

**FOOD SAFETY AND INSPECTION SERVICE
1999 NATIONAL RESIDUE PROGRAM
RESIDUE DATA**

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PREFACE

Welcome to the 1999 “Red Book”. This book presents the 1999 Food Safety and Inspection Service (FSIS) National Residue Data (NRD). [For those reading this electronically, this document has been commonly known as the “Red Book” because the covers of the printed versions are red.]

The National Residue Program (NRP) requires domestic monitoring and special project samples to be collected from carcasses of food animals and egg products to be analyzed for drug, pesticide, or environmental residues. Test results from analyzed monitoring samples are illustrated in table form in the Red Book. A table for each compound class indicates the number of analyses, violations, and non-positive violations for each production class. Also, two tables display cumulative data from monitoring production classes and specific compound classes. In addition, tables show results of sampling from imported product classes that have been collected and analyzed for drug or pesticide residues. The Red Book includes import results from each country in table form. These tables indicate the number of import results, non-detects, positives, and violations for the compound tested for each imported product. The text of the document explains how FSIS interprets the data collected under NRP.

Also, the Red 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.

CONTACTS AND COMMENTS

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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.

The presence of chemical residues in food 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. On July 25, 1996, the U. S. Department of Agriculture published the *Final Rule on Pathogen Reduction; Hazard Analysis and Critical Control Point (PR/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. Part 417 of the PR/HACCP regulation 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 Hazard Analysis and Critical Control Point (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.

A vigilant chemical residue prevention program is essential to foster 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 the Food Safety and Inspection Service (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 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 other 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 the farms. Typically, an educational visit

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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 the Food Quality Protection Act; and as codified under 40 CFR. Meat, poultry, and egg products may also contain chemical hazards that are the 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.¹ The NRP provides a variety of sampling plans to verify that slaughter establishments are fulfilling their responsibilities under HACCP for preventing violative residues from entering the food supply, and develops national data on the occurrence of chemical residues to support risk assessment, enforcement and educational activities.

The range of chemical compounds evaluated 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 part of maintaining a high level of food safety. American consumers expect that responsible U.S. government agencies thoroughly be able to 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.

¹The species subject to residue sampling under mandatory FSIS inspection are: cattle, swine, sheep, goats, horses, chickens, turkeys, ducks, geese, and guineas. Rabbits are sampled under a voluntary inspection program. In addition, FSIS also has regulatory responsibility for egg products (dried, frozen, and liquid eggs).

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The goals of the NRP are to:

- 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;
- Assess and communicate human exposure to chemical residues; and
- Provide verification of residue control in HACCP systems.

COMPONENTS OF THE FSIS NATIONAL RESIDUE PROGRAM

DOMESTIC RESIDUE SAMPLING PROGRAM

FSIS NRP provides a variety of sampling plans to verify and enforce that slaughter establishments are fulfilling their responsibilities under the HACCP regulation, and in accordance with FDA and EPA regulations, to prevent the occurrence of violative residues. FSIS also utilizes the NRP to collect national data on chemical residues for the support of risk assessment, enforcement, and educational activities. All residue data is collected and stored in the Microbiological and Residue Computer Information System. Detailed information on violations is immediately transferred to the Residue Violation Information System, which facilitates regulatory follow-up on violations and tracking of residue violators by both FSIS and FDA.

Components of the NRP for domestically produced products include:

- Monitoring Plan– the random sampling of specified animal populations at time of slaughter to provide more information about the occurrence of residue violations on an annual, national basis. The monitoring Plan samples animals that appear normal and healthy at the time of slaughter.
- Special Projects – information gathering studies that do not meet the criteria for inclusion in the Monitoring Plan, e.g. 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. 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. For example, when trace metals, such as cadmium or lead, are detected in edible tissues, a Special Project may be initiated to develop information on the frequency and concentration at which these residues occur. As with the Monitoring Plan. Special Projects sample animals that appear normal and healthy at time of slaughter.

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- Surveillance Sampling –considered a subset of Special Projects except that, unlike Special Projects, Surveillance Sampling sometimes employs on-site rapid screening tests. Surveillance Sampling consists of target sampling designed to distinguish components of livestock, poultry, and egg products in which residue problems exist, measure the extent of problems, and evaluate the impact of actions taken to reduce the occurrence of residues.
- Enforcement Testing – the analysis of specimens collected from individual animals or lots that appear suspicious to FSIS in-plant inspectors, based on herd history or antemortem or postmortem inspection. Enforcement Testing is also used to follow up on producers that have marketed animals with violative concentrations of residues, to determine if the non-compliance has been corrected or to verify industry's HACCP system.

It is important to emphasize the differences between the types of samples collected under the Monitoring Plan and Special Projects, as compared with those collected under Enforcement Testing. Since the former plans are designed to collect information upon the prevalence of residue violations in the U.S. food supply, these plans collect samples only from animals that appear normal and healthy at time of slaughter, and are thus permitted entry to the food supply. By contrast, since Enforcement Testing is designed to prevent violative product from entering the food supply, it is targeted towards animals that do not appear to be normal or healthy, or which show abnormal postmortem signs, or which are suspicious based on herd history. Enforcement Testing occasionally also includes samples from animals that have been condemned, based on postmortem inspection.

Further, because carcasses sampled under Enforcement Testing are by definition "suspect," and because a principal goal of Enforcement Testing is to prevent adulterated meat, poultry, and egg products from entering the food supply, all carcasses sampled under Enforcement Testing are held pending the results of official laboratory testing (unless on-site screening tests, described below, show them to be negative, or unless they have already been condemned by the inspector for other reasons). Carcasses found to contain violative concentrations of residues are considered adulterated and are condemned. By contrast, carcasses sampled under the Monitoring Plan and Special Projects are not held pending the results of testing. This is because the primary purpose of these sampling plans is information gathering (and identification of emerging residue problems), rather than direct removal of violative product from the food supply. Additionally, carcasses tested under the Monitoring Plan and Special Projects are unlikely to be violative; violations for most combinations of compound classes and production classes are typically below 0.3%.

Finally, all samples collected under the Monitoring Plan and Special Projects are submitted directly to the FSIS laboratory for testing. By contrast, Enforcement Testing makes extensive use of rapid on-site screening tests. Because FSIS in-plant inspectors are required to subject all carcasses for which there is a suspicion of a residue violation to Enforcement Testing, many such tests are performed, typically between 100,000 and 200,000 annually. However, it is not practical for FSIS to carry out expensive and time-consuming laboratory tests on the total number of Enforcement samples each year. Therefore, to perform such a large number of tests efficiently, carcasses are first pre-screened on-site by FSIS inspectors using rapid screening tests, where such tests are available. In this way, only those samples that test positive by a screening test (again, where such tests are available) are sent to an official laboratory for follow-up testing. If an FSIS inspector suspects that a carcass may contain a violative level of a residue not detected by an official FSIS screening method (see below), a sample taken from that carcass is sent directly to an official laboratory for

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testing.

As explained above, the use of on-site rapid screening tests also facilitates rapid decisions on carcass disposition. A carcass that registers a positive result on the screening test is held pending the outcome of laboratory testing, while one that registers a negative result is permitted to enter the food supply (unless the FSIS inspector has condemned it for some other reason).

FSIS employed the following on-site rapid screening tests in 1999:

1. SOS (Sulfa-On-Site) - test for sulfonamide residues in market hogs; used in urine.
2. CAST (Calf Antibiotic & Sulfonamide Test) - swab test for antibiotic and sulfonamide residues in bob veal calves (less than 3 weeks of age and under 150 lbs.); used in kidney or liver tissue.
3. STOP (Swab Test on Premises) - swab test for antibiotic residues in all species; used in kidney tissue.
4. FAST (Fast Antimicrobial Screen Test) - swab test for antibiotic and sulfonamide residues in all bovine; used in kidney.

IMPORT RESIDUE SAMPLING PROGRAM

The FMIA, PPIA, and EPIA require foreign countries that export meat, poultry, or egg products 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 products to the U.S.

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 protection from foodborne hazards equivalent to that of the U.S. These may include the following:

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

After a foreign country is determined to have an equivalent system of inspection and becomes 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 performs periodic audits on foreign inspection systems. The frequency and extent of these

audits depend on the country's performance history, including the results from previous plant reviews and product reinspection at the port-of-entry. If a country does not maintain an inspection system equivalent to the U.S. system, it is not permitted to export product to the U.S.

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As a further check on the effectiveness of foreign inspection systems, FSIS randomly samples meat, poultry, and egg products for chemical residues at the U.S. port-of-entry. Sampling at the port-of-entry is based on the Import Residue Plan, which is designed annually by FSIS. Components of FSIS import residue sampling includes: Monitoring, Increased Monitoring, Surveillance, and Exploratory Testing. These are described below.

- Monitoring involves the sampling of specified raw or processed products to provide information annually about the occurrence of residue violations on imported products. Monitoring information is obtained through a statistically based random selection of products that have passed inspection from the foreign country. The probability of detecting a violation varies positively with the number of samples analyzed and the true violation rate of the product being tested. The results are used to identify countries whose product contains violative concentrations of residues. When a violation is found in a product, the foreign country is subjected to increased testing until compliance is demonstrated. The product is not retained after the sample is taken.
- Increased Monitoring occurs when FSIS finds a violation in a sample from a foreign country.
- Surveillance Testing occurs when FSIS suspects that a product from a specific country may be likely to have violative concentrations of a residue. Surveillance is designed to measure the extent of problems, and to evaluate the impact of actions taken to reduce the occurrence of residues in imported products.
- Exploratory Testing occurs when FSIS determines a need to study a specific product or compound that is being imported from one or more countries.

Residue sampling of imported meat and poultry is directed by the Automated Import Information System (AIIS), which stores results from all port-of-entry samples for each country and for each establishment. All shipments are reinspected for transportation damage, labeling, proper certification, general condition, and accurate count. The AIIS assigns a variety of inspection types, which may include analysis for chemical residues. Residue analyses are 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.

The first ten shipments of egg products from individual foreign establishments are subjected to 100 percent reinspection, to establish a history of compliance for each product category. This level is reduced to random selection of one reinspection out of eight shipments, which continues as long as the product is in compliance. If a positive result is found in an egg product, import requests would be denied until foreign officials and FSIS determined that egg products originating from that country are safe for human consumption.

Products that are sampled during routine monitoring are eligible to be stamped with the U.S. mark of inspection and allowed to enter commerce prior to receipt of the results of the analysis. If violative results are reported, any remaining imported product from the sampled shipment bearing the U.S. mark of inspection is either destroyed or converted to animal food, if FDA permits it. Product from the sampled shipment is not eligible for export from the U.S. If the importer chooses

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to voluntarily hold the shipment at port-of-entry until the results are received, the product is refused entry when violative results are reported. The product must then be exported from the U.S., destroyed, or converted to animal food provided, approval is received by the FDA.

INTERPRETATION OF THE FSIS NATIONAL RESIDUE PROGRAM

THE DOMESTIC PROGRAM

SAMPLE ANALYSES

The violations and positives reported in the tables showing the 1999 Domestic Residue Program Results and in Appendix I represent the number of samples analyzed. Samples analyzed, generally, are from a single animal, except in the case of poultry. A poultry sample is a composite of six birds taken from the same flock.

In addition, a sample from one animal can be analyzed for more than one residue. For example, a sample from one animal is analyzed for Chlorinated Hydrocarbons (CHCs), Chlorinated Organophosphates (COPs), and Phenylbutazone, which could result in more than one violative residue per sample. Therefore, if one or more is found in a production class, only one violation would be indicated in the table. In the section, Specific Violation Residues, the actual number of violations is reported.

It should also be noted that some sample tissues are analyzed for more than one compound or compound class and are reported here as separate analyses under each relevant compound heading. For example, some sample tissues maybe analyzed using antibiotic and sulfonamide residue methods. Each analysis is reported and included in the total residue findings, even when the samples came from the same animal.

AGGREGATION OF DATA

Care must be taken when making statistical inferences from these data. The domestic monitoring sampling program is designed to detect, with a predetermined level of confidence, specific compounds in the designated slaughter classes. The sampling program is not designed to provide an estimate of an overall national percentage of violations for all chemical residues or slaughter classes tested. The data on violations reported here should not be summed across either slaughter class or compound with the intent of arriving at a single value to represent the percentage occurrence of violations over all the species that were tested. This mathematical operation will not produce a statistically valid estimate for the population, given the sample design in use.

CONFIDENCE INTERVALS

Within a slaughter class/compound pair, the results of the random sampling may be considered as representative of that slaughter class population, since the sample selection procedure is designed to approximate the selection of a simple random sample of animals. The percentage of violations in

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each slaughter class/compound pair is a statistically valid estimate of the corresponding slaughter class population percentage, based on the randomness model. Therefore, the information presented includes these estimates of percentage of violations, along with appropriate confidence intervals. The two-sided 95% confidence intervals for the population percentage of violations are given (i.e., the probability is approximately 95% that the interval ranging from the lower bound through the upper bound will contain the true population value). The confidence intervals were computed using a binomial distribution.

NOMENCLATURE

This edition follows the usage of the 1989 and later editions of the NRP. "Fancy calves" in the 1988 edition became "Formula-fed calves" in 1989; "Western calves" in the 1988 edition became "Heavy calves" in 1989.

Production classes are defined as follows:

- Bulls are mature intact male cattle;
- Beef cows are sexually mature female cattle of beef type, ordinarily having given birth to one or more calves;
- Dairy cows are sexually mature female cattle of dairy type, ordinarily having given birth to one or more calves;
- Heifers are young, female cattle that have not yet given birth to a calf;
- Steers are male cattle castrated before sexual maturity;
- Bob calves are calves up to three weeks of age or 150 pounds;
- Formula-fed calves are confinement-raised cows fed on a liquid milk replacer diet and weighing more than 150 pounds;
- Non-formula fed calves are calves fed a diet that includes solid feeds such as grass and grains requiring a functional rumen and weighing between 150 and 400 pounds;
- Heavy calves are non-formula fed calves weighing greater than 400 pounds with the physical characteristics of a calf;
- Market hogs are swine usually marketed near six months of age and 200 to 300 pounds live weight;
- Boars are mature swine showing male sexual characteristics;
- Stags are male swine castrated after they have reached sexual maturity;
- Sows are mature female swine;
- Sheep include mature sheep with no distinction by gender;
- Lambs include young sheep less than one-year old and yearlings, which are sheep one to two years old;
- Goats are of either sex and any age;
- Horses are of either sex and any age;
- Other livestock include bison, deer, elk, etc.;
- Young chickens include broilers/fryers that are usually less than 10 weeks of age, roasting chickens that are young chickens of either sex usually less than 12 weeks of age, and capons, which are surgically neutered male chickens usually less than 4 months of age;
- Mature chickens are adult female chickens usually more than 10 months of age;
- Young turkeys include fryer/roaster turkeys that are either male or female and usually less than

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12 weeks of age, and turkeys that are either male or female usually less than 6 months of age;

- Mature turkeys are of either sex and usually more than 15 months of age;
- Ducks are of either sex and any age;
- Geese are of either sex and any age;
- Other poultry include ratites (typically ostriches, emus and rheas), guineas, squabs (young, unfledged pigeons), adult pigeons, pheasants, grouse, partridge, quail etc.;
- Rabbits are any of several lagomorph mammals; and
- Egg products are dried, frozen, or liquid eggs.

NON-VIOLATIVE POSITIVE RESULTS

Monitoring and enforcement testing (excluding In-plant tests) for those laboratory-confirmed residues that are below tolerance are shown in Appendix I. The results may include some Unidentified Microbial Inhibitors (UMI's), residues from antibacterial agents that are present but cannot be accurately identified.

THE IMPORT PROGRAM

SAMPLE ANALYSES

The results in Appendix II are reported by country. The headings indicate the number of reported results obtained for each compound per product class and the data show the number of non-detects, positive and violative residues.

RESULTS FROM THE NATIONAL RESIDUE PROGRAM

SUMMARY OF DOMESTIC MONITORING AND SPECIAL PROJECTS DATA

A low level of violative monitoring samples was detected in 1999, similar to findings in recent sampling years. FSIS data indicate that the great majority of the 155.15 million head of livestock and 8.36 billion birds are free of violative residues when they are slaughtered in federally inspected plants.

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The 1999 production for the various slaughter classes are tabulated below:

| Class | Total heads | Class | Total Heads |
|---------------------|-------------|-----------------|---------------|
| Horses | 64,036 | Market hogs | 101,441,787 |
| Bulls | 745,520 | Boar/Stags | 641,994 |
| Beef and dairy cows | 7,168,146 | Sows | 3,671,624 |
| Heifers | 14,324,037 | Other Livestock | 15,487 |
| Steers | 21,654,148 | Young chickens | 7,896,208,458 |
| Bob calves | 606,052 | Mature chickens | 176,054,687 |
| Formula-fed calves | 697,283 | Young turkeys | 259,987,057 |
| Non-formula calves | 21,965 | Mature turkeys | 1,811,358 |
| Heavy calves | 42,864 | Ducks | 23,670,380 |
| Sheep | 217,636 | Rabbits | 367,654 |
| Lambs | 3,345,449 | Geese | 175,958 |
| Goats | 488,828 | Other Poultry | 7,096,793 |

In 1999, the FSIS monitoring and special projects program sampled and tested 12 compound classes of animal drugs and pesticides, comprising approximately 59 residues. Of the 32,137 monitoring and special project's analyses, 122 showed violative concentrations of residues. As noted earlier, the percentage of violations for all samples and all residues is not representative of the percentage that is violative in the livestock population as a whole. The percentage occurrence of violations or positive findings can be considered representative only within a slaughter class/compound pair.

In the 1999 FSIS monitoring program, the following violations were found: 17 sulfonamides, two phenylbutazone, 86 antibiotics, nine chlorinated hydrocarbons and chlorinated organophosphates, six avermectin, and one arsenic. Multiple antibiotic violations were found in a horse sample. One violation was found in a carbadox sample in the special projects program.

The majority of these violations detected in the monitoring program were from illegal levels of approved animal drugs, particularly sulfonamides and antibiotics used to prevent or treat bacterial infections. Most antibiotic and sulfonamide residue violations are confined to a relatively small percentage of livestock and poultry that make up the meat supply. The recurring reason for drug residue violations in livestock and poultry is an apparent failure to allow an adequate withdrawal time for the drugs to clear the animal's system. Detected illegal residues are usually concentrated in kidney, liver, or fat rather than muscle meat. The monitoring program focuses on kidney and liver tissues, since most FDA limits are established in these tissues.

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SUMMARY OF SPECIFIC NATIONAL RESIDUE PROGRAM DATA BY COMPOUNDS/CLASSES

Antibiotics

An antibiotic is a chemical substance with the capacity in dilute solutions to inhibit the growth of microorganisms or destroy them. In 1999, FSIS analyzed 7,343 monitoring samples for antibiotic residues. Eighty-seven antibiotic monitoring violations were found in 86 animals from all slaughter classes monitored for antibiotics. (Multiple antibiotic violations were found in one horse.) Horses accounted for 47 of the antibiotic violations.

CAST: 8,988 analyses were performed on samples from bob calves and non-formula calves in 1999, with 111 violative animals. (8,958 CAST samples were tested in 1998, with 89 violative specimens.)

STOP: 37,526 analyses were performed on samples from horses, cattle, sheep/lambs, goats, and swine in 1999, with 233 violative animals. (37,633 STOP samples were tested in 1998, with 220 violations.)

FAST: 132,473 analyses were performed in cattle, sheep, goats, swine, and other animals in 1999, with 1,175 violative animals. (108,020 FAST samples in 1998 resulted in 751 violations.)

Tilmicosin

Tilmicosin is a macrolide antibiotic specifically developed for bovine respiratory disease. Four hundred twenty dairy cows and 446 formula fed-calves monitoring samples were tested for tilmicosin and none of the 1999 monitoring samples were violative.

Sulfonamides

Sulfonamides are antibacterial agents. Seventeen sulfonamide violations occurred among 6,229 monitoring samples from all slaughter classes monitored for sulfonamides. Bob calves had three violations, while sows, formula-fed calves and young turkeys each had two sulfonamide violations. Bulls, dairy cows, lambs, market hogs, boars/stags, roaster pigs and young chickens each had one sulfonamide violation. The 17 sulfonamide violations included 11 sulfamethazine, three sulfadimethoxine, one sulfamethoxazole, one sulfadoxine and one s-chlorpyridazin. SOS testing resulted in 13 violative animals of 9,460 analyses in 1999. All violations involved sulfamethazine. (11,109 SOS samples were tested in 1998 with 28 violations.) No violations were found in the special project sampling of 60 egg products.

Arsenicals

Arsenical compounds are used in food-producing animals (swine and poultry) primarily as growth

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promoters and to prevent bacterial enteritis. Of the 3,005 monitoring samples, one violation was detected in a duck. No violations were found in the special project sampling of 60 egg products.

Chlorinated Hydrocarbons & Chlorinated Organophosphates

Chlorinated hydrocarbons and chlorinated organophosphates are effective insecticides. Some of these compounds - such as DDT - are no longer marketed because of their extremely long half-life. Of the 7,370 monitoring samples, nine violative analyses were found in sample specimens. Violative levels of DDT were found in one sample from a non-formula calf and one sample from a sow. Violative levels of endosulfan were found in one sample from a bull and one sample from a lamb. Violative levels of famphur were found in one sample from a bull and in one sample from a dairy cow. Violative levels of lindane and polychlorinated biphenyls were found in samples from bob calves. A violative level of benzene hexachloride was found in a sample from a goat.

Egg products were added to the National Residue Program in October 1995. In 1999, 384 samples were analyzed for chlorinated hydrocarbons and chlorinated organophosphates. No violations were found.

Avermectins: ivermectin and doramectin

Ivermectin is one of the most widely-sold anthelmintic drugs in the United States. It is active against a wide variety of parasites. Six of 4220 samples in the 1999 monitoring program were violative: two in horses, and one each in a bull, beef cow, goat and a heavy calf. Samples were taken from 17 production classes.

Doramectin is a potent endectocide that combines broad-spectrum activity with a prolonged duration of activity offering broad-spectrum activity against the major internal and external parasites of cattle. None of the 4,220 samples in the 1999, monitoring program was violative. Samples were taken from 17 production classes.

Carbadox

Carbadox is a coccidiostat registered for use in swine. No violations were found among the 332 market hogs monitoring samples tested. One violation was found in the special projects sampling of 146 roaster pigs.

Beta-Agonists: clenbuterol

Clenbuterol, a growth promotant, is not currently registered for use in food animal in the United States. Clenbuterol is also a β -agonist and can cause increased heart rate, muscular tremors, headache, nausea, fever, and chills in people who have eaten the livers of animals that have been treated with clenbuterol.

In 1999, samples from 373 animals (mostly show animals) were analyzed. All samples were negative for clenbuterol. No violations were found in special project sampling of 265 formula-fed calves and 271 market hogs.

1999 FSIS RESIDUE DATA

Phenylbutazone

Phenylbutazone is an anti-inflammatory drug that is not registered for use in food animals. The method used to analyze for chlorinated hydrocarbons can be used to screen for residues of phenylbutazone. Of the 7,370 monitoring samples, two were found violative. One was detected in a horse and one in a heavy calf.

Dexamethasone

Dexamethasone is a member of the glucocorticoid class of drugs. Dexamethasone is used for the treatment of primary bovine ketosis and as an anti-inflammatory agent in cattle and horses. No violations were found in the special project sampling of 314 dairy cows.

Flunixin

Flunixin is a nonsteroidal anti-inflammatory drug (NASID). Flunixin is recommended for the alleviation of inflammation and pain associated with musculoskeletal disorders in horses. It is also recommended for the alleviation of visceral pain associated with colic in horses. No violations were found in the special project sampling of 325 dairy cows.

Fluoroquinolones

Fluoroquinolones are a modern group of therapeutic antibiotic, active against a range of bacteria. No violations were found in the special project sampling of 320 dairy cows, 297 young chickens, and 307 young turkeys.

Nitroimidazoles

Nitroimidazoles are a group of drugs that have both antiprotozoal and antibacterial activity. They act by binding to bacterial DNA and are very effective drugs with excellent distribution in the body. No violations were found in the special product sampling of 408 formula-fed calves.

SUMMARY OF RESIDUE PROGRAM BY SPECIES-SPECIFIC RESULTS

Appendix III contains the results of the National Residue Monitoring Program in a species-specific format. The number of positives and violations are reported in intervals, with the lowest interval being 0.01-0.1 ppm. If samples did not contain detectable residues, the samples are categorized under "None" for "Amount Found in Sample." The no-detect level, however, varies for each analyte and is *not* <0.01 ppm for every analyte in Appendix III. The limits of detection may be found in Appendix V (FSIS Laboratory Residue Analytical Capability).

1999 FSIS RESIDUE DATA

SUMMARY OF IMPORT RESULTS

In 1999, the FSIS Import Residue Plan sampled for eight classes of animal drugs and pesticides comprising over 50 residues. During 1999, the United States imported approximately 3,385,250,926 pounds of fresh and processed meat, poultry, and egg products from 31 countries. One chlorinated organophosphate violation was found out of 10,236 reported results.

**1999 FSIS RESIDUE DATA
CORRECTIONS TO THE 1998 DOMESTIC RESIDUE DATA BOOK**

The enforcement data in the following tables, entitled Swab Test on Premises (STOP) and Fast Antimicrobial Screen Test (FAST), should be as follows:

| Swab Test on Premises (STOP) [Includes samples tested for sulfonamides | Enforcement Testing: Analyses/Violations |
|---|---|
| Horses | 70/0 |
| Bulls | 418/1 |
| Steers | 1,796/4 |
| Beef cows | 8,185/35 |
| Heifers | 668/9 |
| Dairy cows | 20,366/171 |
| Formula-fed calves | 436/2 |
| Non- formula calves | 139/6 |
| Bob calves | 30/0 |
| Heavy Calves | 53/3 |
| Calves | 8/0 |
| Sheep | 21/0 |
| Lambs | 727/0 |
| Goats | 88/0 |
| Market hogs | 2,919/3 |
| Boar/Stags | 125/1 |
| Sows | 857/3 |
| Ostrich | 757/0 |
| TOTAL STOP | 37,633/238 |

1999 FSIS RESIDUE DATA

| Fast Antimicrobial Screen Test (FAST) [Includes samples tested for sulfonamides also] | Enforcement Testing: Analyses/Violations |
|--|---|
| Bulls | 544/2 |
| Steers | 950/4 |
| Beef cows | 9,303/28 |
| Heifers | 760/10 |
| Dairy cows | 83,729/688 |
| Bob calves | 12,482/62 |
| Formula-fed calves | 152/3 |
| Non-formula fed calves | 43/0 |
| Heavy calves | 42/1 |
| Market hogs | 3/0 |
| Sows | 12/0 |
| TOTAL FAST | 108,020/751 |