-raised**), 230 import pork |
| MWL | Spectinomycin in dairy cows | 7/1/99 - 12/31/99 | 360 | 0 | 360 | 360 dairy cows |
| MWL | Dexamethasone in dairy cows | 2/1/99 - 5/31/99 | 300 | 0 | 300 | 300 dairy cows, peak usage in February |
| MWL | Vet tranquilizers in market hogs | 10/1/99 - | 300 | 0 | 300 | 300 market hogs |
| MWL | Antibiotics in eggs | TBD after met.ext. | 460 | 0 | 460 | |
| WL | OP's (by CHC/COP method)‡ | TBD after met.ext. | TBD | TBD | TBD | |
| **Total Special Projects** | | | **5800** | **230** | **6030** | |
| | | | | | | |
| **Total Monitoring and Special Projects** | | | **38080** | **8680** | **46760** | |

**Key:**

PROD. CLASS = Production class; COLL. DATES = Sample collection dates; TBD = To be determined; met. ext. = Method extension

f.f. veal = Formula-fed veal; y. chickens = Young chickens; y. turkeys = Young turkeys

CHC = Chlorinated hydrocarbon; COP = Chlorinated organophosphate; OP = Organophosphate

EL = FSIS Eastern Laboratory, Athens, GA; MWL = FSIS Midwestern Laboratory, St. Louis, MO; WL = FSIS Western Laboratory, Alameda, CA

*FDA will analyze eyeballs from 300 formula-fed veal and 300 market hogs; MWL will analyze livers from positive samples only.

†For fluoroquinolones, DES, and veterinary tranquilizers, while sample collection will be completed by 12/31/99, laboratory analysis may carry over into the beginning of 2000.

‡No additional sample collection will be required, since these compounds will be detected by the CHC/COP method, following its extension.

**FSIS will attempt to collect samples from *pen-raised* formula-fed veal, since higher nitroimidazole use thought likely with this production practice.

# APPENDIX I
# U.S. RESIDUE LIMITS FOR COMPOUNDS IN MEAT AND POULTRY

# APPENDIX I: U.S. RESIDUE LIMITS FOR COMPOUNDS IN MEAT AND POULTRY

## INTRODUCTION

This section provides information on residue limits of potential contaminants in meat and poultry products applied by Food Safety and Inspection Service (FSIS), as of December 31, 1998. These limits include tolerances and action levels developed by the Environmental Protection Agency (EPA) for pesticide chemicals, by the Food and Drug Administration (FDA) for animal drugs and unavoidable contaminants. These limits are derived in most cases from the Code of Federal Regulation (CFR): pesticide limits from 40 CFR 180, those for animal drugs from 21 CFR 556, and unavoidable contaminants from 21 CFR 520, 522, 524, 526, 529 (new animal drug not subject to certification), 540, 544, 546, 548 (antibiotic drugs for use with animals), and 558 (new animal drugs for use in animal feed). This document includes the relevant citations.

Formal tolerances are not established in all cases. For example, tolerance exemptions have been granted by FDA and EPA in approving the use of some pesticides and new animal drugs. For some unavoidable contamination situations, FDA and EPA, upon request, recommend action levels to FSIS; however, tolerances or action levels have not been established for all such situations. FSIS does not permit concentrations of residues in meat and poultry that exceed the residue limits published in this section.

The residue limits for poultry and livestock species are listed alphabetically by compound (which may include a compound's metabolites). The entries include, among other things, CFR or Federal Register (FR) citations for tolerance, and notations of action levels. Entries for animal drugs with "zero" or "no-residue" tolerances also include, in parenthesis, the limits of quantification considered by FDA in approving those drugs in food-producing animals. These limits are used by FDA for enforcement purposes, and are applied by FSIS in determining if products are adulterated. All tolerance and action level units are in parts per million **(ppm).** Please note that CFR is the official source for all tolerances, and the FR is the official source for action levels. If there are any discrepancies between this section and the CFR/FR, use the values the CFR or FR.

Any residue of a new animal drug found in the edible tissues of a species for which the drug is not approved will be considered an adulterant, pending a judgement by FDA that sets an allowable safe concentration. A substance endogenous to the animal tissue would not be considered adulterant.

Unless otherwise indicated, "meat by-products" include kidney and liver.

## KEY TO ABBREVIATIONS

| | | |
|---|---|---|
| EK: Excluding Kidneys | M: Muscle | Et: Edible tissue |
| F: Fat | S: Skin | Mb: Meat byproducts |
| K: Kidney | SF: Skin with fat | CFR: Code of Federal Regulation |
| L: Liver | Sm: Skeletal muscle | FR: Federal Register |

**(units are parts per million)**

| Compound | Cattle | Sheep/Goats | Swine | Poultry | Horses | Reference |
|---|---|---|---|---|---|---|
| **Acephate** | 0.1F | 0.1F | 0.1F | 0.1F | 0.1F | 40 CFR 180.108 |
| **& metabolite** | 0.1M | 0.1M | 0.1M | 0.1M | 0.1M | |
| | 0.1Mb | 0.1Mb | 0.1Mb | 0.1Mb | 0.1Mb | |
| **2-Acetyl-amino** | - | - | - | 0.1Et[1] | - | 21 CFR 556.20 |
| **5-nitrothiazole** | | | | | | |
| **Acifluorfen & metabolites** | 0.02K | 0.02K | 0.02K | 0.02F | 0.02K | 40 CFR 180.383 |
| | 0.02L | 0.02L | 0.02L | 0.02M | 0.02L | |
| | - | - | - | 0.02Mb | - | |
| **Aklomide** | - | - | - | 4.5L[2] | - | 21 CFR 556.30 |
| **& metabolite** | - | - | - | 4.5M[2] | - | |
| | - | - | - | 3.0SF[2] | - | |
| **Alachlor** | 0.02F | 0.02F | 0.02F | 0.02F | 0.02F | 40 CFR 180.249 |
| **& metabolites** | 0.02M | 0.02M | 0.02M | 0.02M | 0.02M | |
| | 0.02Mb | 0.02Mb | 0.02Mb | 0.02Mb | 0.02Mb | |
| **Albendazole** | 0.2L[3] | - | - | - | - | 21 CFR 556.34 |
| **Aldicarb** | 0.01F | 0.01F | 0.01F | - | 0.1F | 40 CFR 180.269 |
| **& metabolites** | 0.01M | 0.01M | 0.01M | - | 0.01M | |
| | 0.01Mb | 0.01Mb | 0.01Mb | - | 0.01Mb | |
| **Aldrin** | 0.3F[4] | 0.3F[4] | 0.3F[4] | 0.3F[4] | 0.3F[4] | 51 FR 46662 |
| **4-amino-6-(1,1 dimethlethyl)** | 0.7F | 0.7F | 0.7F | 0.7F | 0.7F | 40 CFR 180.332 |
| **3-(methylthio)-1,2,4-Triazin-** | 0.7M | 0.7M | 0.7M | 0.7M | 0.7M | |
| **5-(4H)-one** | 0.7Mb | 0.7Mb | 0.7Mb | 0.7Mb | 0.7Mb | |
| **Amitraz & metabolites** | 0.1F | 0F | 0.1F | 0.01F | 0F | 40 CFR 180.287 |
| | 0.05M | 0M | 0.05M | 0.01M | 0M | |
| | 0.3Mb | 0Mb | 0.3Mb | 0.05Mb | - | |
| | - | - | 0.2K | - | - | |
| | - | - | 0.2L | - | - | |
| **Amoxicillin** | 0.01Et | - | - | - | - | 21 CFR 556.38 |
| **Ampicillin** | 0.01Et | - | 0.01Et | - | - | 21 CFR 556.40 |
| **Amprolium** | 2.0F[5] | - | - | 1.0K[6] | - | 21 CFR 556.50 |
| | 0.5K[5] | - | - | 1.0L[6] | - | |
| | 0.5L[5] | - | - | 0.5M[6] | - | |
| | 0.5M[5] | - | - | - | - | |
| **Apramycin** | - | - | 0.1K[3] | - | - | 21 CFR 556.52 |

| Compound | Cattle | Sheep/Goats | Swine | Poultry | Horses | Reference |
|---|---|---|---|---|---|---|
| **Arsenic** | - | - | 2.0K | 0.5M[6] | - | 21 CFR 556.60 |
| | - | - | 2.0L | 2.0Et[6] | - | |
| | - | - | 0.5 Mb | | - | |
| | - | - | 0.5M | | - | |
| **Atrazine** | 0.02F | 0.02F | 0.02F | 0.02F | 0.02F | 40 CFR 180.220 |
| | 0.02M | 0.02M | 0.02M | 0.02M | 0.02M | |
| | 0.02Mb | 0.02Mb | 0.02Mb | 0.02Mb | 0.02Mb | |
| **Avermectin** | 0.015 F | - | - | - | - | 40 CFR 180.449 |
| | 0.02 L | - | - | - | - | 54 FR 31836 |
| | 0.02 M | - | - | - | - | 21 CFR 556.344 |
| | 0.02 Mb | | | | | |
| **Azoxystrobin** | 0.3L | 0.3L | 0.2L | 0.4L | 0.3L | 40 CFR 180.507 |
| | 0.01M | 0.01M | 0.01M | 0.01M | 0.01M | |
| | 0.01F | 0.01F | 0.01F | 0.01F | 0.01F | |
| | 0.06K | - | - | - | - | |
| **Bacitracin** | 0.5Et | - | 0.5Et | 0.5Et[1,8] | - | 21 CFR 556.70 |
| **Bambermycin** | [21] | - | - | [21] | - | 21 CFR 556.428 |
| **Benomyl** | 0.1F | 0.1F | 0.1F | 0.1F | 0.1F | 40 CFR 180.294 |
| **& metabolites** | - | - | - | 0.2L | - | |
| | 0.1M | 0.1M | 0.1M | 0.1M | 0.1M | |
| | 0.1Mb | 0.1Mb | 0.1Mb | 0.1Mb | 0.1Mb | |
| **Benoxacor** | 0.01 F | 0.01 F | 0.01 F | 0.01 F | 0.01 F | 40 CFR 180.460 |
| | 0.01 K | 0.01 K | 0.01 K | - | 0.01 K | |
| | 0.01 L | 0.01 L | 0.01 L | 0.01 L | 0.01 L | |
| | 0.01 M | 0.01 M | 0.01 M | 0.01 M | 0.01 M | |
| | 0.01 Mb | 0.01 Mb | 0.01 Mb | 0.01 Mb | 0.01 Mb | |
| **Bentazon** | 0.05F | 0.05F | 0.05F | 0.05F | - | 40 CFR 180.355 |
| **& metabolite** | 0.05M | 0.05M | 0.05M | 0.05M | - | |
| | 0.05Mb | 0.05Mb | 0.05Mb | 0.05Mb | - | |
| **Benzene hexachloride** | 0.3F[4] | 0.3F[4]- | 0.3F[4] | 0.3F[4] | 0.3F[4] | 51 FR25697 |
| **Bifenthrin** | 1.0F | 1.0F | 1.0F | 0.05F | 1.0 F | 40 CFR 180.442 |
| | 0.5M | 0.5M | 0.5M | 0.05M | 0.5M | |
| | 0.1Mb | 0.1Mb | 0.1Mb | 0.05Mb | 0.1Mb | |
| **Bromoxynil** | 1.0F | 1.0F | 1.0F | - | 1.0F | 40 CFR 180.324 |
| | 0.5M | 0.5M | 0.5M | - | 0.5M | |
| | 3.0Mb | 3.0.Mb | 3.0Mb | - | 3.0Mb | |

| Compound | Cattle | Sheep/Goats | Swine | Poultry | Horses | Reference |
|---|---|---|---|---|---|---|
| **Buprofezin** | 0.02F<br>0.5Mb<br>0.02M | 0.02F<br>0.5Mb<br>0.02M | 0.02F<br>0.5Mb<br>0.02M | -<br>-<br>- | 0.02F<br>0.5Mb<br>0.02M | 40 CFR 180.511 |
| **Buquinolate** | -<br>-<br>-<br>- | -<br>-<br>-<br>- | -<br>-<br>-<br>- | 0.4K<br>0.4L<br>0.1M<br>0.4SF | -<br>-<br>-<br>- | 21 CFR 556.90 |
| **Sec-butylamine** | [27] | -<br>-<br>-<br>- | -<br>-<br>-<br>- | -<br>-<br>-<br>- | -<br>-<br>-<br>- | 40 CFR 180.321 |
| **Cacodylic acid (as $As_2O_3$)** | 0.7F<br>1.4K<br>1.4L<br>0.7M<br>0.7Mb | -<br>-<br>-<br>-<br>- | -<br>-<br>-<br>-<br>- | -<br>-<br>-<br>-<br>- | -<br>-<br>-<br>-<br>- | 40 CFR 180.311 |
| **Captan** | 0.05F<br>0.05M<br>0.05Mb | -<br>-<br>- | 0.05F<br>0.05M<br>0.05Mb | -<br>-<br>- | -<br>-<br>- | 40 CFR 180.103 |
| **Carbadox & metabolite** | - | - | 0.03 L | - | - | 21 CFR 556.100 |
| **Carbaryl & metabolites** | 0.1F<br>1.0K<br>1.0L<br>0.1M<br>0.1Mb | 0.1F<br>1.0K<br>1.0L<br>0.1M<br>0.1Mb | 0.1F<br>1.0K<br>1.0L<br>0.1M<br>0.1Mb | 5.0 F<br>-<br>-<br>5.0 M<br>- | 0.1F<br>1.0K<br>1.0L<br>0.1M<br>0.1Mb | 40 CFR 180.169 |
| **Carbofuran & metabolites** | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | -<br>-<br>- | 0.05F<br>0.05M<br>0.05Mb | 40 CFR 180.254 |
| **Carbomycin** | - | - | - | 0 Et[2] | - | 21 CFR 556.110 |
| **Carbophenothion** | 0.1F | 0.1F | 0.1F | - | - | 40 CFR 180.156 |
| **Carboxin & metabolite** | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 40 CFR 180.301 |
| **Ceftiofur & metabolites** | 8.0 K<br>2.0 L<br>1.0 M | - | - | - | - | 21 CFR 556.115<br>21 CFR 556.113 |
| **Cephapirin** | 0.1Et | - | - | - | - | 21 CFR 556.115 |
| **Chlordane** | 0.3F[4] | 0.3F[4] | 0.3F[4] | 0.3F[4] | 0.3F[4] | 51 FR 46665 |

| Compound | Cattle | Sheep/Goats | Swine | Poultry | Horses | Reference |
|---|---|---|---|---|---|---|
| **Chlordimeform** | 0.01F<br>0.1M<br>0.1Mb | 0.01F<br>0.1M<br>0.1Mb | 0.01F<br>0.1M<br>0.1Mb | 0.25F<br>0.25M<br>0.25Mb | 0.01F<br>0.1M<br>0.1Mb | 40 CFR 180.285 |
| **Chlorfenapyr** | 0.1F<br>0.3Mb<br>0.01M | 0.1F<br>0.3Mb<br>0.01M | 0.1F<br>0.3Mb<br>0.01M | -<br>-<br>- | 0.1F<br>0.3Mb<br>0.01M | 40CFR 180.513 |
| **Chlorfenvinphos** | 0.2F | 0.2F | 0.005F | 0.005F | 0.005F | Administrative Guideline/action level |
| **Chlorhexidine** | 0(0.001)Et[5] | - | - | - | - | 21 CFR 556.120 |
| **2-Chloro-N-isopropylacetanilide [Propachlor]** | 0.02F<br>0.02M<br>0.02Mb | 0.02F<br>0.02M<br>0.02Mb | 0.02F<br>0.02M<br>0.02Mb | 0.02F<br>0.02M<br>0.02Mb | 0.02F<br>0.02M<br>0.02Mb | 40 CFR 180.211 |
| **Chloroneb** | 0.2F<br>0.2M<br>0.2Mb | 0.2F<br>0.2M<br>0.2Mb | 0.2F<br>0.02M<br>0.2Mb | -<br>-<br>- | 0.2F<br>0.2M<br>0.2Mb | 40 CFR 180.257 |
| **Beta-(4-chlorophenoxy) -alpha-(1,1-dimethyl-1H-1,2,4-triazole-l-enthanol) [Triadimenol]** | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.01F<br>0.01M<br>0.01Mb | 0.1F<br>0.1M<br>0.1Mb | 40 CFR 180.450 |
| **1-(4-Chlorophenoxy) -3,3- dimethyl-1-(1H-1, 2,4-triazol-1-yl)-2-butanone & metabolites [Triadimefon]** | 1.0F<br>1.0M<br>1.0Mb | 1.0F<br>1.0M<br>1.0Mb | 0.04F<br>0.04M<br>0.04Mb | 0.04F<br>0.04M<br>0.04Mb | 1.0F<br>1.0M<br>1.0Mb | 40 CFR 180.410 |
| **2-(m-chlorophenoxy) propionic acid)** | [28] | [28] | [28] | [28] | [28] | 40 CFR 180.325 |
| **2-chloro-1-(2,4,5-tri-chlorophenyl) vinyl dimethyl phosphate [Stirofos, Tetrachlorvinphos]** | 1.5F | 0.5F | 1.5F | 0.75F | 0.5F | 40 CFR 180.252 |
| **Chlorpropham** | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 40 CFR 180.319 |
| **Chlorpyrifos & metabolite** | 0.3F<br>0.05M<br>0.05Mb | 0.2F<br>0.05M<br>0.05Mb | 0.2F<br>0.05M<br>0.05Mb | 0.1F<br>0.1M<br>0.1Mb | 0.25F<br>0.25M<br>0.25Mb | 40 CFR 180.342 |
| **Chloropyrifos-methyl & metabolite** | 0.5F<br>0.5M<br>0.5Mb | 0.5F<br>0.5M<br>0.5Mb | 0.5F<br>0.5M<br>0.5Mb | 0.5F<br>0.5M<br>0.5Mb | 0.5F<br>0.5M<br>0.5Mb | 40 CFR 180.419 |

| Compound | Cattle | Sheep/Goats | Swine | Poultry | Horses | Reference |
|---|---|---|---|---|---|---|
| **Chlorsulfuron** | 0.3F<br>0.3Mb<br>0.3M | 0.3F<br>0.3Mb<br>0.3M | 0.3F<br>0.3Mb<br>0.3M | -<br>-<br>- | 0.3F<br>0.3Mb<br>0.3M | 40 CFR 180.405 |
| **Chlortetracycline** | 12.0F[22]<br>12.0K[22]<br>6.0L[22]<br>2.0M[22] | 12.0F[10, 22]<br>12.0K[10, 22]<br>6.0L[10, 22]<br>2.0M[10, 22] | 12.0F[22]<br>12.0K[22]<br>6.0L[22]<br>2.0M[22] | 12.0F[22]<br>12.0K[22]<br>6.0L[22]<br>2.0M[22] | -<br>-<br>-<br>- | 21 CFR 556.150 |
| **Clethodim** | 0.2F<br>0.2M<br>0.2Mb | 0.2F<br>0.2M<br>0.2Mb | 0.2F<br>0.2M<br>0.2Mb | 0.2F<br>0.2M<br>0.2Mb | 0.2F<br>0.2M<br>0.2Mb | 40 CFR 180.458 |
| **Clofencet** | 0.04F<br>10.0K<br>0.5Mb<br>0.15M | 0.04F<br>10.0K<br>0.5Mb<br>0.15M | 0.04F<br>10.0K<br>0.5Mb<br>0.15M | 0.04F<br>-<br>0.2Mb<br>0.15M | 0.04F<br>10.0K<br>0.5Mb<br>0.15M | 40 CFR 180.497 |
| **Clofentezine & metabolite** | 0.05F<br>0.4L<br>0.05M<br>0.05Mb | 0.05F<br>0.4L<br>0.05M<br>0.05Mb | 0.05F<br>0.4L<br>0.05M<br>0.05Mb | -<br>-<br>-<br>- | 0.05F<br>0.4L<br>0.05M<br>0.05Mb | 40 CFR 180.446 |
| **Clopidol** | 3.0K<br>1.5L<br>0.2M | 3.0K<br>1.5L<br>0.2M | 0.2Et<br>-<br>- | 15.0K<br>15.0L<br>5.0M | -<br>-<br>- | 21 CFR 556.160 |
| **Clopyralid** | 1.0F<br>12.0K<br>1.0M<br>1.0Mb | 1.0F<br>12.0K<br>1.0M<br>1.0Mb | 0.2F<br>-<br>0.2M<br>0.2Mb | 0.2F<br>-<br>0.2M<br>0.2Mb | 1.0F<br>12.0K<br>1.0M<br>1.0Mb | 40 CFR 180.431 |
| **Clorsulon** | 1.0K[11] | - | - | - | - | 21 CFR 556.163 |
| **Cloxacillin** | 0.01Et | - | - | - | - | 21 CFR 556.165 |
| **Coordination product of zinc & maneb** | 0.5K<br>0.5L | 0.5K<br>0.5L | 0.5K<br>0.5L | 0.5K<br>0.5L | 0.5K<br>0.5L | 40 CFR 180.176 |
| **Coumaphos & oxygen analog** | 1.0F<br>1.0M<br>1.0Mb | 1.0F<br>1.0M<br>1.0Mb | 1.0F<br>1.0M<br>1.0Mb | 1.0F<br>1.0M<br>1.0Mb | 1.0F<br>1.0M<br>1.0Mb | 40 CFR 180.189 |
| **Cyano (3-phenoxyphenyl)-methyl-4-chloro-a-(1-methyl-ethyl benzene acetate) [Fenvalerate]** | 1.5F<br>1.5M<br>1.5Mb | 1.5F<br>1.5M<br>1.5Mb | 1.5F<br>1.5M<br>1.5Mb | -<br>-<br>- | 1.5F<br>1.5M<br>1.5Mb | 40 CFR 180.379 |

| Compound | Cattle | Sheep/Goats | Swine | Poultry | Horses | Reference |
|---|---|---|---|---|---|---|
| **Cyclanilide** | 0.1F<br>2.0K<br>0.02M<br>0.2Mb | 0.1F<br>2.0K<br>0.02M<br>0.2Mb | 0.1F<br>2.0K<br>0.02M<br>0.2Mb | -<br>-<br>-<br>- | 0.1F<br>2.0K<br>0.02M<br>0.2Mb | 40 CRF 180.506 |
| **Cyfluthrin** | 5.0F<br>0.4M<br>0.4Mb | 5.0F<br>0.4M<br>0.4Mb | 5.0F<br>0.4M<br>0.4Mb | 0.01F<br>0.01M<br>0.01Mb | 5.0F<br>0.4M<br>0.4Mb | 40 CFR 180.436 |
| **Cyhalothrin** | 3.0F<br>0.2M<br>0.2Mb | 3.0F<br>0.2M<br>0.2Mb | 3.0F<br>0.2M<br>0.2Mb | 0.01F<br>0.01M<br>0.01Mb | 3.0F<br>0.2M<br>0.2Mb | 40 CFR 180.438 |
| **Cyhexatin & metabolites** | 0.2F<br>0.5K<br>0.5L<br>0.2M<br>0.2Mb | 0.2F<br>0.5K<br>0.5L<br>0.2M<br>0.2Mb | 0.2F<br>0.5K<br>0.5L<br>0.2M<br>0.2Mb | -<br>-<br>-<br>-<br>- | 0.2F<br>0.5K<br>0.5L<br>0.2M<br>0.2Mb | 40 CFR 180.144 |
| **Cypermethrin** | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | -<br>-<br>- | 0.05F<br>0.05M<br>0.05Mb | 40 CFR 180.418 |
| **Cyromazine** | -<br>-<br>- | -<br>-<br>- | -<br>-<br>- | 0.05F[12]<br>0.05M[12]<br>0.05Mb[12] | -<br>-<br>- | 40 CFR 180.414 |
| **2,4-D & metabolite** | 0.2F<br>2.0K<br>0.2M<br>0.2Mb | 0.2F<br>2.0K<br>0.2M<br>0.2Mb | 0.2F<br>2.0K<br>0.2M<br>0.2Mb | 0.05Et<br>-<br>-<br>- | 0.2F<br>2.0K<br>0.2M<br>0.2Mb | 40 CFR 180.142 |
| **Dalapon** | 0.2M<br>0.2Mb | 0.2M<br>0.2Mb | 0.2M<br>0.2Mb | 3.0Et<br>9.0K | -<br>- | 40 CFR 180.150 |
| **DDT & metabolites** | 5.0F[4] | 5.0F[4] | 5.0F[4] | 5.0F[4] | 5.0F[4] | 51 FR 46658 |
| **Decoquinate** | 2.0Et<br>1.0Sm | 2.0Et[13]<br>1.0Sm[13] | -<br>- | 2.0Et[2, 3]<br>1.0Sm[2] | -<br>- | 21 CFR 556.170 |
| **Dialifor & oxygen analog** | [29] | [29] | -<br>-<br>- | [29] | -<br>-<br>- | 40 CFR 180.326 |
| **Diazinon** | 0.7F<br>0.7M<br>0.7Mb | 0.7F[10]<br>0.7M[10]<br>0.7Mb[10] | -<br>-<br>- | -<br>-<br>- | -<br>-<br>- | 40 CFR 180.153 |

| Compound | Cattle | Sheep/Goats | Swine | Poultry | Horses | Reference |
|---|---|---|---|---|---|---|
| **Dicamba & metabolite** | 0.2F<br>1.5K<br>1.5L<br>0.2M<br>0.2Mb | 0.2F<br>1.5K<br>1.5L<br>0.2M<br>0.2Mb | 0.2F<br>1.5K<br>1.5L<br>0.2M<br>0.2Mb | -<br>-<br>-<br>-<br>- | 0.2F<br>1.5K<br>1.5L<br>0.2M<br>0.2Mb | 40 CFR 180.227 |
| **3,5-Dichloro-N-(1,1-dimethyl-2-propynyl) benzamide & metabolites [Pronamide]** | 0.02F<br>0.4K<br>0.4L<br>0.02M<br>0.02Mb | 0.02F<br>0.4K<br>0.4L<br>0.02M<br>0.02Mb | 0.02F<br>0.4K<br>0.4L<br>0.02M<br>0.02Mb | 0.02F<br>0.2K<br>0.2L<br>0.02M<br>0.02Mb | 0.02F<br>0.4K<br>0.4L<br>0.02M<br>0.02Mb | 40 CFR 180.317 |
| **1-[2-(2,4-Dichlorophenyl)-4-propyl-1,3-dioxolan-2-y]methyl]-1H-1,2,4-triazole & metabolites [Propiconazole]** | 0.1F<br>2.0K<br>2.0L<br>0.1M<br>0.1Mb | 0.1F<br>2.0K<br>2.0L<br>0.1M<br>0.1Mb | 0.1F<br>2.0K<br>2.0L<br>0.1M<br>0.1Mb | 0.1F<br>0.2K<br>0.2L<br>0.1M<br>0.1Mb | 0.1F<br>2.0K<br>2.0L<br>0.1M<br>0.1Mb | 40 CFR 180.434 |
| **Dichlorvos** | 0.02F<br>0.02M<br>0.02Mb | 0.02F<br>0.02M<br>0.02Mb | 0.1F<br>0.1M<br>0.2Mb | 0.05F<br>0.05M<br>0.05Mb | 0.02F<br>0.02M<br>0.02Mb | 40 CFR 180.235<br>21 CFR 556.180 |
| **Dieldrin** | 0.3F[4] | 0.3F[4] | 0.3F[4] | 0.3F[4] | 0.3F[4] | 51 FR 46662 |
| **3,7-Dichloro-8-quinoline carboxylic acid** | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.1Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.1Mb | 0.05F<br>0.05M<br>0.05Mb | 40 CFR 180.463 |
| **Difenoconazole** | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 40 CFR 180.475 |
| **Difenzoquat** | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 40 CFR 180.369 |
| **Diflubenzuron** | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 40 CFR 180.377 |
| **Dihydrostreptomycin** | 0.5Et<br>2.0K | -<br>- | 0.5Et<br>2.0K | -<br>- | -<br>- | 21 CFR 556.200 |
| **Dimethipin** | 0.02F<br>0.02M<br>0.02Mb | 0.02F<br>0.02M<br>0.02Mb | 0.02F<br>0.02M<br>0.02Mb | -<br>-<br>- | 0.02F<br>0.02M<br>0.02Mb | 40 CFR 180.406 |
| **Dimethoate & oxygen analog** | 0.02F<br>0.02M<br>0.02Mb | 0.02F<br>0.02M<br>0.02Mb | 0.02F<br>0.02M<br>0.02Mb | 0.02F<br>0.02M<br>0.02Mb | 0.02F<br>0.02M<br>0.02Mb | 40 CFR 180.204 |

| Compound | Cattle | Sheep/Goats | Swine | Poultry | Horses | Reference |
|---|---|---|---|---|---|---|
| **O,O-dimethyl-S-[(4-oxo-1,2,3-benzotriazin- 3(4H)-yl) methyl] phosphorodithioate [Azinphosmethyl]** | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | -<br>-<br>- | -<br>-<br>- | 0.1F<br>0.1M<br>0.1Mb | 40 CFR 180.154 |
| **N,N-dimethylpiperidinium chloride** | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 40 CFR 180.384 |
| **Dimethyl-(2,2,2-trichloro-1-hydroxyethyl) phosphonate** | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | -<br>-<br>- | -<br>-<br>- | 0.1F<br>0.1M<br>0.1Mb | 40 CFR 180.198 |
| **3,5-Dinitrobenzamide** | - | - | - | 0 Et[2] | - | 21 CFR 556.220 |
| **Dioxathion** | [30] | [30] | 1.0F | - | 1.0F | 40 CFR 180.171 |
| **Diphenamid** | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | -<br>-<br>- | 0.05F<br>0.05M<br>0.05Mb | 40 CFR 180.230 |
| **Diphenylamine** | 0M | 0M | 0M | 0M | 0M | 40 CFR 180.190 |
| **Dipropyl isocinchomeronate** | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | -<br>-<br>- | 0.1F<br>0.1M<br>0.1Mb | 40 CFR 180.143 |
| **Diquat** | 0.02F<br>0.02M<br>0.02Mb | 0.02F<br>0.02M<br>0.02Mb | 0.02F<br>0.02M<br>0.02Mb | 0.02F<br>0.02M<br>0.02Mb | 0.02F<br>0.02M<br>0.02Mb | 40 CFR 180.226 |
| **Diuron** | 1.0F<br>1.0M<br>1.0Mb | 1.0F<br>1.0M<br>1.0Mb | 1.0F<br>1.0M<br>1.0Mb | -<br>-<br>- | 1.0F<br>1.0M<br>1.0Mb | 40 CFR 180.106 |
| **Dodine** | 0M | 0M | 0M | 0M | 0M | 40 CFR 180.172 |
| **Doramectin** | 0.1L | - | 0.16L | - | - | 21 CFR 556.228<br>21 CFR 556.225 |
| **Endosulfan & Metabolite** | 0.2F<br>0.2M<br>0.2Mb | 0.2F<br>0.2M<br>0.2Mb | 0.2F<br>0.2M<br>0.2Mb | -<br>-<br>- | 0.2F<br>0.2M<br>0.2Mb | 40 CFR 180.182 |
| **Endrin** | 0.3F[4] | 0.3F[4] | 0.3F[4] | 0.3F[4] | 0.3F[4] | MPI Dir 917.1 |
| **Enrofloxacin** | 0.1M[33] | - | - | 0.3M | - | 21 CFR 556.228 |
| **Eprinomectin** | 4.8L | - | - | - | - | 21 CFR 556.227 |
| **Erythromycin** | 0.1Et | - | 0.1Et | 0.125Et | - | 21 CFR 556.230 |

| Compound | Cattle | Sheep/Goats | Swine | Poultry | Horses | Reference |
|---|---|---|---|---|---|---|
| **Esfenvalerate** | - | - | - | 0.3F<br>0.03L<br>0.3M<br>0.3MB | - | 40 CFR 180.533 |
| **Estradiol benzoate & related esters** | 480F[4,23]<br>360K[4,23]<br>240L[4,23]<br>120M[4,23] | 600F[14,23]<br>600K[14,23]<br>600L[14,23]<br>120M[14,23] | -<br>-<br>-<br>- | -<br>-<br>-<br>- | -<br>-<br>-<br>- | 21 CFR 556.240 |
| **Ethalfluralin** | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 40 CFR 180.416 |
| **Ethephon** | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | -<br>-<br>- | 0.1F<br>0.1M<br>0.1Mb | 40 CFR 180.300 |
| **Ethion & oxygen analog** | 2.5F<br>2.5M[15]<br>1.0Mb | 0.2F<br>0.2M<br>0.2Mb | 0.2F<br>0.2M<br>0.2Mb | 0.2F<br>0.2M<br>0.2Mb | 0.2F<br>0.2M<br>0.2Mb | 40 CFR 180.173 |
| **Ethofumesate & metabolites** | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | -<br>-<br>- | 0.05F<br>0.05M<br>0.05Mb | 40 CFR 180.345 |
| **Ethopabate** | -<br>-<br>- | -<br>-<br>- | -<br>-<br>- | 1.5K[2]<br>1.5L[2]<br>0.5M[2] | -<br>-<br>- | 21 CFR 556.260 |
| **2-[1-Ethoxyimino)butyl)-5[2-(ethylthio)propyl]-3-hydroxy-2-cyclohexene-1-one & metabolites [Sethoxydim]** | 0.2F<br>0.2M<br>0.2Mb | 0.2F<br>0.2M<br>0.2Mb | 0.2F<br>0.2M<br>0.2Mb | 0.2F<br>0.2M<br>0.2Mb | 0.2F<br>0.2M<br>0.2Mb | 40 CFR 180.412 |
| **Ethoxyquin** | 5.0F<br>-<br>0.5M | 5.0F<br>-<br>0.5M | 5.0F<br>-<br>0.5M | 3.0F<br>3.0L<br>0.5M | 5.0F<br>-<br>0.5M | 21 CFR 172.140 |
| **5-Ethoxy-3-(trichloro-methyl)-1,2,4-thiadiazole & metabolite[Etridazole]** | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 40 CFR 180.370 |
| **Ethyl 4,4'-dichlorobenzilate [Chlorobenzilate]** | 0.5F<br>0.5M<br>0.5Mb | 0.5F[10]<br>0.5M[10]<br>0.5Mb[10] | -<br>-<br>- | -<br>-<br>- | -<br>-<br>- | 40 CFR 180.109 |

| Compound | Cattle | Sheep/Goats | Swine | Poultry | Horses | Reference |
|---|---|---|---|---|---|---|
| **Ethyl 3-methyl-4-(methylthio)phenyl (1-methylethyl) phosphoramidate** [**Fenamiphos**] | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | -<br>-<br>- | 0.05F<br>0.05M<br>0.05Mb | 40 CFR 180.349 |
| **O-Ethyl-O-[4-(methylthio)-phenyl]-S-propyl phosphorodithioate & metabolites [Sulprofos]** | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.01F<br>0.01M<br>0.01Mb | 0.1F<br>0.1M<br>0.1MB | 40 CFR 180.374 |
| **S-[2-(Ethyl sulfinyl)-ethyl] O,O-dimethyl-phosphorodithioate & metabolites [Oxydemeton methyl]** | 0.01F<br>0.01M<br>0.01Mb | 0.01F<br>0.01M<br>0.01Mb | 0.01F<br>0.01M<br>0.01Mb | -<br>-<br>- | 0.01F<br>0.01M<br>0.01Mb | 40 CFR 180.330 |
| **Famphur** | 0.1F<br>0.1M<br>0.1Mb | -<br>-<br>- | -<br>-<br>- | -<br>-<br>- | -<br>-<br>- | 21 CFR 556.2738 |
| **Fenarimol** | 0.1F<br>0.1K<br>0.1L<br>0.01M<br>0.01Mb | 0.1F<br>0.1K<br>0.1L<br>0.01M<br>0.01Mb | 0.1F<br>0.1K<br>0.1L<br>0.01M<br>0.01Mb | 0.01F<br>-<br>-<br>0.01M<br>0.01Mb | 0.1F<br>0.1K<br>0.1L<br>0.01M<br>0.01Mb | 40 CFR 180.421 |
| **Fenbendazole** | 0.8L | 0.8L[5] | [21] | - | - | 21 CFR 556.275 |
| **Fenoxaprop-ethyl & metabolites**[4] | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | -<br>-<br>- | 0.05F<br>0.05M<br>0.05Mb | 56 FR 42531 |
| **Fenprostalene** | [21, 24] | - | - | - | - | 21 CFR 556.277 |
| **Fenpropathrin** | 1.0F<br>0.1M<br>0.1Mb | 1.0F<br>0.1M<br>0.1Mb | 1.0F<br>0.1M<br>0.1Mb | 0.05F<br>0.05M<br>0.05Mb | 1.0F<br>0.1M<br>0.1Mb | 40 CFR 180.466 |
| **Fenridazon, potassium salt** | 0.05F<br>1.0K<br>1.0L<br>0.05M<br>0.05Mb | 0.05F<br>1.0K<br>1.0L<br>0.05M<br>0.05Mb | 0.05F<br>1.0K<br>1.0L<br>0.05M<br>0.05Mb | 0.30F<br>-<br>-<br>0.30M<br>0.30Mb | 0.05F<br>1.0K<br>1.0L<br>0.05M<br>0.05Mb | 40 CFR 180.423 |
| **Fenthion & metabolites** | 0.1F<br>0.1M<br>0.1Mb | -<br>-<br>- | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | -<br>-<br>- | 40 CFR 180.214 |

| Compound | Cattle | Sheep/Goats | Swine | Poultry | Horses | Reference |
|---|---|---|---|---|---|---|
| **Fipronil** | 0.4F<br>0.1L<br>0.04M<br>0.04Mb | 0.4F<br>0.1L<br>0.04M<br>0.04Mb | 0.04F<br>0.02L<br>0.01M<br>0.01Mb | 0.05F<br>-<br>0.02M<br>0.02Mb | 0.04F<br>0.1L<br>0.04M<br>0.04Mb | 40 CFR 180.517 |
| **Florphenicol** | 3.7L<br>0.3M | - | - | - | - | 21 CFR 556.283 |
| **Fluazifop & butyl ester** | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 40 CFR 180.411 |
| **Flunixin meglumine** | 0.125L<br>0.03M | | | | | |
| **Fluridone** | 0.05F<br>0.1K<br>0.1L<br>0.05M<br>0.05Mb | 0.05F<br>0.1K<br>0.1L<br>0.05M<br>0.05Mb | 0.05F<br>0.1K<br>0.1L<br>0.05M<br>0.05Mb | 0.05F<br>0.1K<br>0.1L<br>0.05M<br>0.05Mb | 0.05F<br>0.1K<br>0.1L<br>0.05M<br>0.05Mb | 40 CFR 180.420 |
| **Fluroxypyr 1-methylheptyl ester** | 0.1F<br>0.5K<br>0.1M<br>0.1Mb | 0.1F<br>0.5K<br>0.1M<br>0.1Mb | 0.1F<br>0.5K<br>0.1M<br>0.1Mb | -<br>-<br>-<br>- | 0.1F<br>0.5K<br>0.1M<br>0.1Mb | 40 CFR 180.535 |
| **N-(3-(1-methylethoxy)phenyl -2-(Trifluromethyl) benzamide [Flutolanil]** | 0.1F<br>1.0K<br>2.0L<br>0.05M<br>0.05Mb | 0.1F<br>1.0K<br>2.0L<br>0.05M<br>0.05Mb | 0.1F<br>1.0K<br>2.0L<br>0.05M<br>0.05Mb | 0.05F<br>-<br>-<br>0.05M<br>0.05Mb | 0.1F<br>1.0K<br>2.0L<br>0.05M<br>0.05Mb | 40 CFR 180.484 |
| **Fluvalinate** | 0.01F<br>0.01M<br>0.01Mb | 0.01F<br>0.01M<br>0.01Mb | 0.01F<br>0.01M<br>0.01Mb | 0.01F<br>0.01M<br>0.01Mb | 0.01F<br>0.01M<br>0.01Mb | 40 CFR 180.427 |
| **Furazolidone** | - | - | 0 Et | - | - | 21 CFR 556.290 |
| **Gentamicin sulfate** | -<br>-<br>-<br>- | -<br>-<br>-<br>- | 0.4F<br>0.4K<br>0.3L<br>0.1M | 0.1Et[6]<br>-<br>-<br>- | -<br>-<br>-<br>- | 21 CFR 556.300 |
| **Glufosinate** | 0.05F<br>0.05M<br>0.1Mb | 0.05F<br>0.05M<br>0.1Mb | 0.05F<br>0.05M<br>0.1Mb | 0.05F<br>0.05M<br>0.1Mb | 0.05F<br>0.05M<br>0.1Mb | 40 CFR 180.473 |
| **Glyphosate & metabolite** | 4.0K<br>0.5L | 4.0K<br>0.5L | 4.0K<br>0.5L | 0.5K<br>0.5L | 4.0K<br>0.5L | 40 CFR 180.364 |

| Compound | Cattle | Sheep/Goats | Swine | Poultry | Horses | Reference |
|---|---|---|---|---|---|---|
| **Halofuginone** | -<br>- | -<br>- | -<br>- | 0.16L[25]<br>0.13L[1] | -<br>- | 21 CFR 556.308 |
| **Halosulfuron** | 0.1M<br>0.1Mb | 0.1M<br>0.1Mb | 0.1M<br>0.1Mb | - | 0.1M<br>0.1Mb | 40 CFR 180.479<br>40 CFR 180.479 |
| **Haloxon** | 0.1Et | - | - | - | - | 21 CFR 556.310 |
| **HCB**[4] | 0.5F | 0.5F | 0.5F | 0.5F | 0.5F | MPI Dir 917.1 |
| **Heptachlor & heptachlor epoxide**[4] | 0.2F<br>0.2M<br>0.2Mb | 0.2F<br>0.2M<br>0.2Mb | 0.2F<br>0.2M<br>0.2Mb | 0.2F<br>0.2M<br>0.2Mb | 0.2F<br>0.2M<br>0.2Mb | 54 FR 33690<br>MPI Dir 917.1 |
| **Hexakis (2-methyl-2-phenylpropyl) distannoxane [Fenbutatin oxide]** | 0.5F<br>0.5M<br>0.5Mb | 0.5F<br>0.5M<br>0.5Mb | 0.5F<br>0.5M<br>0.5Mb | 0.1F<br>0.1M<br>0.1Mb | 0.5F<br>0.5M<br>0.5Mb | 40 CFR 180.362 |
| **Hexazinone & metabolite** | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | -<br>-<br>- | 0.1F<br>0.1M<br>0.1Mb | 40 CFR 180.396 |
| **Hygromycin B** | - | - | 0Et | 0Et | - | 21 CFR 556.330 |
| **Imazalil & metabolites [enilconazole]** | 0.01F<br>0.5L<br>0.01M<br>0.01Mb | 0.01F<br>0.5L<br>0.01M<br>0.01Mb | 0.01F<br>0.5L<br>0.01M<br>0.01Mb | -<br>-<br>-<br>- | 0.01F<br>0.5L<br>0.01M<br>0.01Mb | 40 CFR 180.413 |
| **Imidacloprid** | 0.3F<br>0.3M<br>0.3Mb | 0.3F<br>0.3M<br>0.3Mb | 0.3F<br>0.3M<br>0.3Mb | 0.05F<br>0.05M<br>0.05Mb | 0.3F<br>0.3M<br>0.3Mb | 40 CFR 180.472 |
| **Iprodione & metabolites** | 0.5F<br>3.0K<br>3.0L<br>0.5M<br>0.5Mb | 0.5F<br>3.0K<br>3.0L<br>0.5M<br>0.5Mb | 0.5F<br>3.0K<br>3.0L<br>0.5M<br>0.5Mb | 3.5F<br>-<br>-<br>1.0M<br>1.0Mb | 0.5F<br>3.0K<br>3.0L<br>0.5M<br>0.5Mb | 40 CFR 180.399 |
| **Isopropyl carbanilate**[17] **[IPC, Isopropocarb]** | 31 | 31 | 31 | 31 | 31 | 40 CFR 180.319 |
| **Isopropyl-m-chlorocarbanilate** [17] **[CIPC, chlorpropham]** | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 40CFR 180.3192 |
| **Ivermectin** | 0.1L | 0.03L | 0.02L | - | - | 21 CFR 566.344 |

| Compound | Cattle | Sheep/Goats | Swine | Poultry | Horses | Reference |
|---|---|---|---|---|---|---|
| **Lambda-cyhalothrin** | 3.0F<br>0.2M<br>0.2Mb | 3.0F<br>0.2M<br>0.2Mb | 3.0F<br>0.2M<br>0.2Mb | 0.03F<br>0.01M<br>0.01Mb | 3.0F<br>0.2M<br>0.2Mb | 40 CFR 180.438 |
| **Lasalocid** | 0.7L[18] | [21, 10] | - | 0.3Sf[2, 18] | - | 21 CFR 556.347 |
| **Levamisole** | 0.1Et | 0.1Et[10] | 0.1Et | - | - | 21 CFR 556.350 |
| **Lincomycin** | - | - | 0.1Et | - | - | 21 CFR 556.360 |
| **Lindane** | 7.0F | 7.0F | 4.0F | - | 7.0F | 40 CFR 180.133<br>MPI Dir 917.1 |
| **Linuron** | 1.0F<br>1.0M<br>1.0Mb | 1.0F<br>1.0M<br>1.0Mb | 1.0F<br>1.0M<br>1.0Mb | -<br>-<br>- | 1.0F<br>1.0M<br>1.0Mb | 40 CFR 180.184 |
| **Maduramicin** | - | - | - | 0.38F[8] | - | 21 CFR 556.375 |
| **Malathion** | 4.0F<br>4.0M<br>4.0Mb | 4.0F<br>4.0M<br>4.0Mb | 4.0F<br>4.0M<br>4.0Mb | 4.0F<br>4.0M<br>4.0Mb | 4.0F<br>4.0M<br>4.0Mb | 40 CFR 180.111 |
| **Maleic hydrazide** | 3.0F<br>7.0L<br>32.0K<br>2.5M<br>- | 3.0F<br>7.0L<br>32.0K<br>2.5M<br>- | 3.0F<br>7.0L<br>32.0K<br>2.5M<br>- | 0.5F<br>0.5L<br>-<br>0.5M<br>1.4Mb | 3.0F<br>7.0L<br>32.0K<br>2.5M<br>- | 40 CFR 180.175 |
| **Melengestrol Acetate** | 0.025F | - | - | - | - | 21 CFR 556.380 |
| **N-(Mercapto-methyl) phthalimide-S-(O,O-dimethyl phosphoro dithioate) & oxygen analog [Phosmet]** | 0.2F<br>0.2M<br>0.2Mb | 0.2F<br>0.2M<br>0.2Mb | 0.2F<br>0.2M<br>0.2Mb | -<br>-<br>- | 0.2F<br>0.2M<br>0.2Mb | 40 CFR 180.261 |
| **Metalaxyl & metabolite** | 0.4F<br>0.4K<br>0.4L<br>0.05M<br>0.05Mb | 0.4F<br>0.4K<br>0.4L<br>0.05M<br>0.05Mb | 0.4F<br>0.4K<br>0.4L<br>0.05M<br>0.05Mb | 0.4F<br>0.4K<br>0.4L<br>0.05M<br>0.05Mb | 0.4F<br>0.4K<br>0.4L<br>0.05M<br>0.05Mb | 40 CFR 180.408 |
| **Methidathion** | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 40 CFR 180.298 |
| **Methoprene** | 1.0F<br>0.1M<br>0.1Mb | 1.0F<br>0.1M<br>0.1Mb | 1.0F<br>0.1M<br>0.1Mb | 1.0F<br>0.1M<br>0.1Mb | 1.0F<br>0.1M<br>0.1Mb | 40 CFR 180.359 |

| Compound | Cattle | Sheep/Goats | Swine | Poultry | Horses | Reference |
|---|---|---|---|---|---|---|
| **Methoxychlor** | 3.0F | 3.0F | 3.0F | - | 3.0F | 40 CFR 180.120<br>MPI Dir 917.1 |
| **2-Methyl-4- chlorophenoxy-acetic acid & metabolite [MCPA]** | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | -<br>-<br>- | 0.1F<br>0.1M<br>0.1Mb | 40 CFR 180.339 |
| **6-Methyl-1,3- dithiolo [4,5-b] quinoxalin-2-one [Oxythioquinox]** | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | -<br>-<br>- | 0.05F<br>0.05M<br>0.05Mb | 40 CFR 180.338 |
| **1-Methylethyl-2-((ethoxy((1-methylethyl) amino) phosphinothioyl)oxy) benzoate & metabolites [Isofenphos]** | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 40 CFR 180.387 |
| **Metolachlor & metabolites** | 0.02F<br>0.2K<br>0.05L<br>0.02M<br>0.02Mb | 0.02F<br>0.2K<br>0.05L<br>0.02M<br>0.02Mb | 0.02F<br>0.2K<br>0.05L<br>0.02M<br>0.02Mb | 0.02F<br>-<br>0.05L<br>0.02M<br>0.02Mb | 0.02F<br>0.2K<br>0.05L<br>0.02M<br>0.02Mb | 40 CFR 180.368 |
| **Metoserpate hydrochloride** | - | - | - | 0.02Et[2] | - | 21 CFR 556.410 |
| **Metribuzin** | 0.7F<br>0.7M<br>0.7Mb | 0.7F<br>0.7M<br>0.7Mb | 0.7F<br>0.7M<br>0.7Mb | 0.7F<br>0.7M<br>0.7Mb | 0.7F<br>0.7M<br>0.7Mb | 40 CFR 180.332 |
| **Metsulfuron methyl** | 0.1F<br>0.5K<br>0.1M<br>0.1Mb | 0.1F<br>0.5K<br>0.1M<br>0.1Mb | 0.1F<br>0.5K<br>0.1M<br>0.1Mb | -<br>-<br>-<br>- | 0.1F<br>0.5K<br>0.1M<br>0.1Mb | 40 CFR 180.428 |
| **Mirex** | 0.1F[4]<br>0.1M[4]<br>0.1Mb[4] | 0.1F[4]<br>0.1M[4]<br>0.1Mb[4] | 0.1F[4]<br>0.1M[4]<br>0.1Mb[4] | 0.1F[4]<br>0.1M[4]<br>0.1Mb[4] | 0.1F[4]<br>0.1M[4]<br>0.1Mb[4] | 51 FR 45114 |
| **Monensin** | 0.05Et | 0.05Et[13] | - | [12] | - | 21 CFR 556.420 |
| **Morantel tartrate** | 0.7L[19] | 0.7L[13, 19] | - | - | - | 21 CFR 556.425 |
| **Moxidectin** | 0.05M<br>0.02L | | | | | 21 CFR 556.426 |

| Compound | Cattle | Sheep/Goats | Swine | Poultry | Horses | Reference |
|---|---|---|---|---|---|---|
| **Myclobutanil & metabolite** | 0.05F<br>1.0L<br>0.1M<br>0.2Mb | 0.05F<br>1.0L<br>0.1M<br>0.2Mb | 0.05F<br>1.0L<br>0.1M<br>0.2Mb | 0.02F<br>-<br>0.02M<br>0.02Mb | 0.05F<br>1.0L<br>0.1M<br>0.2Mb | 40 CFR 180.443 |
| **Naled & metabolite** | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 40 CFR 180.215 |
| **Narasin** | - | - | - | [12, 2] | - | 21 CFR 556.428 |
| **Neomycin** | 7.2F<br>7.2K<br>3.6L<br>1.2M | 7.2F<br>7.2K<br>3.6L<br>1.2M | 7.2F<br>7.2K<br>3.6L<br>1.2M | -<br>-<br>-<br>- | -<br>-<br>-<br>- | 21 CFR 556.430 |
| **Nequinate** | - | - | - | 0.1Et[2] | - | 21 CFR 556.440 |
| **Nicarbazine** | -<br>-<br>-<br>- | -<br>-<br>-<br>- | -<br>-<br>-<br>- | 4.0K[2]<br>4.0L[2]<br>4.0M[2]<br>4.0S[2] | -<br>-<br>-<br>- | 21 CFR 556.445 |
| **Nicotine** | -<br>-<br>- | -<br>-<br>- | -<br>-<br>- | 1.0F<br>1.0M<br>1.0Mb | -<br>-<br>- | 40 CFR 180.167a |
| **Nitrapyrin & metabolite** | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 40 CFR 180.350 |
| **Norflurazon** | 0.1F<br>0.1M<br>0.1Mb<br>0.25L | 0.1F<br>0.1M<br>0.1Mb<br>0.25L | 0.1F<br>0.1M<br>0.1Mb<br>0.25L | 0.1F<br>0.1M<br>0.1Mb<br>- | 0.1F<br>0.1M<br>0.1Mb<br>0.25L | 40 CFR 180.356 |
| **Novobiocin** | 1.0Et | - | - | 1.0Et | - | 21 CFR 556.460 |
| **Nystatin** | - | - | 0(5.6)Et | 0(5.6)Et | - | 21 CFR 556.470 |
| **N-Octyl bicycloheptene-dicarboxamide** | 0.3F | 0.3F | 0.3F | - | 0.3F | 40 CFR 180.367 |
| **Oleandomycin** | - | - | 0.15Et | 0.15Et | - | 21 CFR 556.480 |
| **Ormetoprim** | - | - | - | 0.1Et | - | 21 CFR 556.490 |
| **Oxadiazon & metabolites** | 0.01F<br>0.01M<br>0.01Mb | 0.01F<br>0.01M<br>0.01Mb | 0.01F<br>0.01M<br>0.01Mb | -<br>-<br>- | 0.01F<br>0.01M<br>0.01Mb | 40 CFR 180.346 |

| Compound | Cattle | Sheep/Goats | Swine | Poultry | Horses | Reference |
|---|---|---|---|---|---|---|
| **Oxfendazole** | 0.8L | - | - | - | - | 21 CFR 556.495 |
| **Oxyfluorfen & metabolites** | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 40 CFR 180.381 |
| **Oxytetracycline** | 12.0F[22]<br>12.0K[22]<br>6.0L[22]<br>2.0M[22] | 12.0F[10, 22]<br>12.0K[10, 22]<br>6.0L[10, 22]<br>2.0M[10, 22] | 12.0F[22]<br>12.0K[22]<br>6.0L[22]<br>2.0M[22] | 12.0F [22]<br>12.0K[22]<br>6.0L[22]<br>2.0M[22] | -<br>-<br>-<br>- | 21 CFR 556.500 |
| **Paraquat** | 0.05F<br>0.3K<br>0.05M<br>0.05Mb | 0.05F<br>0.3K<br>0.05M<br>0.05Mb | 0.05F<br>0.3K<br>0.05M<br>0.05Mb | 0.01F<br>-<br>0.01M<br>0.01Mb | 0.3F<br>0.3K<br>0.05M<br>0.05Mb | 40 CFR 180.205 |
| **PCB's[20]** | - | - | - | 3.0F[4] | - | 21 CFR 109.30 |
| **Penicillin** | 0.05Et | 0 Et | 0 Et | 0 Et | - | 21 CFR 556.510 |
| **Permethrin & metabolites** | 3.0F<br>0.25M<br>2.0Mb | 3.0F<br>0.25M<br>2.0Mb | 3.0F<br>0.25M<br>3.0Mb | 0.15F<br>0.05M<br>0.25Mb | 3.0F<br>0.25M<br>2.0Mb | 40 CFR 180.378 |
| **Phorate & metabolite** | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 40 CFR 180.206 |
| **Phosalone** | [32] | [32] | [32] | -<br>-<br>- | [32] | 40 CFR 180.263 |
| **Picloram** | 0.2F<br>5.0K<br>0.5L<br>0.2M<br>0.2Mb | 0.2F<br>5.0K<br>0.5L<br>0.2M<br>0.2Mb | 0.2F<br>5.0K<br>0.5L<br>0.2M<br>0.2Mb | 0.05F<br>-<br>-<br>0.05M<br>0.05Mb | 0.2F<br>5.0K<br>0.5L<br>0.2M<br>0.2Mb | 40 CFR 180.292 |
| **Piperonyl butoxide** | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 3.0F<br>3.0M<br>3.0Mb | 0.1F<br>0.1M<br>0.1Mb | 40 CFR 180.127 |
| **Pirlimycin** | 0.5L | - | - | - | - | 21 CFR 556.575 |
| **Pirimiphos methyl & metabolites** | 0.2F<br>2.0K<br>2.0L<br>0.2M<br>0.2Mb | 0.2F<br>2.0K<br>2.0L<br>0.2M<br>0.2Mb | 0.2F<br>2.0K<br>2.0L<br>0.2M<br>0.2Mb | 0.2F<br>-<br>-<br>2.0M<br>2.0Mb | 0.2F<br>2.0K<br>2.0L<br>0.2M<br>0.2Mb | 40 CFR 180.409 |

| Compound | Cattle | Sheep/Goats | Swine | Poultry | Horses | Reference |
|---|---|---|---|---|---|---|
| **Primisulfuron methyl** | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 40 CFR 180.452 |
| **Profenofos & metabolites** | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 40 CFR 180.404 |
| **Progesterone** | 0.012F[26]<br>0.009K[26]<br>0.006L[26]<br>0.003M[26] | 0.15F[26]<br>0.015K[26]<br>0.015L[26]<br>0.003M[26] | -<br>-<br>-<br>- | -<br>-<br>-<br>- | -<br>-<br>-<br>- | 21 CFR 556.540 |
| **Propamocarb Hydrichloride** | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | -<br>-<br>- | 0.1F<br>0.1M<br>0.1Mb | 40 CFR 180.499 |
| **Propanil & metabolites** | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 40 CFR 180.274 |
| **Propargite** | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 40 CFR 180.259 |
| **Propham** | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 40 CFR 180.319 |
| **Prosulfuron** | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | -<br>-<br>- | 0.05F<br>0.05M<br>0.05Mb | 40 CFR 188.481 |
| **Pyrantel tartrate** | -<br>-<br>- | -<br>-<br>- | 10.0K<br>10.0L<br>1.0M | -<br>-<br>- | -<br>-<br>- | 21 CFR 556.560 |
| **Pyrethins** | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.2F<br>0.2M<br>0.2Mb | 0.1F<br>0.1M<br>0.1Mb | 40 CFR 180.128 |
| **Pyridaben** | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | -<br>-<br>- | 0.05F<br>0.05M<br>0.05Mb | 40 CFR 180.494 |
| **Quizalofop ethyl & metabolites** | 0.05F<br>0.02M<br>0.05Mb | 0.05F<br>0.02M<br>0.05Mb | 0.05F<br>0.02M<br>0.05Mb | 0.05F<br>0.02M<br>0.05Mb | 0.05F<br>0.02M<br>0.05Mb | 40 CFR 180.441 |

| Compound | Cattle | Sheep/Goats | Swine | Poultry | Horses | Reference |
|---|---|---|---|---|---|---|
| **Robenidine hydrochloride** | -<br>-<br>- | -<br>-<br>- | -<br>-<br>- | 0.2F[2]<br>0.2S[2]<br>0.1Et[2] | -<br>-<br>- | 21 CFR 556.580 |
| **Sarafloxacin** | - | - | - | [21] | - | 21 CFR 556.594 |
| **Sethoxydim** | 0.2F<br>0.2M<br>0.2Mb | 0.2F<br>0.2M<br>0.2Mb | 0.2F<br>0.2M<br>0.2Mb | 0.2F<br>0.2M<br>0.2Mb | 0.2F<br>0.2M<br>0.2Mb | 21 CFR 180.412 |
| **Simazine** | 0.02F<br>0.02M<br>0.02Mb | 0.02F<br>0.02M<br>0.02Mb | 0.02F<br>0.02M<br>0.02Mb | 0.02F<br>0.02M<br>0.02Mb | 0.02F<br>0.02M<br>0.02Mb | 40 CFR 180.213 |
| **Sodium acifuorfen** | 0.02K<br>0.02L | 0.02K<br>0.02L | 0.02K<br>0.02L | 0.02F<br>0.02M<br>0.02Mb | 0.02K<br>0.02L | 40 CFR 180.383 |
| **Spectinomycin** | 4.0K<br>0.4M | - | - | 0.1Et | - | 21 CFR 556.600 |
| **Spinosad** | 0.6F<br>0.04M<br>0.2Mb | 0.6F<br>0.04M<br>0.2Mb | 0.6F<br>0.04M<br>0.2Mb | -<br>-<br>- | 0.6F<br>0.04M<br>0.2Mb | 40 CFR 180.495 |
| **Streptomycin** | 2.0K[5]<br>0.5Et[5] | -<br>- | 2.0K<br>0.5Et | 2.0K<br>0.5Et | -<br>- | 21 CFR 556.610 |
| **Sulfabromomethazine** | 0.1Et | - | - | - | - | 21 CFR 556.620 |
| **Sulfachloropyrazine** | - | - | - | 0Et [2] | - | 21 CFR 556.625 |
| **Sulfachlorpyridazine** | 0.1Et[5] | - | 0.1Et | - | - | 21 CFR 556.630 |
| **Sulfadimethoxine** | 0.1Et | - | - | 0.1Et | - | 21 CFR 556.640 |
| **Sulfaethoxypyridazine** | 0.1Et | - | 0Et | - | 0Et | 21 CFR 556.650 |
| **Sulfamethazine** | 0.1Et | - | 0.1Et | 0.1Et | - | 21 CFR 556.670 |
| **Sulfanitran & metabolites** | - | - | - | 0Et | - | 21 CFR 556.680 |
| **Sulfathiazole** | - | - | 0.1Et | - | - | 21 CFR 556.690 |
| **Sulfaquinoxaline** | 0.1Et | - | - | 0.1Et | - | 21 CFR 520.2325a |
| **Sulfomyxin** | - | - | - | 0(0.1)Et | - | 21 CFR 556.700 |

| Compound | Cattle | Sheep/Goats | Swine | Poultry | Horses | Reference |
|---|---|---|---|---|---|---|
| **Tebufenozide** | 0.1F | 0.1F | - | - | - | 40 CFR 180.482 |
| | 0.02K | 0.02K | - | - | - | |
| | 1.0L | 1.0L | - | - | - | |
| | 0.1Mb | 0.1Mb | - | - | - | |
| | 0.02M | 0.02M | - | - | - | |
| **Tebuconazole** | 0.2Mb | 0.2Mb | 0.2Mb | 0.2Mb | 0.2Mb | 40 CFR 180.474 |
| **Tebuthiuron & metabolites** | 2.0F | 2.0F | - | - | 2.0F | 40 CFR 180.390 |
| | 2.0M | 2.0M | - | - | 2.0M | |
| | 2.0Mb | 2.0Mb | - | - | 2.0Mb | |
| **Terbacil & metabolites** | 0.1F | 0.1F | 0.1F | - | 0.1F | 40 CFR 180.209 |
| | 0.1M | 0.1M | 0.1M | - | 0.1M | |
| | 0.1Mb | 0.1Mb | 0.1Mb | - | 0.1Mb | |
| **Testosterone propionate** | 0.0026F[34] | - | - | - | - | 21 CFR 566.170 |
| | 0.0019K[34] | - | - | - | - | |
| | 0.0013L[34] | - | - | - | - | |
| | 0.00064M[34] | - | - | - | - | |
| **Tetracycline** | 12.0F[22] | 12.0F[10, 22] | 12.0F[22] | 12.0F[22] | 12.0F[22] | 21 CFR 567.720 |
| | 12.0K[22] | 12.0K[10, 22] | 12.0K[22] | 12.0K[22] | 12.0K[22] | |
| | 6.0L[22] | 6.0L[10, 22] | 6.0L[22] | 6.0L[22] | 6.0L[22] | |
| | 2.0M[22] | 2.0M[10, 22] | 2.0M[22] | 2.0M[22] | 2.0M[22] | |
| **Tetradifon** | 0M | 0M | 0M | 0M | 0M | 40 CFR 180.174 |
| **Thiabendazole & metabolites** | 0.1Et | 0.1Et | 0.1Et | - | 0.1Et | 21 CFR 556.730 |
| | 0.1F | 0.1F | 0.1F | 0.1F | 0.1F | 40 CFR 180.242 |
| | 0.1M | 0.1M | 0.1M | 0.1M | 0.1M | |
| | 0.1Mb | 0.1Mb | 0.1Mb | 0.1Mb | 0.1Mb | |
| **Thidiazuron & metabolites** | 0.2F | 0.2F | 0.2F | 0.2F | 0.2F | 40 CFR 180.403 |
| | 0.2M | 0.2M | 0.2M | 0.2M | 0.2M | |
| | 0.2Mb | 0.2Mb | 0.2Mb | 0.2Mb | 0.2Mb | |
| **Thiobencarb & metabolites** | 0.2F | 0.2F | 0.2F | 0.2F | 0.2F | 40 CFR 180.401 |
| | 0.2M | 0.2M | 0.2M | 0.2M | 0.2M | |
| | 0.2Mb | 0.2Mb | 0.2Mb | 0.2Mb | 0.2Mb | |
| **Thiophanate methyl & metabolites** | 0.1F | 0.1F | 0.1F | 0.1F | 0.1F | 40 CFR 180.371 |
| | 0.2K | 0.2K | - | - | - | |
| | 0.1Mb | 0.1Mb | 0.1Mb | 0.1Mb | 0.1Mb | |
| | 0.1M | 0.1M | 0.1M | 0.1M | 0.1M | |
| | 2.5L | 2.5L | 1.0L | 0.2L | 1.0L | |
| **Tiamulin** | - | - | 0.6L | - | - | 21 CFR 556.738 |
| **Tilmicosin** | 1.2L | - | 7.5L | - | - | 21 CFR 556.735 |

| Compound | Cattle | Sheep/Goats | Swine | Poultry | Horses | Reference |
|---|---|---|---|---|---|---|
| **Toxaphene** | 7.0F | 7.0F | 7.0F | 7.0F | 7.0F | 40 CFR 180.138 |
| **Trenbolone** | [21] | - | - | - | - | 21 CFR 556.739 |
| **Triadimefon** | 1.0F<br>1.0M<br>1.0Mb | 1.0F<br>1.0M<br>1.0Mb | 0.04F<br>0.04M<br>0.04Mb | 0.04F<br>0.04M<br>0.04Mb | 1.0F<br>1.0M<br>1.0Mb | 40 CFR 180.410 |
| **Triasulfuron**[21] | 0.1F<br>0.5K<br>0.1M<br>0.1Mb | 0.1F<br>0.5K<br>0.1M<br>0.1Mb | 0.1F<br>0.5K<br>0.1M<br>0.1Mb | -<br>-<br>-<br>- | 0.1F<br>0.5K<br>0.1M<br>0.1Mb | 57 FR 8845<br>40 CFR 180.459 |
| **S,S,S-Tributyl phosphoro-trithioate** | 0.02F<br>0.02M<br>0.02Mb | 0.02F<br>0.02M<br>0.02Mb | -<br>-<br>- | -<br>-<br>- | -<br>-<br>- | 40 CFR 180.272 |
| **Trichlorfon** | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | -<br>-<br>- | -<br>-<br>- | 0.1F<br>0.1M<br>0.1Mb | 40 CFR 180.198 |
| **Triclopyr & metabolites** | 0.05F<br>0.5K<br>0.5L<br>0.05M<br>0.05Mb | 0.05F<br>0.5K<br>0.5L<br>0.05M<br>0.05Mb | 0.05F<br>0.5K<br>0.5L<br>0.05M<br>0.05Mb | -<br>-<br>-<br>-<br>- | 0.05F<br>0.5K<br>0.5L<br>0.05M<br>0.05Mb | 40 CFR188.417 |
| **Triflumazole** | 0.5F<br>0.05M<br>0.5Mb | 0.5F<br>0.05M<br>0.5Mb | 0.5F<br>0.05M<br>0.5Mb | 0.05F<br>0.05M<br>0.1Mb | 0.5F<br>0.05M<br>0.5Mb | CFR 180.476 |
| **Tripelennamine** | 0.2Et | - | - | - | - | 21 CFR 556.741 |
| **Triphenyltin hydroxide** | 0.05K<br>0.05L | 0.05K<br>0.05L | 0.05K<br>0.05L | -<br>- | 0.05K<br>0.05L | 40 CFR 180.236 |
| **Trisulfuron** | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | 0.1F<br>0.1M<br>0.1Mb | -<br>-<br>- | 0.1F<br>0.1M<br>0.1Mb | 40 CFR 180.459 |
| **Tylosin** | 0.2F<br>0.2K<br>0.2L<br>0.2M | -<br>-<br>-<br>- | 0.2F<br>0.2K<br>0.2L<br>0.2M | 0.2F<br>0.2K<br>0.2L<br>0.2M | -<br>-<br>-<br>- | 21 CFR 556.740 |
| **Virginiamycin** | [21] | -<br>-<br>-<br>-<br>- | 0.4F<br>0.4K<br>0.3L<br>0.1M<br>0.4S | 0.2F[16]<br>0.5K[16]<br>0.3L[16]<br>0.1M[16]<br>0.2S[16] | -<br>-<br>-<br>-<br>- | 21 CFR 556.750 |

| Compound | Cattle | Sheep/Goats | Swine | Poultry | Horses | Reference |
|---|---|---|---|---|---|---|
| **Zeranol** | [21] | 0 Et[10] | - | - | - | 21 CFR 556.760 |
| **Zeta-cypermethrin** | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | 0.05F<br>0.05M<br>0.05Mb | -<br>-<br>- | 0.05F<br>0.05M<br>0.05Mb | 40 CFR 180.418 |
| **Zoalene & metabolite** | -<br>-<br>-<br>- | -<br>-<br>-<br>- | -<br>-<br>-<br>- | 2.0F[2]<br>6.0K[2]<br>6.0L[2]<br>3.0M[2]<br>3.0L[1]<br>3.0L[1] | -<br>-<br>-<br>- | 21 CFR 556.770 |

[1] Turkeys only

[2] Chickens only

[3] Tolerance for marker residue

[4] Action level

[5] Calves only

[6] Chickens and turkeys

[7] Tolerances (for residues resulting from use as a pesticide) established until September 1, 1999

[8] Also, pheasants and quail

[9] No more than 0.02 can be carbamates

[10] Sheep only

[11] Tolerances for clorsulon corresponds to 3.0 ppm total residues in kidney

[12] Chicken layer hens & breeder hens, tolerance for parent cyromazine; an additional tolerance of 0.05 for F, M and Mb exists for the metabolite, melamine

[13] Goats only

[14] Lambs only (ppt); above concentrations naturally present

[15] Fat basis only

[16] Broiler chickens

[17] Interim Tolerance

[18] Tolerance for parent lasalocid.

[19] Tolerance for marker residue N-methyl-1,3-propanediamine(MAPA)

[20] The temporary tolerances for unavoidable residues of PCB's in infant & junior foods are 0.2 ppm and 3 ppm, respectively [21 CFR 109.30(a)(3,8)].

[21] No tolerance required

[22] Sum of residues of all tetracyclines

[23] Parts per trillion

[24] Concentration for the total residues of Fenprostalene in uncooked edible tissues of cattle are:

0.01 ppm M, 0.02 ppm L, 0.03 ppm K, 0.04 ppm F and 0.1 ppm in injection site

[25] Broilers only

[26] Above concentrations naturally present

[27] Revoked 10/98 40 CFR 180.321, 186.450

[28] Revoked 10/98 40 CFR, 180.325, 186.850

[29] Revoked 10/98 40 CFR, 180.326, 185.1650, 186.1650

[30] Revoked 10/98 40 CFR, 180.171, 186.2450

[31] Revoked 10/98 40 CFR, 180.319

[32] Revoked 10/98 40 CFR, 180.263, 185.4800, 186.4800

[33] Desethyl ciprofloxacin is the marker residue

[34] Heifers,steers,and calves; above concentrations naturally present.

# APPENDIX II

# FSIS LABORATORY RESIDUE ANALYTICAL CAPABILITY

# APPENDIX II. FSIS LABORATORY RESIDUE ANALYTICAL CAPABILITY

## INTRODUCTION

The Food Safety and Inspection Service (FSIS) requires practical analytical methods for detecting, quantifying, and identify residues that may be present in meat, poultry, and their processed products. These methods can be used by the Agency for monitoring and surveillance activities to determine whether product is adulterated and for human risk assessment (exposure) purposes. The Agency uses available methodology to take appropriate regulatory action against adulterated products, consistent with the reliability of the analytical data. However, because of the large number of potential residues that may occur in the food chain, practical methods are not available for many compounds of interest. This section describes the types of methods used by FSIS to conduct analyses and their suitability for regulatory use. A list of key terms precedes the method descriptions. Note that the chemistry method descriptions with few exceptions, are referenced to the latest edition of the FSIS Analytical Chemistry Laboratory Guidebook.

## CRITERIA FOR PRACTICAL METHODS

The following criteria have been identified as primary concerns for methods suitable for regulatory use.

1. The method requires no more than 2-4 hours of analytical time per sample.
2. A quality assurance plan has been developed for the method.

## KEY TO ABBREVIATIONS

**AAS** -- Atomic Absorption Spectrometry

**AOAC** -- Association of Official Analytical Chemists International

**CELIA, CA** -- Competitive Enzyme Labeled Immunoassay for Chloramphenicol: a laboratory test that detects and identifies chloramphenicol residues in cattle and pork muscle

**ECD** -- Electron capture detector

**EI** -- Electron impact

**ELISA** -- Enzyme-Linked Immuno Sorbent Assay

**E-Z SCREEN** -- A proprietary immunoassay system for rapid detecting and identifying various antibiotics and other residues in tissue extracts

**GC** -- Gas chromatography

**GLC** -- Gas liquid chromatography (same as GC)

**GPC** -- Gel Permeation Chromatography

**HFAA** -- Heptaflourobutyric acid anhydride

**HPLC** -- High pressure liquid chromatography

**ICP**-- Inductively Coupled Plasma Spectrophotometry

**JAOAC** -- Journal of the Association of Official Analytical Chemists

**LDL** -- Lowest detectable limit. The smallest amount of individual residue or sample component that can be reliably observed or found in the sample matrix by the current appropriate methodology. Qualitative number. Not applicable to compounds with established tolerances.

**METHOD STATUS** -- See discussion above

**MIC** -- Minimum inhibitory concentration: the minimum amount of antimicrobial compound present in a buffer extract of tissue that will inhibit bacterial growth in a cell culture media

**MPL** -- Minimum proficiency level: the minimum amount of analyte expected to be identified and quantified by a laboratory and upon which ongoing capability will be evaluated. It is the smallest concentration for which the predicted coefficient of variation for reproducibility (CV) is less than or equal to 20 percent and the upper 90 percent confidence level for the predicted CV is less than 30 percent

**MS** -- Mass spectrometry

**NADA** -- New Animal Drug Application, issued by the Center for Veterinary Medicine Food and Drug Administration (CVM-FDA)

**NE** -- Level not established

**NICI** -- Negative ion chemical ionization

**PICI** -- Positive ion chemical ionization

**PP** -- Processed product

**QUANTIFICATION** -- The determination of the amount of residue present in a sample

**ppb** -- Parts per billion

**ppm** -- Parts per million

**QAP**—Quality Assurance Plan

**REFERENCE METHODS** -- Analytical procedures by which other methods may be evaluated and for which standards are established. These methods are considered suitable for regulatory use in the National Residue Program

**RESIDUE** -- Any compound present in edible or target tissues of the animal that results from that compound's use or inadvertent introduction into the animal. "Residue" includes the compound itself, its

metabolite, and other substances formed in or on food because of the compound's use or inadvertent introduction

**SOS** -- Sulfa-on-Site: a rapid in-plant chemical screening test for detecting sulfonamide residues in food animal urine or serum that provides same-day results

**STOP** -- Swab Test on Premises: an overnight in-plant laboratory microbiological screen test for detecting antibiotic residues in edible tissues

**SWAB** -- STOP precursor: an overnight laboratory microbiological screen test for detecting antibiotic residues in edibles tissues

**TLC** -- Thin layer chromatography

**UV** -- Ultraviolet spectrophotometric techniques for detection and quantification

| Compound | Method Description | LDL/MIC | MPL | Species/Tissues | Reference |
|---|---|---|---|---|---|
| **Albendazole (amino sulfone metabolite)** | Marker residue detected and quantified by HPLC-fluorescence detection | 20 ppb | 50 ppb | Cattle/liver | 1 |
| | Extraction with organic solvents followed by HPLC with UV detection; confirmed by GC/EI/MS | 0.05 ppm | NE | Red meat, liver, muscle | 1 |
| **Aldicarb and Metabolites** | GPC plus HPLC with post- column fluorescence detection; extracts verified by oxidation to the sulfone | 5 ppb | 10 ppb | All/liver | 1 |
| **Aldrin** | GPC plus GLC | 0.02 ppm | 0.1 ppm | All/fat | 1 |
| | Extracts from GPC or Mills confirmed by GC/MS. | 0.03 ppm | NE | All/fat,PP | 1 |
| **Amoxicillin Trihydrate** | Microbiological assay procedure: ability of tissue extracts containing antimicrobial activity to inhibit microbial growth | 0.02 ppm | 0.02 ppm | Cattle, swine/ kidney,liver, muscle | 2 |
| | Tissue extracts quantified by HPLC using fluorometer | 0.01 ppm | 0.01 ppm | Cattle, swine/ kidney,liver, muscle | 1 |
| **Ampicillin Trihydrate** | Microbiological assay procedure: ability of tissue extracts containing antimicrobial activity to inhibit microbial growth | 0.01 ppm | 0.01 ppm | Cattle, swine/ all | 3 |
| **Apramycin** | Sample extraction TLC; bioautographed using *Bacillus subtilis* as a test organism | 0.05 ppm | 0.1 ppm | Swine/kidney ,muscle | 1 |
| **Atrazine** | Fat extracted using C18 columns and quantified by capillary GC with nitrogen/ phosphorous detector | 5 ppb | NE | All/fat | 1 |

| Compound | Method Description | LDL/MIC | MPL | Species/Tissues | Reference |
|---|---|---|---|---|---|
| | Extracts confirmed by GC/MS | 5 ppb | NE | All/fat | 1 |
| **Bacitracin methylene disalicylate Bacitracin**, **zinc** | Microbiological assay procedure: ability of tissue extracts containing antimicrobial activity to inhibit microbial growth | 0.05 ppm | NE | All/kidney, liver, muscle | 4 |
| **Bambermycins** | Microbiological assay procedure: ability of tissue extracts containing antimicrobial activity to inhibit microbial growth | 25 ppb | NE | All/kidney, liver, muscle | 5 |
| **Bendiocarb** | GPC plus HPLC with post-column fluorescence detection. | 5 ppb | 10 ppb | All/liver | 1 |
| **Benomyl (Benzimidazole)** | pH extraction with organic solvents; followed by HPLC ppm with UV detection; extracts derivatized and confirmed by GC/EI/MS | 0.05 ppm | 50 ppb | Poultry/ liver, muscle | 1 |
| | Micro alumina assay: column chromatography plus GLC | 0.01 ppm | NE | All/fat,PP | 1 |
| **BHC** | GPC plus GLC | 0.01 ppm | 0.1 ppm | All/fat | 1 |
| | Beta and delta isomers: GPC plus GLC | Identifi-cation only | Identifi-cation only | All/fat | 1 |
| | Extracts from GPC or Mills confirmed by GC/MS | 0.02 ppm | NE | All/fat, PP | 1 |
| **Bufencarb** | GPC plus HPLC with post- column fluorescence detection. Extracts are subjected to reverse phase chromatography, derivatized and confirmed by GC/MS | 5 ppb | 10 ppb | All/liver | 1 |

| Compound | Method Description | LDL/MIC | MPL | Species/Tissues | Reference |
|---|---|---|---|---|---|
| **Cacodylic acid** | | | | | |
| | Dry ashed tissue is dissolved and reacted to produce arsine gas, which reacts to form a blue complex for colorimetric quantification | 0.05 ppm | 0.20 ppm | All/kidney, liver, muscle | 6 |
| **Cadmium** | Dry ashed tissue is dissolved and quantified by ICP | | 0.002 ：g/mL | All/kidney , liver, muscle | 1 |
| **Calcium** | Tissue is wet ashed and titrated with specific indicator | 0.03% | 0.03% | All/muscle | 8 |
| | Wet ashed tissue is quantified by AAS | NE | NE | All | |
| **Cambendazole (Benzimidazol)** | Extraction with organic solvents followed by HPLC with UV detection; extracts confirmed by GC/EI/MS | 0.05 ppm | 50 ppb | Red meat/ liver, muscle, PP | 1 |
| **Captan** | GPC plus GLC | 0.02 ppm | 0.05 ppm | Red meat/fat | 1 |
| **Carbadox** | Tissue extract is hydrolyzed and a derivative is prepared and separated by ion exclusion chromatography, then quantified by GC-ECD | 7.5 ppb | 30 ppb | Swine/ liver, | 1 |
| | Extracts confirmed by GC/EI/MS | 7.5 ppb | NE | Swine/ liver, muscle | 1 |
| **Carbarsone** | Dry ashed tissue is dissolved and reacted to produce arsine gas, which reacts to form blue complex for colorimetric quantification | 0.05 ppm | 0.20 ppm | All/kidney, liver, muscle | 6 |

| Compound | Method Description | LDL/MIC | MPL | Species/Tissues | Reference |
|---|---|---|---|---|---|
| **Carbaryl** | GPC plus HPLC with post- column fluorescence detection | 5 ppb | 10 ppb | All/liver | 1 |
| | Extracts are subjected to reverse phase chromatography, derivatized and confirmed by GC/MS | 10 ppb | NE | | |
| **Carbofuran and metabolite** | GPC plus HPLC with post- column fluorescence detection. | 5 ppb | 10 ppb | All/liver | 1 |
| | Extracts are subjected to reverse phase chromatography, derivatized and confirmed by GC/MS | 10 ppb | NE | | |
| **Carbophenothion** | Tissue extracts are quantified by GLC with flame photometric or nitrogen-phosphorous flame ionization detector | 0.10 ppm | NE | All/liver, muscle | |
| | GPC plus GLC | 0.03 ppm | 0.20 ppm | All/fat | 1 |
| | GPC extracts are confirmed by CG/EI/MS | 0.01 ppm | NE | Red meat/fat | 1 |
| **Chloramphenicol** | Tissue extracts are screened by E-Z screen | 25 ppb | NE | Calf/ muscle, kidney | 9 |
| | Tissue extract screened for chloramphenicol by CELIA CA | 5ppb | NE | Calf/ muscle | 10 |
| | Extraction of parent and glucuronide using C18 columns with GC capillary quantification as the trimethylsilyl derivative | 0.5 ppb | 1.0 ppb | Calf/muscle | 1 |
| | Extracts are confirmed using NICI/MS | 0.15 ppb | NE | Calf/muscle | 1 |
| | C18 cleanup of the hydrolyzed extract with GC capillary | 2.5 ppb | 5.0 ppb | Calf/urine | 1 |

| Compound | Method Description | LDL/MIC | MPL | Species/Tissues | Reference |
|---|---|---|---|---|---|
| **Chloramphenicol (continued)** | quantification as the trimethyl derivative | | | | |
| | Extracts are confirmed using NICI/MS | 5 ppb | NE | Calf/urine | 1 |
| **Chlordane** | GPC followed by GC-ECD | 0.10 ppm | 0.30 ppm | All/fat | 1 |
| | Extracts from GPC or Mills are confirmed by GC/MS | NE | NE | All/fat, PP | 1 |
| **Chlordecone (Kepone)** | GPC plus GLC | 0.03 ppm | 0.20 ppm | All/fat | 1 |
| | GPC extracts are confirmed by GC/EI/MS | 0.05 ppm (poultry) 0.20 ppm (cattle) | NE | Poultry, red meat/fat | 1 |
| **2-Chloro-1-(2,4,-di chlorophenyl) vinyl diethyl phosphate (chlorfenvinphos)** | GPC plus GLC | 0.03 ppm | 0.10 ppm | All/fat | 1 |
| | GPC extracts are confirmed by CG/EI/MS | 0.01 ppm (poultry) 0.10 ppm (red meat) | NE NE | Poultry, red meat/fat | 1 |
| **2-Chloro-1-(2,4,5-trivinyl dimethyl phosphate (stirophos)** | GPC plus GLC | 0.05 ppm | 0.30 ppm | All/fat | 1 |
| | GPC extracts are confirmed by GC/EI/MS | 0.05 ppm (poultry) 0.10 ppm (cattle) | NE | Poultry, red meat/fat | 1 |
| **Chlorpyrifos** | GPC followed by GC-ECD | 0.05 ppm | 0.20 ppm | All/fat | 1 |
| | GPC extracts are confirmed by GC/EI/MS | 0.05 ppm (poultry) 0.50 ppm (swine) | NE | Poultry,swine/ fat | 1 |
| **Chlortetracycline** | Antibiotic screen test (Swab): ability of tissue fluids containing anti-microbial activity to inhibit microbial growth | 0.01 ppm | NE | All/kidney | 11 |
| | Microbiological assay | 0.01 ppm | NE | All/kidney liver, | 12 |

| Compound | Method Description | LDL/MIC | MPL | Species/Tissues | Reference |
|---|---|---|---|---|---|
| **Chlortetracycline (contiued)** | procedure: ability of tissue extracts containing antimicrobial activity to inhibit microbial growth | | | muscle | |
| | Extraction using C18 columns followed by HPLC with UV detection | 0.05 ppm | 0.10 ppm | All/kidney liver, muscle | 1 (Guide-book draft) |
| **Chromium** | Dry ashed tissue is extracted with organic reagent and quantified using ICP | 0.01 mg/L | 0.037 mg/L | All/kidney liver, muscle | 1 |
| **Clenbuterol** | Liquid-liquid extraction with internal standard, detected by GC/MS of the oxazolidin-3-one derivatives. | | 1.0 ppb | cattle, swine, sheep/liver, muscle. | 1 (9/95) |
| **Clopidol** | Organic solvent extraction with HPLC-UV detection | 0.1 | NE | Poultry/liver ppm | 1 |
| | Organic solvent extraction with GC-EC detection | 0.1 ppm | NE | Poultry/liver | 1 |
| **Clorsulon** | Tissue extracts are quantified by HPLC-UV detection | 0.25 ppm | 0.50 ppm | Red meat kidney, muscle, liver,PP | 1 |
| | Tissue extracts for HPLC are derivatized and confirmed by GC/MS | 0.5 ppm | NE | Red meat/ Kidney, muscle, liver, PP | 1 |
| **Cloxacillin** | Antibiotic screen test(Swab): ability of tissue fluids containing anti- microbial activity to inhibit microbial growth | 0.16 ppm | NE | All/kidney | 14 |
| | Microbiological assay combined with HPLC separation and quantified by microbial inhibition | 0.02 ppm | NE | Dairy cows/ kidney, liver, muscle | 15 |
| **Cobalt** | Dry ashed tissue is dissolved and quantified by ICP | 0.009 mg/L | 0.03 mg/L | All/kidney, liver, muscle | |

| Compound | Method Description | LDL/MIC | MPL | Species/Tissues | Reference |
|---|---|---|---|---|---|
| **Copper** | Dry ashed tissue is dissolved and quantified by ICP | 0.006 mg/L | 0.02 mg/L | All/kidney, liver, muscle | 1 |
| **Coumaphos and oxygen analog** | GPC followed by GC-ECD | 0.15 ppm | 0.30 ppm | All/fat | 1 |
| | GPC extracts are confirmed by CG/EI/MS | 0.20 ppm | 0.30 ppm | Red meat/fat | 1 |
| **Cresylic acid** | Tissue extracts are derivatized and determined by GC-ECD | NE | NE | Poultry/fat | 1 |
| **Crufomate (Ruelene)** | Tissue extracts are quantified by GLC with flame photometric or nitrogen-phosphorous flame ionization detector | 0.10 ppm | NE | All/liver, muscle | 1 |
| **Cyanide salts** | Aqueous extraction followed by a colori-metric determination | 0.5 ppm | NE | All/all | 1 |
| | For confirmation, cyanogen chloride is produced and determined by GC/ECD | 0.5 ppm | NE | All/all | 1 |
| **Cyano (3-phenoxy chlorophenyl) methyl- 4-a-(methylethyl) -benzeneacetate (Fenvalerate)** | Organic solvent extracts are quantified as the sum of both isomers by GC/EC; extracts are confirmed by GC/EI/MS | 0.03 ppb | NE | All/fat | 1 |
| **DDE (metabolites of DDT collectively reported as DDT)** | GPC followed by GC-ECD | 0.02 ppm | 0.05 ppm | All/fat | 1 |
| | Extracts from GPC are confirmed by GC/MS (LRC) | 0.02 ppm | NE | All/fat,PP | 1 |
| **DDT (isomers of DDT collectively reported as DDT)** | GPC followed by GC-ECD | 0.04 ppm | 0.15 ppm | All/fat | 1 |

| Compound | Method Description | LDL/MIC | MPL | Species/Tissues | Reference |
|---|---|---|---|---|---|
| **Decoquinate** | Zymark Pytech System; organic extraction followed by HPLC with fluorescence detection | 0.20 ppm | 0.50 ppm | Cattle, poultry/ liver, muscle | 1 |
| **Dexamethasone** | Extract is partitioned on an SPE column with quantitation by HPLC/UV | | 5.0 ppb | Cattle, swine, veal, sheep/liver, muscle | 1 (guide-book draft) |
| **Deltamethrin** | Organic solvent extracts are quantified by GC/ECD; | | 20 ppb | Bovine/Poultry/fat | 1 |
| | Solvent extraction followed by a competitive ELISA determination | 0.5 ppm | NE | All/fat | 1 |
| **Diazinon** | Tissue extracts are quantified by GLC with flame photometric or nitrogen-phosphorous flame ionization detector | 0.1 ppm | 0.15 ppm | All/liver, muscle | 1 |
| **Dibutyltin dilaurate** | Tissue extraction acid hydrolysis-morin derivatization--HPLC-UV | 0.25 ppm | NE | Turkey/liver | 1 |
| **Dieldrin** | GPC plus GLC | 0.01 ppm | 0.05 ppm | All/fat | 1 |
| | Extracts from GPC are confirmed by GC/MS | 0.02 ppm | NE | All/fat, PP | 1 |
| **Diethylstilbestrol (DES)** | Solid phase extraction technique using an internal standard followed by methylsilation for GC/MS quantification and confirmation | | 0.25 ppb | Cattle, sheep liver, muscle | 1 |
| **Dihydrostrepto-mycin** | Antibiotic screen test (Swab): ability of tissue fluids containing anti-microbial activity to inhibit microbial growth | 0.25 ppm | NE | All/kidney | 11 |
| | Microbiological assay procedure: ability of tissue extracts containing antimicrobial activity to inhibit microbial growth | 0.25 ppm | NE | All/kidney, liver, muscle | 16 |

| Compound | Method Description | LDL/MIC | MPL | Species/Tissues | Reference |
|---|---|---|---|---|---|
| **3, 5-Dimethyl-4-(methylthio)phenyl ethylcarbamate and metabolite** | GPC plus HPLC with post- column fluorescence detection. Extracts are subjected to reverse phase chromatography, derivatized and confirmed by GC/MS | 5 ppb | 10 ppb | All/liver | 1 |
| **Dimetridazole and hydroxy metabolite** | Extracts are quantified by HPLC/UV | 1.0ppb | NE | Turkey, swine/ muscle | 1 |
| | Tissue extracts from HPLC are confirmed by GC/NICI/MS | 1.0 ppb | NE | Turkey, swine/ muscle | 1 |
| **Dioxacarb** | GPC plus HPLC with post- column fluorescence detection | 5 ppb | 10 ppb | All/liver | 1 |
| | Extracts are subjected to reverse phase chromatography, derivatized and confirmed by GC/MS | 10 ppb | NE | | |
| **Dioxathion** | Tissue extracts are quantified by GLC with flame photometric or nitrogen-phosphorous flame ionization detector | 0.10 ppm | NE | All/liver, muscle | |
| **Dodecachloro-octahydro-1,3,4-metheno-2H-cyclobuta(cd)-pentalene[Mirex]** | GPC plus GLC | 0.04 ppm | 0.10 ppm | All/fat | 1 |
| | Extracts from GPC or Mills are confirmed by GC/MS | 0.05 ppm | NE | All/fat, PP | 1 |
| **Doramectin** | Tissue extracts are quantified by HPLC fluorescence detection | 2 ppb | 7.5 ppb | Red meat/ liver, muscle | 1 |

| Compound | Method Description | LDL/MIC | MPL | Species/Tissues | Reference |
|---|---|---|---|---|---|
| **Endosulfan I** | GPC plus GLC | 0.01ppm | 0.10ppm | All/fat | 1 |
| | GPC extracts are confirmed by GC/EI/MS | 0.02ppm | NE | Red meat/fat | |
| **Endosulfan II** | GPC plus GLC | 0.02ppm | 0.20 ppm | All/fat | 1 |
| **Endrin** | GPC plus GLC | 0.03 ppm | 0.05 ppm | All/fat | 1 |
| | Extracts from GPC or Mills are confirmed by GC/MS | 0.05 ppm | NE | All/fat,PP | 1 |
| **Erythromycin** | Antibiotic screen test (Swab): ability of tissue fluids containing antimicrobial activity to inhibit microbial growth | 25 ppb | NE | All/kidney | 11 |
| | Microbiological assay procedure: ability of tissue fluids containing antimicrobial activity to inhibit microbial growth | 25 ppb | NE | All/kidney, liver, muscle | 17 |
| **Ethion and oxygen analog** | Tissue extracts are quantified by GLC with flame photometric or nitrogen-phosphorous flame ionization detector | 0.10 ppm | 0.15 ppm | All/liver, muscle | 1 |
| | Tissue extracts are quantified by GLC with flame photometric or nitrogen-phosphorous flame ionization detector | NE | NE | All/liver muscle | 1 |
| **Ethylene dibromide** | Residue is co-distilled from aqueous suspension and quantified by GLC | 0.5 ppb | 1.0 ppb | All/fat | 1 |
| | MS by NICI to determine bromine | 1 ppb | NE | All/fat | 1 |
| **Fenbendazole** | Extraction with organic solvents followed by HPLC with UV detection; extracts derivatized and confirmed by GC/EI/MS | | 0.5 ppb | All/ liver, muscle | 1 |

| Compound | Method Description | LDL/MIC | MPL | Species/Tissues | Reference |
|---|---|---|---|---|---|
| **Fenbendazole (continued)** | Tissue extracts are quantified by HPLC | 200 ppb | 400 ppb | Cattle, calf/ liver | 18 |
| | Quantification extract purified by TLC, derivatized and identified by HPLC fluorescence | 200 ppb | NE | Cattle, calf/ liver | 18 |
| **Fenitrothion** | Tissue extracts are quantified by GLC with flame photometric or nitrogen- phosphorous flame ionization detector | 0.10 ppm | 0.15 ppm | All/liver, muscle | 1 |
| **Flucythrinate** | Organic solvent extracts are quantified as the sum of both isomers by GC/EC; extracts are confirmed by GC/EI/MS | | | All/fat | 1 |
| | Solvent extraction followed by a competitive ELISA determination | | NE | All/fat | 1 |
| **Gasoline** | Fat from product is heated in a sealed vial and gasoline components are identified by pattern recognition using GC/flame ionization detection | 0.1 ppm | 1.0 ppm | Canned meat | 1 |
| **Gentamicin sulfate** | Tissue extracts are screened by E-Z Screen | 50 ppb | NE | All/muscle liver, kidney | 19 |
| | Microbiological assay procedure: ability of tissue extracts containing antimicrobial activity to inhibit microbial growth | NE | NE | Swine/kidney Tissue | 20 |
| | Extraction followed by detection by HPLC with fluorescence detector | 0.2 ppm | 0.4 ppm | Swine/kidney tissue | 1 |

| Compound | Method Description | LDL/MIC | MPL | Species/Tissues | Reference |
|---|---|---|---|---|---|
| **Halofuginone** | Tissue extracts are quantified by HPLC-UV | 0.05 ppm | 0.05 ppm | Chicken/liver | 1 |
| | Tissue extracts are confirmed by GC/MS/MS | 0.05 ppm | 0.05 ppm | Chicken/liver | 21 |
| **HCB** | GPC plus GLC | 0.01 ppm | 0.01 ppm | All/fat | 1 |
| | Extracts from GPC are confirmed by GC/ MS | 0.01 ppm | NE | All/fat,PP | 1 |
| **Heptachlor and heptachlor epoxide** | GPC plus GLC | 0.01 ppm | 0.05 ppm | All/fat | 1 |
| | Extracts from GPC are confirmed by GC/MS | | 0.01ppm, Heptachlor; 0.1 ppm, Heptachlor Epoxide | All/fat,PP | 1 |
| **Hetacillin, Potassium** | Antibiotic screen test (Swab): ability of tissue fluids containing anti-microbial activity to inhibit microbial growth | NE | NE | All/kidney | 14 |
| **5-Hydroxy-thiabendazole** | Extraction with organic solvents followed by HPLC with UV detection; extracts confirmed by derivatized GC/EI/MS | 0.05 ppm | 50 ppb | Red meat/ liver, muscle | 1 |
| **Hygromycin B** | Antibiotic screen test (Swab):ability of tissue fluids containing antimicrobial activity to inhibit microbial growth | 5.00 ppm | NE | All/kidney | 14 |
| **Ipronidazole and hydroxy metabolite** | Tissue extracts are quantified by HPLC/UV | 1.0 ppb | NE | Turkey, swine/ muscle | 1 |
| | Tissue extracts from HPLC are confirmed by GC/NICI/MS | 1.0 ppb | NE | Turkey, swine muscle | 1 |
| **Iron** | Dry ashed tissue is dissolved and quantified by ICP | 0.009 mg/L | 0.14 μg/ml | All/kidney, liver, muscle | 1 |

| Compound | Method Description | LDL/MIC | MPL | Species/Tissues | Reference |
|---|---|---|---|---|---|
| **Ivermectin** | Tissue extracts are quantified by HPLC fluorescence | 2 ppb | 7.5 ppb | Red meat/ liver, muscle | 1 |
| | APCI/MS to confirm Ivermectin and Doramectin | 7.5 ppb | 15 ppb | Red meat/ liver, muscle | 1 |
| **Lasalocid** | Tissue extracts are quantified by HPLC fluorescence detector | 0.025 ppm | 0.35 ppm | Cattle/liver<br>Poultry/fat, skin | 1<br>22 |
| | Tissue extraction followed by bioautography | 0.005 ppm | 0.01 ppm | Poultry/fat, skin | 22 |
| **Lasalocid (Cont.)** | GC pyrolysis of the HPLC extract with MS identification of the fragments | 0.2 ppm | NE | Cattle/liver; Poultry/fat, skin | 22 |
| **Lead** | Dry ashed tissue is dissolved and quantified by ICP | | 0.05 µg/mL | All/kidney liver, muscle | 1 |
| | Dry ashed tissue is quantified by anodic stripping voltammetry | 1.0 ppb | NE | Poultry/kidney, liver | 7 |
| **Levamisole** | Tissue extracts are quantified by GLC flame photometric detection | 0.05 ppm | 0.1 ppm | Red meat/ liver, muscle | 1 |
| | Tissue extracts are subjected to GC/MS | 0.05 ppm | NE | Red meat/ liver, muscle | 1 |
| **Lincomycin hydrochloride** | Microbiological assay procedure: ability of tissue extracts containing antimicrobial activity to inhibit microbial growth | 0.10 ppm | 0.10 ppm | Poultry, swine/all | 23 |
| **Lindane** | GPC plus GLC | 0.01 ppm | 0.01 ppm | All/fat | 1 |
| | Extracts from GPC or Mills are confirmed by GC/MS | | 0.01 ppm | All/fat, PP | 1 |

| Compound | Method Description | LDL/MIC | MPL | Species/Tissues | Reference |
|---|---|---|---|---|---|
| **Linuron** | GPC plus GLC | 0.25 ppm | 0.50 ppm | All/fat | 1 |
| | Extracts are confirmed by GC/EI/MS | 0.05 ppm | 0.50 ppm | Red meat/ fat | 1 |
| **Lysergic acid diethylamide** | Tissue extracts are spotted for TLC and detected with specific chromagenic reagent | NE | NE | All/kidney, liver, muscle | 1 |
| **Macrolide antibiotics** | Qualitative identification by APCI-MS/MS full Scan | | | All/kidney, liver, muscle | unpubli-shed |
| **Malathion** | Tissue extracts were quantified by GLC with flame photometric or nitrogen-phosphorous flame ionization detector | 0.10 ppm | 0.2 ppm | All/ liver, muscle | 1 |
| **Manganese** | Dry ashed tissue is dissolved and quantified by ICP | | 0.002 µg/ml | All/kidney, liver, muscle | 1 |
| **Mebendazole** | Extraction with organic solvents followed by HPLC with UV detection; extracts are confirmed by GC/EI/MS | 0.05 ppm | 50 ppb | Red meat/ liver, muscle/processed products | 1 |
| **Melengestrol acetate (MGA)** | Tissue extract is column chromatographed on Florisil and quantified by GLC | 5.0 ppb | 10.0 ppb | Cattle/fat | 1 |
| | Extracts are derivatized with HFB and confirmed by GC/EI/MS | 5.0 ppb | 10.0 ppb | Cattle/fat | 1 |
| **Mercury** | Tissue is digested in acid. Mercury is reduced to its vapor and quantified by flameless AAS | 0.01 ppm | 0.02 ppm | All/kidney, liver, muscle | 1 |
| **Methanearsonic acid** | Dry ashed tissue is dissolved and reacted to produce arsine gas, which is quantified by AAS | 0.05 ppm | NE | All/kidney, liver, muscle | 1 |
| | The same as above, but arsine gas reacts to form blue complex for colori - metric quantification | 0.05 ppm | 0.20 ppm | All/kidney, liver, muscle | 1 |

| Compound | Method Description | LDL/MIC | MPL | Species/Tissues | Reference |
|---|---|---|---|---|---|
| **Methomyl** | GPC plus HPLC with post- column fluorescence detection | 5 ppb | 10 ppb | All/liver | 1 |
| **Methoxychlor** | GPC plus GLC | 0.15 ppm | 0.50 ppm | All/fat | 1 |
| | Extracts from GPC are confirmed by GC/MS | 0.15 ppm | 0.15 ppm | All/fat, | 1 |
| **Methyl parathion** | Tissue extracts are quantified by GLC with flame photometric or nitrogen-phosphorous flame ionization detector | 0.10 ppm | 0.20 ppm | All/liver, muscle | 1 |
| **Monensin** | Tissue extract is partitioned by TLC and semi-quantified by inhibition of micro-organism growth | | NE | Poultry/ fat | 1 |
| **Morantel tartrate** | Tissue extract is hydrolyzed and a derivative is quantified by GLC | 0.25 ppm<br>0.50 ppm | 0.50 ppm<br>0.50 ppm | Cattle/liver<br>Cattle/muscle | 1<br>1 |
| | Identification of a structurally significant hydrolyzed fragment by GC/MS | 0. 25 ppm | NE | Cattle/liver, muscle | 24 |
| **Narasin** | Tissue extracts are spotted on TLC and quantified with a bio-autographic overlay | | NE | Cattle, poultry/liver, kidney, fat | 1 |
| **Neomycin** | Antibiotic screen test (Swab):ability of tissue fluids containing anti-microbial activity to inhibit microbial growth | 0.25 ppm | NE | All/kidney | 14 |
| | Microbiological assay procedure: ability of tissue extracts containing antimicrobial activity to inhibit microbial growth | 0.25 | NE | All/kidney, liver, muscle | 25 |

| Compound | Method Description | LDL/MIC | MPL | Species/Tissues | Reference |
|---|---|---|---|---|---|
| **Nequinate** | Zymark Pytechnology System: Tissue extracts are screened by HPLC/UV | NE | NE | Cattle/liver, muscle | 13 |
| **Nicarbazin** | Tissues are extracted with ethyl acetate; the dinitro-carbanilide moiety is quantified by HPLC-UV. Extracts verified by photodiode array detection | 0.1 ppm | 0.4 ppm | Chicken/ liver muscle | 1 |
| **Nickel** | Dry ashed tissue is dissolved and quantified by ICP | 0.015 mg/L | 0.014 μg/ml | All/kidney, liver, muscle | 1 |
| **Nonachlor** | GPC plus GLC | 0.03 ppm | 0.15 ppm | All/fat | 1 |
| | Extracts from GPC are confirmed by GC/MS | 0.05 ppm | NE | All/fat, PP | |
| **Novobiocin** | Microbiological assay procedure: ability of tissue extracts containing antimicrobial activity to inhibit microbial growth | 0.125 ppm | NE | All/kidney, liver, muscle | 4 |
| | Zymark Pytechnology System: organic solvent extraction followed by HPLC/UV detection. | 0.50 ppm | NE | All/kidney, liver, muscle | 1 |
| | Manual system organic solvent extraction followed by HPLC/UV detection | 0.50 ppm | 1.0 ppm | All/kidney, liver, muscle | 1 |
| **Oleandomycin** | Antibiotic screen test (Swab): ability of tissue fluids containing antimicrobial activity to inhibit microbial growth | 0.25 ppm | NE | All/kidney | 14 |

| Compound | Method Description | LDL/MIC | MPL | Species/Tissues | Reference |
|---|---|---|---|---|---|
| **Oxfendazole** | \Extraction with organic solvents followed by HPLC with UV detection; extracts are derivatized and confirmed by GC/EI/MS | 0.05 ppm | 50 ppb | Red meat, liver, muscle, PP | 1 |
| **Oxytetracycline hydrochloride** | Antibiotic screen test (Swab): ability of tissue fluids containing anti-microbial activity to inhibit microbial growth | 0.08 ppm | NE | All/kidney | 14 |
| | Microbiological assay procedure: ability of tissue extracts containing antimicrobial activity to inhibit microbial growth | 0.08 ppm | 0.08 ppm | All/kidney, liver muscle | 14 |
| | Extraction using C18 columns followed by HPLC with UV detection | 0.05 ppm | 0.10 ppm | All/kidney, liver muscle | 1 (Guide-book draft) |
| **Parathion** | Tissue extracts are quantified by GLC with flame photometric or nitrogen-phosphorous flame ionization detector | NE | NE | All/liver, muscle | |
| **PBB's** | GPC cleanup followed by GLC/ECD and MS/EI | 0.05 ppm | NE | All/fat | 26 |
| **PCB's (reported as Aroclor 1242, 1248, 1254, 1260, etc.)** | Column chromatography plus GLC. | 0.30 ppm | 0.50 ppm | All/fat PP | 1 |
| | GPC plus GLC | 0.30 ppm | 0.50 ppm | All/fat | |
| **Penicillin, procaine and procaine G** | Antibiotic screen test (Swab): ability of tissue containing anti-microbial activity to inhibit microbial growth. | 12.5 ppb | NE | All/kidney | 14 |

| Compound | Method Description | LDL/MIC | MPL | Species/Tissues | Reference |
|---|---|---|---|---|---|
| **Pentachloroanisole** | GPC plus GC | NE | NE | Poultry/fat | |
| | Extracts confirmed by GC/EI/MS | NE | NE | Poultry/fat | |
| **Pentachlorophenol (PCP)** | Tissue extracts for GLC are confirmed by GC/MS. | 0.03 ppm | 50 ppb | All/liver, muscle | 1 |
| | Extracts confirmed by GC/EI/MS | NE | NE | Poultry/fat | 1 |
| **Permethrin (cis & trans)** | Solvent extraction followed by a competitive ELISA determination. | 1.0 ppb | 50 ppb | All/fat | 1 |
| | Organic solvent extracts are quantified as the sum of both isomers; extracts are confirmed by GC/EI/MS | 1.0 ppb | 50 ppb | All/fat | 1 |
| **Phencyclidine** | Tissue extracts are spotted for TLC with specific chromogenic agent | NE | NE | All/kidney,liver, muscle | 1 |
| **Phenothrin** | Solvent extraction followed by a competitive ELISA determination | | NE | All/fat | 1 |
| **Phosalone** | GPC plus GLC | 0.01 ppm | 0.05 ppm | All/fat | 1 |
| | GPC extracts are confirmed by GC/EI/MS | 0.02 ppm | 0.04 ppm | Red meat, fat | 1 |
| **Propazine** | Fat extracted using C18 columns and quantified by capillary GC detector Lab with nitrogen-phosphorous flame ionization detector. | 5 ppb | 10 ppb | All/fat | 1 |
| | Extracts confirmed by GC/MS | 5 ppb | 10 ppb | All/fat | 1 |
| **Promecarb** | GPC plus HPLC with post- column fluorescence detection. Extracts are subjected to reverse phase chromatography, derivatized and confirmed | 5 ppb | 10 ppb | All/liver | 1 |

| Compound | Method Description | LDL/MIC | MPL | Species/Tissues | Reference |
|---|---|---|---|---|---|
| | by GC/MS | | | | |
| **Propoxur** | GPC plus HPLC with post- column fluorescence detection. Extracts are subjected to reverse phase chromatography, derivatitized and confirmed by GC/MS | 5 ppb | 10 ppb | All/liver | 1 |
| **Pyrantel tartrate** | Tissue extract is hydrolyzed and a derivative is quantified by GLC | 0.25 ppm | 0.50 ppm | Swine/liver, muscle | 1 |
| | Identification of a structurally significant hydrolyzed fragment by GC/MS | 0.25 ppm | NE | Swine/liver, muscle | 27 |
| **Ronnel** | GPC plus GLC | 0.02 ppm | 0.05 ppm | All/fat | 1 |
| | Extracts are confirmed by GC/EI/MS | 0.01 ppm (poultry)<br>0.10 ppm (red meat) | 0.05 ppm<br>0.05 ppm | Poultry, red meat, fat | 1 |
| **Roxarsone** | Dry ashed tissue is dissolved and reacted to produce arsine gas, which is quantified by AAS. | 0.05 ppm | NE | All/kidney, liver muscle | 1 |
| | Dry ashed tissue is dissolved and reacted to produce arsine gas, which reacts to form blue complex for colorimetric quantification | 0.05 ppm | 0.20 ppm | All/kidney, liver, muscle | 1 |
| **Simazine** | Fat extracted using C18 columns and quantified by capillary GC with nitrogen-phosphorous detector. | 5 ppb | 10 ppb | All/fat | 1 |
| | Extracts confirmed by GC/MS | 5 ppb | NE | All/fat | 1 |

| Compound | Method Description | LDL/MIC | MPL | Species/Tissues | Reference |
|---|---|---|---|---|---|
| **Simazine** | Fat extracted using C18 columns and quantified by capillary GC with nitrogen-phosphorous detector. | 5 ppb | 10 ppb | All/fat | 1 |
| | Extracts confirmed by GC/MS | 5 ppb | NE | All/fat | 1 |
| **Spectinomycin hydrochloride** | Microbiological assay: tissue extracts are quantified using a turbidimetric assay. | 2.8 ppm | NE | All/kidney, liver, muscle | 28 |
| **Streptomycin** | Antibiotic screen test (Swab): ability of tissue fluids containing antimicrobial activity to inhibit microbial growth | 0.25 ppm | NE | All/kidney | 14 |
| | Microbiological assay procedure: ability of tissue extracts containing antimicrobial activity to inhibit microbial growth | 0.25 ppm | NE | All/kidney, liver, muscle | 30 |
| **Styrene** | Tissues are subjected to GC/MS head space analysis. | | NE | All/kidney, liver, muscle fat, PP | 1 |
| **Sulfachloro-pyridazine** | TLC fluorescence: tissue extracts are partitioned by TLC and quantified by densitometry | 0.02 ppm | 0.05 ppm | Red meat/ liver, muscle | 1 |
| **Sulfadiazine** | TLC fluorescence: tissue extracts are partitioned by TLC and quantified by densitometry | 0.02 ppm | 0.05 ppm | Red meat/ liver, muscle | 1 |
| | Extraction followed by GC/CI and EI/MS | 0.05 ppm | 0.05 ppm | Red meat/ liver, muscle | 1 |
| **Sulfadimethoxine** | TLC fluorescence: tissue extracts are partitioned by TLC and quantified by densitometry | 0.02 ppm | 0.05 ppm | All/liver, muscle | 1 |

| Compound | Method Description | LDL/MIC | MPL | Species/Tissues | Reference |
|---|---|---|---|---|---|
| **Sulfadoxine** | TLC fluorescence: tissue extracts are partitioned by TLC and quantified by densitometry. | 0.05 ppm | 0.05 ppm | Red meat/ liver, muscle | 1 |
| | Tissue extracts are confirmed by GC/EI/MS | NE | 0.05 ppm | Red meat/ liver, muscle | 1 |
| **Sulfaethoxy-pyridazine** | TLC fluorescence: tissue extracts are partitioned by TLC and quantified by densitometry | 0.02 ppm | 0.05 ppm | Red meat/ liver, muscle | 1 |
| **Sulfamethazine** | TLC fluorescence: tissue extracts are partitioned by TLC and quantified by densitometry. | 0.02 ppm | 0.05 ppm | All/liver, muscle | 1 |
| | Tissue extracts are confirmed by GC/EI/MS | 0.05 ppm | 0.05 ppm | All/liver, muscle | 1 |
| | Tissue extracts are screened by E-Z Screen | 50 ppb | NE | All/liver | 1 |
| **Sulfamethoxy-pyridazine** | TLC fluorescence: tissue extracts are partitioned by TLC and quantified by densitometry | 0.02 ppm | 0.05 ppm | Red meat/ liver, muscle | 1 |
| **Sulfaphenazole** | TLC fluorescence: tissue extracts are partitioned by TLC and quantified by densitometry | 0.05 ppm | 0.05 ppm | Red meat/ liver, muscle | 1 |
| | Tissue extracts are confirmed by GC/EI/MS | NE | 0.05 ppm | Red meat/ liver, muscle | 1 |
| **Sulfapyridine** | TLC fluorescence: tissue extracts are partitioned by TLC and quantified by densitometry. | 0.02 ppm | 0.05 ppm | All/liver, muscle | 1 |
| | Tissue extracts are confirmed by GC/EI/MS | 0.05 | 0.05 ppm | All/liver, muscle, PP | 1 |

| Compound | Method Description | LDL/MIC | MPL | Species/Tissues | Reference |
|---|---|---|---|---|---|
| **Sulfaquinoxaline** | TLC fluorescence: tissue extracts are partitioned by TLC and quantified by densitometry. | 12.5 ppb | 0.05 ppm | Poultry/liver, muscle | 1 |
| | Tissue extracts are confirmed by GC/EI/MS | 25 ppb | 0.05 ppm | Poultry/liver, muscle | 1 |
| **Sulfathiazole** | TLC fluorescence: tissue extracts are partitioned by TLC and quantified by densitometry | 0.02 ppm | 0.05 ppm | Red meat/ liver, muscle | 1 |
| | Tissue extracts are confirmed by GC/EI/MS | 0.05 ppm | 0.05 ppm | Red meat/ liver, muscle, PP | 1 |
| **Sulfatroxazole** | TLC fluorescence: tissue extracts are partitioned by TLC and quantified by densitometry. | 0.05 ppm | 0.05 ppm | Red meat/ liver, muscle | 1 |
| | Tissue extracts are confirmed by GC/EI/MS | NE | 0.05 ppm | Red meat/ liver, muscle | 1 |
| **Sulfisoxazole** | TLC fluorescence: tissue extracts are partitioned by TLC and quantified by densitometry. | 0.05 ppm | 0.05 ppm | Red meat/ liver, muscle | 1 |
| | Tissue extracts are confirmed by GC/EI/MS | NE | 0.05 ppm | Red meat/ liver, muscle | 1 |
| **TDE (metabolite of DDT reported as DDT)** | GPC plus GLC | 0.03 ppm | 0.15 ppm | All/fat | 1 |
| | Extracts from GPC are confirmed by GC/MS | 0.02 ppm | 0.04 ppm | All/fat PP | 1 |
| **Terbuthylazine** | Fat extracted using C18 columns and quantified by capillary GC with nitrogen-phosphorous detector Extracts confirmed by GC/MS | 5 ppb | 10 ppb | All/fat | 1 |

| Compound | Method Description | LDL/MIC | MPL | Species/Tissues | Reference |
|---|---|---|---|---|---|
| **Terpene polychlorinates (Strobane)** | Micro alumina assay: column chromatography plus GLC | 0.50 ppm | 1.0 ppm | All/fat | 1 |
| | Mills method: Florisil column chromatography plus GLC | 0.50 ppm | 1.0 ppm | All/fat | 1 |
| **Tetracycline hydrochloride** | Antibiotic screen test (Swab): ability of tissue chloride fluids containing anti-microbial activity to inhibit microbial growth | 0.08 ppm | NE | All/kidney | 14 |
| | Microbiological assay procedure: ability of tissue extracts containing antimicrobial activity to inhibit microbial growth. | 0.08 ppm | NE | All/kidney, liver, muscle | 29 |
| **Tetracycline hydrochloride** | Extraction using C18 columns followed by HPLC with UV detection. | 0.05 ppm | 0.10 ppm | All/kidney, liver, muscle | 1 (Guide-book draft) |
| **Thiabendazole** | pH extraction with organic solvents followed by HPLC with UV detection; extracts derivatized and confirmed by GC/EI/MS | 0.05 ppm | 50 ppb | Red meat, PP liver, muscle | 1 |
| **Tiamulin** | Organic solvent extraction followed by GC of the 8-hydroxymutilin metabolite. | 0.2 ppm | NE | Swine/liver | 30 |
| | Extracts confirmed by GC/MS | NE | NE | Swine/liver | 30 |

| Compound | Method Description | LDL/MIC | MPL | Species/Tissues | Reference |
|---|---|---|---|---|---|
| **Tilmicosin** | Antibiotic screen test (SWAB): ability of tissue chloride fluids containing anti-microbial activity to inhibit microbial growth. | NE | NA | All/Kidney | 28 |
| | Microbial assay procedure: ability of tissue extract containing antimicrobial activity to inhibit microbial growth. | NE | NA | All/Kidney | 29 |
| | Liquid-liquid extraction with quantitation by ion pairing HPLC/UV | | 0.3 ppm M<br>0.6 ppm L | Beef liver, kidney, muscle | 1 (Guidebook draft) |
| **Tin** | Tissue is dry ashed and dissolved and quantified by AAS (used to screen for organotin compounds) | 0.02 ppm | 0.1 ppm | All/kidney, liver, muscle | 1 |
| **Toxaphene** | GPC plus GLC | 0.50 ppm | 1.0 ppm | All/fat | 1 |
| | Tissue extracts are screened by E-Z screen. | 50 ppm | NE | All/muscle, liver, kidney | 9 |
| **Tylosin** | Microbiological assay procedure: ability of tissue extracts containing antimicrobial activity to inhibit microbial growth | 0.2 ：g/mL | NA | Cattle/muscle | 31 |
| **Virginiamycin** | Microbiological assay procedure: ability of tissue extracts containing antimicrobial activity to inhibit microbial growth | 0.64 ppm | NA | Swine/ kidney, liver, muscle | 31 |
| | Organic solvent extraction followed by HPLC/UV quantification | 0.1 ppm | 0.2 ppm | All/kidney, liver, muscle | 1 |

| Compound | Method Description | LDL/MIC | MPL | Species/Tissues | Reference |
|---|---|---|---|---|---|
| **Zeranol and metabolite taleranol** | Extraction followed by radioimmunoassay. | | NE | Cattle/liver, muscle | 1 |
| | Solid phase extraction using an internal standard followed by polymethyl-silation for GC/MS quantification and confirmation | | NE | Cattle, sheep/liver, muscle | 1 |
| **Zinc** | Dry ashed tissue is dissolved and quantified by ICP | 0.006 mg/L | 0.006 µg/ml | All/kidney, liver, muscle | 1 |

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