

FOOD SAFETY AND INSPECTION SERVICE

DOMESTIC RESIDUE DATA BOOK

NATIONAL RESIDUE PROGRAM

1997

**FOOD SAFETY AND INSPECTION SERVICE
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EXPLANATION OF THE 1997 FSIS NATIONAL RESIDUE PROGRAM

Introduction

The Food Safety and Inspection Service (FSIS) of the United States Department of Agriculture (USDA) is responsible for ensuring that USDA-inspected meat, poultry, and egg products are safe, wholesome, free of adulterating residues, and accurately labeled. As part of this responsibility, FSIS conducts the National Residue Program (NRP) to help prevent the marketing of animals containing unacceptable (violative) residues from pesticides, animal drugs, or potentially hazardous chemicals. The NRP collects samples of meat and poultry products at domestic slaughter establishments under FSIS and State inspection authority. These samples are then analyzed for violative residue concentrations. Violative residue concentrations are determined by reference to residue limits (tolerances or action levels) established by the Environmental Protection Agency (EPA) for pesticides and by the Food and Drug Administration (FDA) for animal drugs and environmental contaminants.

The NRP activities reported in this report cover monitoring and enforcement testing.

Monitoring

Monitoring involves the sampling of specified animal populations to provide information about the occurrence of residue violations on an annual, national basis. Compounds considered for inclusion in the National Residue Program generally have established residue limits - either tolerances or action levels. Residue limits pertinent to the 1997 NRP are listed in Appendix I.

Selection for monitoring is based on compound evaluations and the availability of laboratory methodology that is suitable for regulatory purposes. Monitoring information is obtained through a statistically based random selection of specimens of normal-appearing tissues from passed carcasses (healthy animals). Generally, for a specific slaughter class/compound pair, the number of randomly chosen specimens (300) provides a 95% probability of detecting at least one violation when 1 percent of the animal population is violative (see Table on page 16). In addition to profile information, the results are 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.

Exceptions to the number of specimens selected are made for minor slaughter classes and for major slaughter classes in which problems are suspected; smaller sample sizes may be used in the former case, larger sample sizes in the latter. The information generated from monitoring is reviewed periodically to assist in the allocation of Agency resources. A total of **26,626** monitoring sample units were analyzed during 1997 from all classes of food-producing animals.

Enforcement Testing

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Enforcement testing consists of the analysis of specimens obtained from individual animals or lots based on clinical signs, herd history, or post mortem findings. Testing is performed to detect individual animals with violative concentrations of residues. It 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 those who have been identified as marketing animals with violative concentrations of residues. A total of **165,328** enforcement testing samples were analyzed in 1997.

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 approximately 50 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 slaughter 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 slaughter classes for which they 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 than the SOS test. FAST was implemented in pilot plants in 1995. FAST has now been extended to virtually all the larger bovine slaughtering plants.

Up to 1996, almost every bob veal was tested. In-plant positives were presumed to be violative without laboratory confirmation. Beginning in 1996, in-plant positive samples were sent to the FSIS laboratory for confirmation for quality control purposes (9 CFR §310.21). Once a confirmed violation rate had been established for a slaughterhouse, the testing rates would depend upon the confirmed violation rate and would decrease from the initial 100% testing of the bob veal. Because the number of tests run on bob veal in 1997 depended upon the number of **confirmed** violations found in 1996, and because not all of the 1996 in-plant positives could be confirmed by the

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laboratory, the number of FAST tests decreased significantly in 1997.

INTERPRETATION OF PROGRAM RESULTS

Sample Analyses/Violations

In the 1997 Residue Data Book, the main entries in the body of the table under compound or compound/class headings refer to analyses of sample units comprising tissues from a single animal or several birds from the same production lot. The “Specific Violative Residues” sections presented in smaller type below the tables refer to the actual residues found.

The violations and positives reported in the tables giving the results for the 1997 residue program and in Appendix II represent the number of sample units. A sample unit is generally a single animal, except for poultry. A poultry sample unit is a composite of six birds taken from the same flock. For example, tissue from one animal analyzed by the Chlorinated Hydrocarbons (CHCs) and Chlorinated Organophosphates (COPs) method could contain more than one violative residue from this compound class. In the table, this animal would be counted as a single violation. Below the tables, the specific violative residues are enumerated. In the example above, if two different CHCs were found to be violative in a single animal, both analytes would be listed in this section.

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. Each analysis is reported and included in the total residue findings, even when the samples came from the same animal.

In addition, limits of quantitation and detection should be considered when interpreting residue levels and occurrences.

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.

A Note on Calf Nomenclature

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

Non-violative Positive Results

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

Voluntary Inspection Program

Voluntary inspection and certification program are maintained for rabbits and ratites. Results from 1997 are presented in Appendix III.

RESULTS

1997 Summary

A low level of violative monitoring samples was detected in **1997**, as has been found in previous sampling years. FSIS data indicate that the great majority of the 120.49 million head of livestock and 8.02 billion birds are free of violative residues when they are slaughtered in federally inspected plants.

The 1997 production for the various slaughter classes are tabulated below:

Class	Total heads	Class	Total Heads
Horses	82,025	Goats	356,201
Bulls	690,613	Market hogs	76,831,627
Beef and dairy cows	6,200,888	Boar/stags	676,811
Heifers	11,030,665	Sows	3,052,928
Steers	16,588,183	Young chickens	7,548,516,805

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Bob calves	746,192	Mature chickens	162,484,819
Formula-fed calves	707,308	Young turkeys	281,452,406
Non-formula calves	24,847	Mature turkeys	1,761,537
Heavy calves	42,392	Ducks	21,716,756
Class	Total heads	Class	Total Heads
Sheep	187,504	Geese	192,013
Lambs	3,269,059		

In **1997** the FSIS monitoring program sampled and tested for seven classes of animal drug and pesticide compounds, comprising approximately 57 residues. Of the 26,626 monitoring analyses, 72 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 are 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 **1997** monitoring program, the 72 violative residues were distributed as follows: 20 sulfonamides, 32 antibiotics, nine chlorinated hydrocarbons and chlorinated organophosphates, six ivermectin, and five arsenic.

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.

SPECIFIC NATIONAL RESIDUE PROGRAM COMPOUNDS/CLASSES

Antibiotics

Thirty-two antibiotic monitoring violations were found among 7,732 samples from all slaughter classes monitored for antibiotics. Multiple antibiotic violations were found in two horses. Horses, in fact, accounted for 22 of the violations.

CAST: 11,988 analyses were performed on bob veal calf samples in **1997**, with 55 violative animals. (21,045 CAST samples were tested in 1996, with 169 violative specimens.)

STOP: 33,709 analyses were performed on samples from horses, cattle, sheep/lambs, goats, swine, and ostriches in 1997, with 150 violations. (41,995 STOP samples were tested in 1996, with 292 violations.)

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FAST: 109,021 analyses were performed in cattle, sheep, goats, swine, and other animals in 1997, with 472 violations. (156,078 FAST samples in cattle in 1996 resulted in 1,024 violations.)

Sulfonamides

Twenty sulfonamide violations occurred among 5,646 samples from all slaughter classes monitored for sulfonamides. Sows had five violations, bob calves and regular veal had three sulfa violations, boar/stags and market hogs each had two violations, and horses, heifers, dairy cows, goats, and young turkeys each had one violation. The 20 sulfa violations included 16 sulfamethazine and three sulfadimethoxine, and one sulfathiazole. SOS testing produced 9 violations of 10,072 analyses in 1997. All violations involved sulfamethazine. (15,600 SOS samples were tested in 1996 with 24 violations.)

Arsenicals

Arsenical compounds are used in food-producing animals (swine and poultry) primarily as growth promoters and to prevent bacterial enteritis. Of the 2,428 monitoring samples of poultry, three violations were detected in young chickens, and one violation each was detected in young turkeys and goats.

Chlorinated Hydrocarbons & Chlorinated Organophosphates

These chemicals are effective insecticides. Some of these compounds - such as DDT - are no longer marketed because of their extremely long half-life. Of the 5,625 monitoring samples, nine violative analyses were found in sample specimens from horses, bulls, young chickens, boar/stags, and goats. Violative levels of chlordane were found in a goat and in a boar/stag. Violative levels of methoxychlor and chlorpyrifos were found respectively in a boar/stag; and a young chicken, and violative levels of dieldrin and heptachlor were found in horses. PCBs were detected in bulls and horses.

Eggs were added to the National Residue Program in October 1995. In 1996, 238 samples were analyzed for chlorinated hydrocarbons and chlorinated organophosphates, and in 1997, 402 samples were analyzed for these residues. No detectable residues were found in 1996 or 1997.

Halofuginone

Halofuginone prevents coccidiosis, a serious and potentially fatal parasitic infection that spreads rapidly among chickens and turkeys. No violations were found among the 770 monitoring samples taken in 1997. The following samples were analyzed: 292 young chickens, 243 mature chickens, 135 young turkeys and 100 mature turkeys.

Ivermectin

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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 3,715 samples in 1997 monitoring were violative: three in goats, and one each in formula-fed calves, non-formula-fed calves, and horses.

Carbadox

Carbadox is a coccidiostat registered for use in swine. During each FDA/State investigation of an illegal tissue residue the inspector notes drugs found on the farm. Such field intelligence data indicated that carbadox was occasionally found at cattle-only facilities raising questions about possible misuse of the product. The high regulatory and toxicological concerns associated with this product elevated the need to monitor for this compound in a species other than in which it was approved.

No violations were found among the 470 steers and 240 heifers tested.

Beta-Agonists: Clenbuterol

Clenbuterol, a growth promotant, is not currently registered for any food animal use 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 1997, the livers from 228 animals (mostly show animals) were analyzed. All the liver samples were negative for clenbuterol.

Phenylbutazone

The method used to analyze for chlorinated hydrocarbons can be used to screen for residues of phenylbutazone, an anti-inflammatory that is not registered for use in food animals. The presence of phenylbutazone is confirmed by full scan GC/MS. Phenylbutazone was detected in one horse tested in the National Monitoring Program and one steer during enforcement testing.

1997 RESIDUE PROGRAM SPECIES-SPECIFIC RESULTS

Appendix IV contains the results of the National Residue 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 IV. The limits of detection may be found in Appendix V.

IMPORT RESIDUE PLAN

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Federal meat and poultry inspection laws require foreign countries exporting meat and poultry to the U.S. to impose inspection requirements **equivalent** to U.S. requirements. As part of the process for a foreign country satisfying the equivalence standard with respect to the U.S., **the country must respond to a set of five questionnaires that are designed to obtain information regarding various risk areas. One of the risk areas is residues.**

A critical process in the foreign inspection system is residue control and monitoring to ensure that chemicals or drugs prohibited in food animal production in the US are controlled by foreign countries whose products are destined for the US consumer. Present statutes require that foreign residue control programs include random sampling of animals at slaughter, the use of approved sampling and analytical methods, testing of the target tissue for specific compounds, and testing for compounds identified as potential contaminants of meat, poultry and egg product exported to the U.S. In addition, every foreign country must submit residue monitoring plans and results of the previous year's testing.

FSIS evaluates foreign residue control programs through on-site observation of the foreign country's inspection system, including the exporting plants, equipment and the laboratories, and through actual sampling of imported products at the time of entry into the U.S. Import reinspection performed by FSIS inspectors at various ports-of-entry around the country is a check on the effectiveness of foreign inspections systems. A component of the import reinspections process is residue sampling. To ensure that representative specimens are selected, a specimen is chosen at random from the lot selected for reinspection.

The criteria for acceptance or rejection of imported products are the same as those applied to U.S. meat and poultry products prepared under Federal inspection. When test results indicate a violative level of residue in an imported product, every effort is made to locate and destroy any product already in U.S. distribution channels. Subsequent shipments of the same product from the same establishment are retained at the port-of-entry until laboratory results are known. If results are negative, product is permitted to move into commerce; if violative, product is refused entry into the U.S. In addition, all shipments of like product from the country are placed on an increased testing schedule until a record of compliance is re-established.

Imported products are analyzed for the same residues as in the domestic samples tested in the National Residue Program. The results from import testing are tabulated in Appendix VI.

ERRATUM IN THE 1996 DOMESTIC RESIDUE DATA BOOK

Domestic Residue Data Book National Residue Program, 1996, page 12. In the table entitled CUMULATIVE TOTALS-BY COMPOUND OR CLASS, the entry under "Enforcement Testing Analyses" for antibiotics should be 219, 236, not 219,193. The total for the enforcement testing analyses should be 235,538, not 235,495.

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Contacts and Address for Comments:

The results of the domestic residue sampling programs were compiled by the Emerging Issues Branch, Chemistry and Toxicology Division, in the Office of Public Health and Science. Technical comments/questions about the residue program should be referred to the **Chemistry and Toxicology Division**. The telephone number is 202-501-7319.

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1997 DOMESTIC RESIDUE PROGRAM RESULTS

ANTIBIOTICS

In all the tables in this section and in Appendix II, the number of violations or positives reflects the number of animals (or the number of composite samples in the case of poultry) that were found to contain at least one violative or detectable residue.

Bacitracin	Hygromycin	Novobiocin
Chlortetracycline	Neomycin	Streptomycin
Erythromycin	Oxytetracycline	Tetracycline
Gentamicin	Penicillins	Tylosin

(Non-violative positives are reported in Appendix II)

Slaughter Class	Monitoring			Enforcement Testing
	Analyses/ Violations	Percent Violative	95 percent Confidence Interval	Analyses/ Violations
Horses*	386/20	5.2	3.2-7.9	
Bulls	267/0	0	0.0-1.4	
Beef cows	485/1	0.2	0.0-1.1	
Dairy cows	498/1	0.2	0.0-1.1	
Heifers	316/0	0	0.0-1.2	
Steers	467/0	0	0.0-0.8	
Bob calves	429/2	0.5	0.1-1.7	
Formula-fed calves	505/3	0.6	0.1-1.7	
Non-formula calves	310/1	0.3	0.0-1.8	
Heavy calves	273/0	0	0.0-1.3	
Cattle				71/5
Sheep	301/0	0	0.0-1.2	
Lambs	342/0	0	0.0-1.1	
Sheep/Lambs				10/0
Goats	305/1	0.3	0.0-1.8	

1997 DOMESTIC RESIDUE PROGRAM RESULTS

ANTIBIOTICS, continued

Slaughter Class	Monitoring			Enforcement Testing
	Analyses/ Violations	Percent Violative	95 percent Confidence Interval	Analyses/ Violations
Market hogs	480/1	0.2	0.0-1.2	
Boar/Stags	299/0	0	0.0-1.2	
Sows	488/0	0	0.0-0.8	
Swine				51/1
Young chickens	437/0	0	0.0-0.8	
Mature chickens	242/0	0	0.0-1.5	
Young turkeys	281/0	0	0.0-1.3	
Mature turkeys	121/0	0	0.0-3.0	
Turkeys				12/2
Ducks	495/0	0	0.0-0.7	
Geese	5/0	0	0.0-52.2	

* Multiple violations were found in some animals

SPECIFIC VIOLATIVE RESIDUES

Monitoring:

Beef cow: 1 gentamicin
 Dairy cow: 1 gentamicin
 Bob calves: 1 neomycin, 1 gentamicin
 Formula-fed calves: 3 gentamicin
 Non-formula fed calf: 1 neomycin
 Goat: 1 oxytetracycline
 Market hog: 1 streptomycin
 Horses: 17 streptomycin, 5 penicillin

Enforcement Testing:

Beef cow: 1 oxytetracycline, 1 penicillin
 Dairy cows: 2 gentamicin, 1 streptomycin
 Young turkey: 1 streptomycin, 1 gentamicin
 Sow: 1 penicillin

1997 DOMESTIC RESIDUE PROGRAM RESULTS

ANTIBIOTICS, continued

In-plant Tests

Calf Antibiotic and Sulfonamide Test (CAST): There were 55 violations out of 11,988 animals tested

CAST SPECIFIC VIOLATIVE RESIDUES

Cattle: 11 penicillin, 7 streptomycin, 1 tetracycline, 1 tylosin, 2 oxytetracycline, 8 neomycin, 9 gentamicin, 3 sulfadimethoxine, 5 sulfamethazine, 3 sulfathiazole, 5 sulfamethoxazole

Swab Test on Premises (STOP) [Includes samples tested for sulfonamides	Enforcement Testing: Analyses/Violations
Horse	59/1
Bull	441/3
Steer	2256/11
Beef cow	7133/39
Heifer	864/4
Dairy cow	16,413/78
Formula fed calves	336/2
Non formula fed calves	80/0
Calves	5/0
Bob veal calves	6/2
Heavy calves	72/1
Mature sheep	50/0
Lambs	429/2
Goats	185/1
Market hogs	3,579/4
Boar/stags	54/0
Sows	643/0
Ostrich	1,104/0
Total STOP Tests	33,709/150

1997 DOMESTIC RESIDUE PROGRAM RESULTS

ANTIBIOTICS, continued

STOP SPECIFIC VIOLATIVE RESIDUES

Horses: 1 oxytetracycline
 Bulls: 1 penicillin, 1 sulfadimethoxine, 1 sulfamethazine
 Steer: 2 penicillin, 3 oxytetracycline, 6 sulfamethazine
 Beef cows: 24 penicillin, 1 streptomycin, 2 tetracycline, 4 oxytetracycline, 4 gentamicin, 4 sulfadimethoxine
 Heifers: 1 penicillin, 1 oxytetracycline, 2 sulfamethazine
 Dairy cows: 49 penicillin, 2 streptomycin, 1 tetracycline, 2 erythromycin, 7 oxytetracycline, 8 gentamicin, 8 sulfadimethoxine, 1 sulfamethazine
 Bob veal: 1 streptomycin, 1 sulfamethazine
 Formula fed veal: 1 penicillin, 1 sulfamethazine
 Heavy calf: 1 sulfamethazine
 Lambs: 1 penicillin, 1 oxytetracycline
 Goats: 1 penicillin
 Market hogs: 3 penicillin, 1 sulfathiazole

Fast Antimicrobial Screen Test (FAST) [Includes samples tested for sulfonamides also]	Enforcement Testing: Analyses/Violations
Bovine	79/0
Bulls	721/2
Steers	1,131/4
Beef cows	12,202/35
Heifers	834/4
Dairy cows	75,599/339
Bob calves	17,854/82
Formula fed calves	299/1
Non formula fed calves	28/2
Heavy Calves	91/2
Goats	3/0
Market hogs	14/0

1997 DOMESTIC RESIDUE PROGRAM RESULTS

ANTIBIOTICS, continued

Fast Antimicrobial Screen Test (FAST) [Includes samples tested for sulfonamides also]	Enforcement Testing: Analyses/Violations
Boar/stags	3/0
Sows	7/0
Roaster pigs	2/0
Other	154/0
Total FAST Tests	109,021/471

FAST SPECIFIC VIOLATIVE RESIDUES

Bulls: 2 oxytetracycline

Steers: 1 penicillin, 1 streptomycin, 1 gentamicin, 1 sulfamethazine

Beef cows: 16 penicillin, 1 streptomycin, 1 tetracycline, 7 oxytetracycline, 6 gentamicin, 4 sulfamethazine

Heifer: 2 penicillin, 1 oxytetracycline, 1 sulfamethazine

Dairy cows: 161 penicillin, 37 streptomycin, 5 tetracycline, 1 tylosin, 2 erythromycin, 9 neomycin, 22 oxytetracycline, 1 chlortetracycline, 48 gentamicin, 45 sulfadimethoxine, 7 sulfamethazine, 1 sulfathiazole

Bob veal: 13 penicillin, 12 streptomycin, 4 tetracycline, 1 erythromycin, 8 neomycin, 11 oxytetracycline, 11 gentamicin, 1 sulfadimethoxine, 7 sulfamethazine, 6 sulfathiazole, 8 sulfamethoxazole

Formula fed veal: 1 streptomycin

Non-formula fed veal: 1 penicillin, 1 oxytetracycline

Heavy calves: 1 streptomycin, 1 sulfamethazine

SULFONAMIDES

Sulfachlorpyridazine
Sulfadimethoxine

Sulfamethazine
Sulfathiazole

(Non-violative positives are reported in Appendix II)

1997 DOMESTIC RESIDUE PROGRAM RESULTS

SULFONAMIDES, continued

Slaughter Class	Monitoring			Enforcement Testing
	Analyses/ Violations	Percent Violative	95 percent Confidence Interval	Analyses/ Violations
Horses	234/1	0.4	0.0-2.4	
Bulls	317/0	0	0.0-1.2	
Beef cows	312/0	0	0.0-1.2	
Dairy cows	325/1	0.3	0.0-1.7	
Heifers	247/1	0.4	0.0-2.2	
Steers	248/0	0	0.0-1.5	
Bob calves	429/3	0.7	0.1-2.0	
Formula-fed calves	329/0	0	0.0-1.1	
Non-formula fed calves	310/3	1.0	0.2-2.8	
Heavy calves	208/0	0	0.0-1.8	
Cattle				13/3
Sheep	84/0	0	0.0-4.3	
Lambs	102/0	0	0.0-3.5	
Goats	289/1	0.3	0.0-1.9	
Market hogs	474/2	0.4	0.1-1.5	
Boars/Stags	307/2	0.7	0.1-2.3	
Sows	323/5	1.5	0.5-3.6	
Swine				10/2
Young chickens	275/0	0	0.0-1.3	
Mature chickens	243/0	0	0.0-1.5	

1997 DOMESTIC RESIDUE PROGRAM RESULTS

SULFONAMIDES, continued

Slaughter Class	Monitoring			Enforcement Testing
	Analyses/ Violations	Percent Violative	95 percent Confidence Interval	Analyses/ Violations
Young turkeys	192/1	0.5	0.0-2.9	
Mature turkeys	123/0	0	0.0-3.0	
Ducks	270/0	0	0.0-1.4	
Geese	5/0	0	0.0-52.2	

SPECIFIC VIOLATIVE RESIDUES

Monitoring:

Horse: 1 sulfadimethoxine
 Heifer: 1 sulfamethazine
 Dairy cow: 1 sulfadimethoxine
 Bob calves: 2 sulfamethazine; 1 sulfathiazole
 Non-formula calves: 3 sulfamethazine
 Goats: 1 sulfamethazine
 Market hogs: 2 sulfamethazine
 Boars/Stags: 2 sulfamethazine
 Sows: 5 sulfamethazine
 Young turkey: 1 sulfadimethoxine

Enforcement Testing:

Dairy cow: 1 sulfadimethoxine
 Market hogs: 2 sulfamethazine
 Heavy calf: 1 sulfamethazine
 Steer: 1 sulfamethoxazole

SULFA-ON-SITE (SOS)

Of the 10,072 swine that were tested, 9 animals contained violative levels of sulfonamides. All nine animals contained violative levels of sulfamethazine.

1997 DOMESTIC RESIDUE PROGRAM RESULTS

ARSENIC

(Non-violative positives are reported in Appendix II)

Slaughter Class	Monitoring			Enforcement Testing
	Analyses/ Violations	Percent Violative	95 percent Confidence Interval	Analyses/ Violations
Horses	87/0	0	0.0-4.2	5/0
Bulls	106/0	0	0.0-3.4	
Beef Cows	95/0	0	0.0-3.8	
Dairy Cows	97/0	0	0.0-3.7	
Heifers	99/0	0	0.0-3.7	
Steers	95/0	0	0.0-3.8	
Bob Calves	71/0	0	0.0-5.1	
Formula-fed Calves	103/0	0	0.0-3.5	
Non-formula Calves	53/0	0	0.0-6.7	
Heavy Calves	83/0	0	0.0-4.3	
Sheep	83/0	0	0.0-4.3	
Lambs	106/0	0	0.0-3.4	
Goats	209/1	0.5	0.0-2.6	
Market Hogs	228/0	0	0.0-1.6	
Boar/Stags	101/0	0	0.0-3.6	
Sows	88/0	0	0.0-4.1	
Young Chickens	426/3	0.7	0.1-2.0	
Mature Chickens	100/0	0	0.0-3.6	
Chickens				16/0

1997 DOMESTIC RESIDUE PROGRAM RESULTS

ARSENIC, continued

Slaughter Class	Monitoring			Enforcement Testing
	Analyses/ Violations	Percent Violative	95 percent Confidence Interval	Analyses/ Violations
Young Turkeys	151/1	0	0.0-2.4	
Mature Turkeys	47/0	0	0.0-7.6	
Turkeys				2/0
Other				2/0

CHLORINATED HYDROCARBONS & ORGANOPHOSPHATES (CHC/COP'S)

Aldrin
Benzene Hexachloride (BHC)
Carbophenothion (trithion)
Chlordane (technical)
2-Chloro-1-(2,4,-
dichlorophenyl)vinyl
diethyl phosphate
[chlorfenvinphos, supona]
2-Chloro-1-(2,4,5-
trichlorophenyl)vinyl
dimethyl phosphate
[stirofos, gardona]

Chlorpyrifos
Coumaphos and
oxygen analog
DDT and
metabolites
Dieldrin
Dodecachlorooctahydro-
1,3,4-metheno-2H-
cyclobuta(cd)pentalene
[mirex]
Endosulfan

Endrin
Heptachlor and
heptachlor epoxide
Hexachlorobenzene (HCB)
Lindane
Linuron
Methoxychlor
Phosalone
Polybrominated biphenyls
Polychlorinated biphenyls

1997 DOMESTIC RESIDUE PROGRAM RESULTS

CHCs/COPs, continued

(Non-violative positives are reported in Appendix II)

Slaughter Class	Monitoring			Enforcement Testing
	Analyses/ Violations	Percent Violative	95 percent Confidence Interval	Analyses/ Violations
Horses	457/5	0.9	0.2-2.2	53/0
Bulls	268/1	0.4	0.0-2.1	
Beef cows	296/0	0	0.0-1.2	
Dairy cows	244/0	0	0.0-1.5	
Heifers	240/0	0	0.0-1.5	
Steers	306/0	0	0.0-1.2	
Bob calves	200/0	0	0.0-1.8	
Formula-fed calves	258/0	0	0.0-1.4	
Non-formula calves	208/0	0	0.0-1.8	
Heavy calves	269/0	0	0.0-1.4	
Cattle				11/1
Sheep	288/0	0	0.0-1.3	
Lambs	268/0	0	0.0-1.4	
Goats	468/1	0.2	0.0-1.2	
Market hogs	319/0	0	0.0-1.1	
Boars/Stags	310/2	0.6	0.1-2.3	
Sows	308/0	0	0.0-1.2	
Swine				5/0
Young chickens	274/1	0.4	0.0-2.0	
Mature chickens	102/0	0	0.0-3.5	
Chickens				11/3

1997 DOMESTIC RESIDUE PROGRAM RESULTS

CHCs/COPs, continued

Slaughter Class	Monitoring			Enforcement Testing
	Analyses/ Violations	Percent Violative	95 percent Confidence Interval	Analyses/ Violations
Young turkeys	148/0	0	0.0-2.5	
Mature turkeys	108/0	0	0.0-3.4	
Turkeys				1/0
Ducks	264/0	0	0.0-1.4	
Geese	22/0	0	0.0-15.4	

Egg products were added to the National Residue Program in October, 1995. In 1996, 238 samples were analyzed for chlorinated hydrocarbons and chlorinated organophosphates, and in 1997, 402 samples were analyzed for these residues. No detectable residues were found in 1996 or 1997.

SPECIFIC VIOLATIVE RESIDUES

Monitoring:

Horses: 1 dieldrin, 1 heptachlor, 2 PCB, 1 phenylbutazone*

Bulls: 1 PCB

Goat: 1 chlordane

Boar/stags: 1 chlordane, 1 methoxychlor

Young chicken: 1 chlorpyrifos

Enforcement Testing:

Young chicken: 3 chlorpyrifos

Steer: 1 phenylbutazone*

* The method used to analyze for chlorinated hydrocarbons can be used to screen for residues of phenylbutazone, an anti-inflammatory that is not registered for use in food animals. The presence of phenylbutazone is confirmed by full scan GC/MS.

1997 DOMESTIC RESIDUE PROGRAM RESULTS

HALOFUGINONE

(Non-violative positives are reported in Appendix II)

Slaughter Class	Monitoring			Enforcement Testing
	Analyses/ Violations	Percent Violative	95 percent Confidence Interval	Analyses/ Violations
Young chickens	292/0	0	0.0-1.3	
Mature chickens	243/0	0	0.0-1.5	
Young turkeys	135/0	0	0.0-2.7	
Mature turkeys	100/0	0	0.0-3.6	

IVERMECTIN

(Non-violative positives are reported in Appendix II)

Slaughter Class	Monitoring			Enforcement Testing
	Analyses/ Violations	Percent Violative	95 percent Confidence Interval	Analyses/ Violations
Horses	256/1	0.4	0.0-2.2	5/0
Bulls	320/0	0	0.0-1.1	
Beef cows	239/0	0	0.0-1.5	
Dairy cows	319/0	0	0.0-1.1	
Heifers	97/0	0	0.0-3.7	
Bob calves	72/0	0	0.0-5.0	
Steers	247/0	0	0.0-1.5	
Formula-fed calves	260/1	0.4	0.0-2.1	

1997 DOMESTIC RESIDUE PROGRAM RESULTS

IVERMECTIN, continued

Slaughter Class	Monitoring			Enforcement Testing
	Analyses/ Violations	Percent Violative	95 percent Confidence Interval	Analyses/ Violations
Non-formula calves	195/1	0.5	0.0-2.8	
Heavy calves	213/0	0	0.0-1.7	
Cattle				11/0
Sheep	214/0	0	0.0-1.7	
Lambs	281/0	0	0.0-1.3	
Goats	288/3	1.0	0.2-3.0	5/0
Market hogs	237/0	0	0.0-1.5	
Boar/Stags	244/0	0	0.0-1.5	
Sows	233/0	0	0.0-1.6	
Ostriches				3/0

CARBADOX

(Non-violative positives are reported in Appendix II)

Slaughter Class	Monitoring			Enforcement Testing
	Analyses/ Violations	Percent Violative	95 percent Confidence Interval	Analyses/ Violations
Steers	470/0	0	0.0-0.8	
Heifers	240/0	0	0.0-1.5	

1997 DOMESTIC RESIDUE PROGRAM RESULTS

TRACE METAL ENFORCEMENT TESTING

One steer, two beef cows, seven lambs, one market hog, and two mature chickens were tested for trace metals. There were no violations.

CLENBUTEROL ENFORCEMENT TESTING

Livers from the following animals were analyzed: 4 bovine (unspecified class), 80 steers, 3 sheep, 72 lambs, 2 goats, 2 porcine (unspecified class), 64 market hogs, 1 ostrich. All 228 samples were negative.

CUMULATIVE TOTALS - BY SLAUGHTER CLASS

Slaughter Class	Monitoring: Analyses	Enforcement Testing: Analyses*
Horses	1,420	63
Bulls	1,278	
Beef cows	1,427	
Dairy cows	1,483	
Heifers	1,239	
Steers	1,833	
Bob calves	1,201	
Formula-fed calves	1,455	
Non-formula calves	1,076	
Heavy calves	1,046	
Cattle		193
Sheep	970	
Lambs	1,099	
Sheep/Lambs		92
Goats	1,559	7
Market hogs	1,738	
Boars/Stags	1,261	
Sows	1,440	
Swine		133

1997 DOMESTIC RESIDUE PROGRAM RESULTS

CUMULATIVE TOTAL, continued

Slaughter Class	Monitoring: Analyses	Enforcement Testing: Analyses*
Young chickens	1,704	
Mature chickens	930	
Chickens		29
Young turkeys	907	
Mature turkeys	499	
Turkeys		15
Ducks	1,029	
Ostriches		4
Geese	32	
Other		2
TOTAL	26,626	538*

* Domestic follow-up and inspector-generated sampling; does not include in-plant testing

CUMULATIVE TOTALS - BY COMPOUND OR CLASS

Compound Class	Monitoring Analyses	Enforcement Testing Analyses
Antibiotics	7,732	154,862 ¹
Sulfonamides	5,646	10,095 ²
Arsenic	2,428	25
CHC/COP's	5,625	81
Ivermectin	3,715	24
Carbadox	710	
Halofuginone	770	
Clenbuterol		228
Metals		13
TOTAL	26,626	165,328

¹ Includes CAST, FAST, STOP data and inspector-generated samples

² Includes SOS data and inspector-generated samples

1997 DOMESTIC RESIDUE PROGRAM RESULTS

STATISTICAL TABLE: NUMBER OF SAMPLES REQUIRED TO ENSURE DETECTION OF A PROBLEM THAT AFFECTS A GIVEN PERCENTAGE OF THE SAMPLED POPULATION

Percentage Violative in Sampled Population	Probability of Detection (Percent)			
	90	95	99	99.9
	Samples Required			
10	22	29	44	66
5	45	59	90	135
1	230	299	459	688
0.5	460	598	919	1,379
0.1	2,302	2,995	4,603	6,905
0.05	4,605	5,990	9,209	13,813