UNITED STATES

National Residue Program for

Meat, Poultry, and Egg Products

2017 Residue Sampling Plans

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United States Department of Agriculture

Food Safety and Inspection Service

Office of Public Health Science

Table of Contents

Table of Contents .... *ii*
List of Tables .... *iv*
Preface .... *v*
Contacts and Comments .... *v*
Acknowledgements .... *v*
Principal Authors (USDA/FSIS/OPHS) .... *v*
Acronyms .... *vi*
Introduction *1*
Overview of the Sampling Plans *4*
1. **Tier 1** 4
2. **Tier 2** 4
   A. Inspector-Generated Sampling 4
      i. **Sampling of Individual Suspect Animals** 5
      ii. **Sampling of Suspect Animal Populations** 5
   B. **Targeted Sampling** 5
3. Tier 3 6

IMPORT REINSPECTION SAMPLING PLAN 6
2017 RESIDUE SAMPLING FOR SILURIFORMES 6
SUMMARY OF CHANGES FROM THE 2016 NRP 7
POLICY AND PROCEDURES FOR HOLDING OR CONTROLLING PRODUCT UNDER NRP 7
ANIMAL PRODUCTION CLASSES 8
SUMMARY OF THE DOMESTIC AND IMPORT REINSPECTION SAMPLING PLANS *9*
Summary Tables 1 and 2 (Tier 1) 9
Summary Tables 3 and 4 (Tier 2) 9
Overview of the Program Design 9
Appendix I *14*
List of Chemical Residues by Class/Method 14
1. Veterinary Drugs 14
   a. **Multi-residue method** 14
   b. **Aminoglycoside Method** 14
   c. **Hormones Method** 14
   d. **Beta-Agonist Method** 15
   e. **Avermectin Method** 15
   f. **Nitrofuran Method** 15
   g. **Carbadox Method** 15
2. Pesticides and environmental contaminants 16
   a. **Pesticide Method** 16

b. Metals Method 16

Appendix II* *17

Statistical Table 17

Appendix III* *19

Appendix IV* *20

Appendix V* *21

Chemical Identification and Prioritization Framework for U.S. National Residue Program 21

Pesticide Ranking Based on Relative Public Health Impact 24

List of Tables

Summary Table 1: Analyses per Production Class by Compound Class, Domestic 10
Summary Table 2: Analyses per Production Class by Compound Class, Import........................... 11
Summary Table 3: Analyses per Production Class by Compound Class, Tier 2 Domestic 12
Summary Table 4: Sulfonamide Analyses in Processed Product, Import 13
Chemical Residues: Multi-residue Method.. 14
Chemical Residues: Aminoglycoside Method 14
Chemical Residues: Hormones Method... 14
Chemical Residues: Beta-Agonist Method... 15
Chemical Residues: Avermectin Method.. 15
Chemical Residues: Nitrofuran Method 15
Chemical Residues: Carbadox Method 15
Chemical Residues: Pesticide Method... 16
Chemical Residues: Metals Method 16
Statistical Table: 2017 U.S. National Residue Program.. 17
2017 NRP: Estimated Amount of Domestically Produced Meat, Poultry and Egg Products 19
2017 NRP: Estimated Annual Amount of Product Imported in the United States 20
Pesticide Ranking Based on Relative Public Health Impact 24

Preface

The United States National Residue Program (NRP) for Meat, Poultry and Egg Products: Residue Sampling Plans (traditionally known as the Blue Book) summarizes the process of sampling meat, poultry, and egg products for chemical contaminants of public health concern used by the Food Safety and Inspection Service (FSIS). This document details the principles and methods used to plan and design the following NRP sampling plans for: veterinary drugs, pesticides, and environmental contaminants. Explanations are provided with summary tables.

Contacts and Comments

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Acronyms

AMDUCA – Animal Medicinal Drug Use Clarification Act
AMS – Agricultural Marketing Service
APHIS – Animal and Plant Health Inspection Service
ARS – Agricultural Research Service
CDC – Centers for Disease Control and Prevention
CHCs – Chlorinated Hydrocarbons
COPs – Chlorinated Organophosphates
FDA – Food and Drug Administration
FSIS – Food Safety and Inspection Service
EPA – Environmental Protection Agency
HACCP – Hazard Analysis and Critical Control Points
IPP – Inspection Program Personnel
IRSP – Import Reinspection Sampling Program
KIS™ test – Kidney Inhibition Swab Test
NASS – National Agricultural Statistics Service
NRP – U. S. National Residue Program (Domestic & Import)
NSAID – Non-Steroidal Anti-inflammatory Drug
OFO – Office of Field Operations
OPHS – Office of Public Health Science
PHIS – Public Health Information System
PHV – Public Health Veterinarian
SAT – Surveillance Advisory Team
TOI – Types of Inspection

Introduction

The U.S. National Residue Program (NRP) for Meat, Poultry, and Egg Products, is an interagency program designed to identify, rank, and analyze for chemical contaminants in meat, poultry, and egg products. The program is administered by the U.S. Department of Agriculture's (USDA) Food Safety and Inspection Service (FSIS). FSIS publishes the NRP Residue Sampling Plans (traditionally known as the Blue Book) each year to provide information on the process of sampling meat, poultry, and egg products for chemical contaminants of public health concern.

Background

FSIS administers this regulatory program under the Federal Meat Inspection Act (FMIA) (21 U.S.C. 601 et seq.), the Poultry Products Inspection Act (PPIA) (21 U.S.C. 453 et seq.), and the Egg Products Inspection Act (EPIA) (21 U.S.C. 1031 et seq.). The NRP is an important component of FSIS mission to protect the health and welfare of the consumers by regulating the meat, poultry, and egg products produced in federally inspected establishments and to prevent the distribution into commerce of any such products that are adulterated or misbranded.

The NRP requires the cooperation and collaboration of several agencies for its successful design and implementation. FSIS, along with the Food and Drug Administration (FDA) and the Environmental Protection Agency (EPA), are the primary Federal agencies managing this program. The FDA, under the Federal Food, Drug, and Cosmetic Act (FFDCA), establishes tolerances for veterinary drugs and action levels for food additives and environmental contaminants. The EPA, under the FFDCA, the Federal insecticide, Fungicide, and Rodenticide Act (FIFRA), and the Toxic Substances Control Act (TSCA), establishes tolerances for registered pesticides. Title 21 Code of Federal Regulations (CFR) includes tolerance levels established by FDA, and Title 40 CFR includes tolerance levels established by EPA.

The Surveillance Advisory Team (SAT) meets annually to evaluate chemical compounds for inclusion in the NRP scheduled sampling plans. The SAT includes representatives from FSIS, FDA, EPA, USDA's Agricultural Research Service (ARS), and the USDA's Agricultural Marketing Service (AMS), as well as HHS' Centers for Disease Control and Prevention (CDC). The SAT consists of experts in veterinary medicine, toxicology, chemistry, and public health who provide professional advice, as well as information on veterinary drug and pesticide use in animal husbandry. SAT discussions are used to decide which compounds represent a public health concern and warrant inclusion in the NRP scheduled sampling plans. In addition, the SAT may propose, based on professional judgment and reliable field information, the initiation of exploratory assessments for directed sampling on a production class or region of the country. These agencies work together to create the annual sampling plan, based on the following: prior NRP findings of chemical residues in meat, poultry, and egg products; FDA veterinary drug inventories completed during on-farm visits and investigation information; and pesticides and environmental contaminants of current importance to EPA.

Ultimately, FSIS publishes the completed sampling plan in the Blue Book. For 2017, SAT chose to employ techniques and principles from the field of risk assessment to rank pesticide and environmental contaminants based on relative public health concern, as described in Appendix V. This process enables FSIS to allocate resources to chemicals of high public health concern. FSIS is currently evaluating approaches to identify and prioritize veterinary drugs associated with FSIS-regulated products.

Chemical compounds analyzed in the program include approved and unapproved veterinary drugs, pesticides, and environmental compounds. The NRP is designed to: (1) provide a structured process for identifying and evaluating chemical compounds used in food animals; (2) analyze chemical compounds of concern; (3) collect, analyze, and report results; and (4) identify the need for regulatory follow-up subsequent to the identification of violative levels of chemical residues.

Actions taken on violations

FSIS has administered the NRP by collecting and analyzing meat, poultry, and egg product samples for specific chemical compounds at FSIS laboratories since 1967 for meat and poultry, and beginning in 1995 for egg products. A violation occurs when an FSIS laboratory detects a chemical compound level in excess of an established tolerance or action level as well as if the residue detected has no approved tolerance. Once the laboratory analysis is complete, FSIS enters the detailed residue violation information into the Residue Violation Information System (RVIS), an FSIS/FDA interagency database. FSIS provides establishment and the designated FSIS Inspection Program Personnel (IPP) with the analysis results and also notifies the producer via certified letter. Under best practices, the establishment also should notify the producer that an animal from that business has been identified as having a residue violation. In addition, FSIS shares the violation data with EPA and FDA, where the latter Agency has on-farm jurisdiction. FDA and cooperating State agencies investigate producers linked to residue violations and, if conditions leading to residue violations are not corrected, can enforce legal action.

To notify the public and the industry of repeated residue violations by the same producer, FSIS posts a weekly Residue Repeat Violators List on its Web site that identifies producers with more than one violation on a rolling 12-month period. In addition, the list provides helpful information to the AMS-School Lunch Program processors and producers who are working to avoid illegal levels of residues, serves as a deterrent for violators, and enables FSIS and FDA to make better use of resources (list for processors and producers). Because FSIS updates are posted weekly, FDA may not have investigated each violation at the time of publication.

FSIS Laboratory Analytical Methods

In January 1997, FSIS implemented the Hazard Analysis and Critical Control Point (HACCP) inspection system in all federally inspected establishments. The HACCP regulation (HACCP GPO CFR) requires FSIS-inspected slaughter and processing establishments to identify all food safety hazards (including drug residues, chemical contaminants, and pesticides) that are reasonably likely to occur before, during, and after the food animal or product enters the slaughter establishment. The regulation also requires establishments to identify preventive measures to control these hazards. FSIS takes regulatory action against establishments that do not have an effective chemical residue control program in place. Minimizing food safety hazards from farm-to-fork protects consumers from the public health risks associated with chemical contaminants in food.

With greater public concern about the risks of chemical contaminants, focus has increased on strengthening the identification, prioritization, and testing for chemical hazards in meat, poultry, and egg products in the United States. The sampling plan for residues in FSIS-regulated products includes strengthening the focus of public health-based sampling. This approach includes broader screens for veterinary drugs, pesticides, and heavy metals, as well as conducting more analyses per sample.

FSIS uses analytical methods to detect, identify, and quantify residues that may be present in meat, poultry, and processed egg products. The Agency utilizes these methods for monitoring and for surveillance activities to determine product adulteration and for evaluations of human health risk. The Agency uses available methodologies to take appropriate regulatory action against adulterated products in a manner consistent with the reliability of the analytical data. The FSIS Analytical Chemistry Laboratory Guidebook lists the analytical methods used by the agency.

FSIS uses novel multi-residue methods for the detection and conformation of veterinary drugs, pesticides, and environmental contaminants (see Appendix I). The veterinary drug method screens and confirms for over 80 analytes. The pesticide method screens and confirms for over 100 pesticides. The metal method screens for 17 metals (including lead and cadmium).

Overview of the Sampling Plans

Since 2012 the NRP is implemented on the United States Government fiscal year basis (from October 1 through September 30). The NRP consists of three separate, but interrelated, chemical residue testing programs: scheduled sampling (Tier 1), targeted sampling at the production or compound class level (Tier 2), and targeted sampling at the herd/flock or compound class level (Tier 3). This basic structure has been in existence since 1967. These testing programs provide data for FSIS to detect chemical residues of public health concern and have been modified annually in response to emerging chemical residue concerns and improved testing methodologies.

The 2017 NRP Residue Sampling Plan focuses on chemical residues in domestic meat, poultry, and egg products and the import reinspection of meat, poultry, and egg products. The domestic sampling plan includes scheduled sampling and inspector-generated sampling. The import reinspection sampling plan encompasses normal sampling, increased sampling, and intensified sampling. Directive 10,800.1, Rev 1 provides further detail on those sampling procedures.

On December 2, 2015, FSIS published the final rule, "Mandatory Inspection of Fish of the Order Siluriformes and Products Derived From Such Fish." The 2008 Farm Bill amended the Federal Meat Inspection Act (FMIA) to make all fish of the order Siluriformes amendable to the FMIA and, therefore, subject to FSIS inspection. FSIS is providing an 18-month transitional period for the inspection of Siluriformes and the residue testing will be done based on parameters set forth in the final rule.

DOMESTIC SAMPLING PLAN

1. Tier 1

The Tier 1 sampling plan is the scheduled sampling of specified slaughter subclasses at the time of slaughter, after they have passed antemortem inspection. Carcasses are randomly selected for sampling. The number of samples scheduled each year is based on the probability of detecting at least one violation (Appendix II). Data collected from Tier 1 sampling serves as a baseline level for chemical residue exposure. Sampling tasks are assigned each month through the Public Health Information System (PHIS). The sampling task provides information to the Inspection Program Personnel (IPP) on when to collect the sample (collection window) and which production class to sample. The establishment holds or controls livestock carcasses selected for testing pending the results of analysis. For directed testing of poultry, the IPP recommends to the establishment that the establishment holds the specific poultry carcasses selected for residue testing pending the analysis results.

Tier 1 sampling results also can be used to identify producers or other entities marketing animals with violative levels of residues. Thus, the Tier 1 sampling plan not only gathers information, but also assists in deterring practices that lead to violative residues.

In 2017, the Tier 1 sampling plan will consist of random samples collected from each of the following production classes: beef cows, bob veal, dairy cows, steer, heifers, market hogs, sows, goats, young chickens, and young turkeys. These production classes represent 95 percent of domestic meat and poultry consumption. Estimated consumption volume, per production class, can be found in Appendix III.

2. Tier 2

A. Inspector-Generated Sampling

FSIS inspection program personnel (IPP) conduct inspector-generated sampling when they suspect that animals may have violative levels of chemical residues. Currently, inspector-generated sampling targets individual suspect animals, suspect populations of animals, and animals condemned for specific pathologies listed in FSIS Directive 10,800.1, Rev 1. When Public Health Veterinarians (PHVs) detect evidence of a disease that may have been treated or suspect the administration of a drug, they retain the carcass and analyze samples from those carcasses using an in-plant method to screen for the presence of chemical residues. If the in-plant test is negative for antimicrobial residues included in the screen, the carcass is released to the establishment. If there are screen positive results, the carcass is held pending the results of laboratory testing. The PHV condemns carcasses of animals found to contain violative levels of residues in the muscle or if an unapproved drug is detected in any tissue.

In 2017, IPP will continue to complete in-plant residue screens using the Kidney Inhibition Swab test (KIS™ test). The screen-positive samples are submitted to the FSIS Midwestern Laboratory and analyzed by the laboratory to identify, quantify and confirm the contaminants.

i. Sampling of Individual Suspect Animals

Under the direction of the PHV, IPP are to conduct a KIS™ test on any carcass that based on herd history or ante-mortem or post-mortem findings inspection findings may contain a violative drug residue. IPP are to follow the instructions provided in Directive 10,800.1, Rev 1, chapter three for circumstances warranting a KIS ™ test and chapter four for performing KIS™ tests and documenting the task in PHIS. The PHV selects a carcass for sampling based on the criteria outlined in FSIS Directive 10,800.1, Rev 1 (i.e., animal with disease signs and symptoms, producer history, or as a follow-up to results from random scheduled sampling). Usually, the sample is screened in the plant by the IPP and the screen-result verified when necessary by a PHV. Other samples are sent directly to the laboratory for analysis. For example, if the IPP suspects the misuse of a veterinary drug in an animal, she/he can perform the relevant in-plant screening analysis. If the result of a screening analysis is positive, the carcass is held (if it is not already condemned for other pathology or conditions that would make it unfit for human consumption), and the liver, kidney, and muscle samples from the carcass are then sent to an FSIS laboratory for analysis and confirmation.

ii. Sampling of Suspect Animal Populations

Sampling for suspect animal populations is directed by an FSIS regulation (9 CFR 310.21) and Directive 10,800.1, Rev 1. This is outlined for healthy-appearing bob veal calves and show animals.

B. Targeted Sampling

FSIS implements targeted sampling plans (exploratory assessments) in response to information (obtained by FDA and EPA and provided to FSIS) about misuse of animal drugs and/or exposure to environmental chemicals, as well as in response to Tier 1 analytical results. The duration of these sampling plans vary based on the situation. FSIS may conduct studies to develop information on the frequency and concentration at which some residues like trace metals and industrial components may be inadvertently present in animals. These sampling plans could be designed to distinguish components of meat, 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.

Sampling tasks are assigned through PHIS. The sampling task provides instructions to the IPP on when to collect the sample (collection window) and which slaughter production class to collect from. The establishment holds or controls livestock carcasses selected for testing pending the test results. For directed residue testing of poultry, the IPP recommends to the establishment that the establishments hold the specific poultry carcasses selected for residue testing pending the test results.

In 2017, targeted sampling includes old breeder turkeys, sheep, and roaster pigs as described in Table 3.

3. Tier 3

The Tier 3 sampling plan is similar in structure to the targeted sampling (exploratory assessment) program in Tier 2, with the exception that Tier 3 will encompass targeted testing at a herd or flock level. A targeted testing program designed for livestock or flocks originating from the same farm or geographic region may be necessary on occasion to determine the level of exposure to a chemical or chemicals. For instance, producers may administer some veterinary drugs to a herd or a flock (for example, growth promotants or antibiotics given in the feed) in a way that involves misuse. In addition, livestock and birds may be exposed unintentionally to an environmental contaminant. Therefore, a targeted testing program designed for livestock or flocks originating from the same farm or region may be necessary on occasion to determine the level of a chemical or chemicals to which the livestock or the birds in the flock have been exposed. Tier 3 will provide a vehicle for developing information that will support future policy development within the NRP.

In 2017, Tier 3 sampling may be performed as situations arise during the year.

IMPORT REINSPECTION SAMPLING PLAN

Imported meat, poultry, and egg products are sampled through the port-of-entry Import Reinspection Sampling Plan, a chemical residue monitoring program conducted to verify the equivalence of inspection systems in exporting countries to United States standards. All imported products are subject to reinspection, and one or more Types of Inspection (TOI) are conducted on every lot[1] of product before it enters the U. S. Chemical residue sampling is included in the reinspection of imported products. The following three levels of chemical residue reinspection include:

- normal sampling: random sampling from a lot;
- increased sampling: above-normal sampling resulting from an Agency management decision;
- intensified sampling: additional samples taken when a previous sample for a TOI that failed to meet U. S. requirements.

The data obtained from laboratory analyses are entered into PHIS, an FSIS database designed to generate reinspection assignments, receive and store results, and compile histories for the performance of foreign establishments certified by the inspection system in the exporting country. The import reinspection sampling program is structured based on criteria's used to develop the domestic plan (Tier 1 and Tier 2). The estimated annual amount of product imported into the United States, listed in Appendix IV, was used to assign the number of samples. FSIS intends to collect approximately 1,100 import samples, similar to FY 2016.

2017 RESIDUE SAMPLING FOR SILURIFORMES

On December 2, 2015, FSIS published the final rule, "Mandatory Inspection of Fish of the Order Siluriformes and Products Derived From Such Fish." The 2008 Farm Bill amended the Federal Meat Inspection Act (FMIA) to make all fish of the order Siluriformes amendable to the FMIA and, therefore, subject to FSIS inspection. To provide for an orderly changeover from FDA oversight to FSIS oversight, FSIS is providing an 18-month transitional period to give affected establishments the opportunity to train personnel and to bring their operations into full compliance with FSIS regulations. During the 18-month transitional period, residue testing will be based on parameters set forth in the

[1] An import lot is a group of products defined statistically and/or scientifically by production segments and certified from one country, one establishment. A lot consists entirely of the same species, process category, and product standard of identity (sub-category). A single lot can contain shipping cartons with varying sizes of immediate containers.

final rule. FSIS will schedule routine testing of Siluriformes for dyes (malachite green and gentian violet), nitrofurans, veterinary drugs, metals, and pesticide residues. FSIS plans to take at least one sample per month per domestic slaughter establishment and one sample for every import shipment that is scheduled for re-inspection.

Note: The sampling scheme may change during the 18-month transitional period based on sampling results and findings by FSIS.

SUMMARY OF CHANGES FROM THE 2016 NRP

i. During 2016, goats were in Tier 2 (headquarter generated) sampling. In 2016, there were seven violations (six moxidectin and one ivermectin) in goats; therefore, goats were added to the 2017 Tier 1 sampling plan instead of the Tier 2 sampling plan.
ii. During 2016, several inspector-generated sampling violations were reported for formula-fed veal (other than bob veal), non-formula fed veal, heavy calves, and bulls. Consequently, these slaughter classes were added to the 2017 Tier 2 (headquarter generated) sampling plan to detect the prevalence of chemicals in healthy-appearing animals.
iii. The number of samples for roaster pigs was decreased to 150 due to the low slaughter volume. Roaster pigs will be sampled from March, 2017 to September 2017

POLICY AND PROCEDURES FOR HOLDING OR CONTROLLING PRODUCT UNDER NRP

As of February 2013, the Agency requires official establishments and importers of record to hold or maintain control of lots of product tested for adulterants until acceptable results become available. FSIS stated that the policy would apply to livestock carcasses subject to FSIS testing for residue on domestic products. FSIS explained that it will not hold poultry carcasses pending test results for residues due to historically low residue problems and large lot size. This was outlined in a published Federal Register Notice 76 FRN 19955.

The Hold and Test policy also applies to normal and increased import reinspection sampling. Additionally, for intensified import sampling, the lot must be retained pending laboratory results.

ANIMAL PRODUCTION CLASSES

Production class nomenclature includes:

Bovine

- Beef cows are mature, female cattle bred for muscle development, ordinarily having given birth to one or more calves.
- Bulls are mature, uncastrated male cattle.
- Calves/veal: The agency is currently engaging in rulemaking to define “veal.” For sampling purposes under the NRP, veal calves are defined as immature cattle (including dairy breeds) lacking a functional rumen and intended for meat production. They are recognized as a separate class from suckling calves because of their handling, housing, and proximity to slaughter.
- Dairy cows are mature, female cattle bred for milk production, ordinarily having given birth to one or more calves.
- Heifers are young, female cattle more than 1 year old that have not yet given birth to a calf.
- Steers are male cattle castrated before sexual maturity.

Porcine

- Boars are mature swine showing male sexual characteristics.
- Market swine are usually marketed near 6 months of age and 200 to 300 pounds live weight.
- Roaster swine are animals of both sexes and any age that are marketed with the carcass unsplit and with the head on.
- Sows are mature, female swine, ordinarily having given birth to one or more litters.
- Stags are male swine castrated after they have reached sexual maturity.

Poultry

- Ducks are birds of both sexes and any age.
- Egg products include yolks, whites, or whole eggs after breaking; eggs are processed as dried, frozen, or liquid.
- Geese are birds of both sexes and any age.
- Mature chickens are adult female birds, usually more than 10 months of age.
- Old breeder turkeys are birds of both sexes and usually more than 15 months of age.
- Young chickens include broilers/fryers birds of both sexes that are usually less than 10 weeks of age.
- Roasters are chickens of both sexes, usually less than 12 weeks of age.
- Capons are surgically castrated male chickens usually less than 8 months of age.
- Young turkeys include fryer/roaster birds that are of both sexes and usually less than 12 weeks of age.
- Other poultry include ratites (e.g., ostriches, emus, rheas), guineas, squabs (young, unfledged pigeons), adult pigeons, pheasants, grouse, partridge, quail, etc.

Other Livestock

- Goats are animals of both sexes and any age.
- Lambs are sheep younger than 14 months and having a break joint in at least one leg.
- Rabbits are any of several lagomorph mammals of both sexes and any age.
- Sheep are mature animals of both sexes.
- Other livestock include bison, deer, elk, etc.

SUMMARY OF THE DOMESTIC AND IMPORT REINSPECTION SAMPLING PLANS

Summary Tables 1 and 2 (Tier 1)

Summary Tables 1 and 2 provide an overview of both domestic and import sampling organized by chemical compound class. Each table covers: Animal Medicinal Drug Use Clarification Act (AMDUCA)-prohibited drugs, veterinary drugs, pesticides, and environmental contaminants. The tables also identify the FSIS laboratory that would be conducting the analyses. Due to laboratory capacity, not every sample is analyzed for every compound class. Laboratory personnel make decisions on which samples to analyze. Some of the factors that are included in the decision are (1) the number of samples that can be analyzed per run, (2) the number of samples received that week, and (3) the total number of samples for that compound class/slaughter class pair. The factors behind these decisions can be found in the individual laboratory procedures.

Summary Tables 3 and 4 (Tier 2)

Summary Tables 3 and 4 provide an overview of both domestic and import sampling organized by animal production class. Each table includes the following: Animal Medicinal Drug Use Clarification Act (AMDUCA)-prohibited drugs, veterinary drugs, pesticides, and environmental contaminants. Table 3 shows domestic Tier 2 sampling (formula-fed veal, non formula-fed veal, heavy calf, old breeder turkey, bull, roaster swine, and sheep) and Table 4 lists the sulfonamide sampling for imports.

Overview of the Program Design

The sampling plan design begins with a list of residues that may occur in meat, poultry, and egg products and are of concern to human health. FSIS coordinates an annual meeting of the SAT members to identify and prioritize chemical compounds of public health concern and assemble detailed information on each compound. FSIS combines this information with historical data on violation rates for each chemical compound to develop the domestic sampling and import reinspection plans. These sampling plans guide the allocation of FSIS laboratory, supply, and inspection resources.

Factors considered when developing the domestic and import scheduled sampling plans include:

- Qualitative public health risk associated with each chemical compound or compound class in meat, poultry, and egg products;
- The food animals affected by each chemical compound or compound class;
- The analytical methods that are available to identify the chemical compound or compound classes;
- FSIS laboratory capacity to analyze chemical compounds or compound classes; and
- The existence of a regulatory tolerance.

The import reinspection plan design is similar to the domestic plan, with two important exceptions. Raw product testing from samples collected at the U.S. port-of-entry is rare, because concerns about foreign animal diseases limit many countries to ship processed products only. When import of raw products is allowed, most shipped raw product consists of muscle tissue only. Exporting countries are required to identify the animal species in each product, but they are not required to identify the production class. Imported meat and poultry testing is categorized by species (e.g., poultry or porcine); egg products are distinguished as a separate category. There are different compound applications by importing countries: allowance in food animals that are not approved for such use in the United States and different use practices for compounds that are approved in the United States. For these reasons, the compounds selected for analysis in the import plan may not necessarily be the same as those in the U.S. domestic plan.

Summary Table 1: No. of Analyses per Production Class by Compound Class
2017 Domestic Scheduled Sampling: Tier 1

Methods	No. of Chemical Analyses per Production Class *									
	Beef cows (*n*=800)	Bob veal (*n*=400)	Dairy cows (*n*=800)	Steers (*n*=400)	Heifers (*n*=400)	Market swine (*n*=800)	Sows (*n*=800)	Young chickens (*n*=800)	Young turkeys (*n*=800)	Goats (*n*= 300)
Multi-residue	800	400	800	400	400	800	800	800	800	300
Aminoglycosides	800	400	800	400	400	800	800	800	800	300
Pesticides	300	300	300	110	110	300	300	300	300	150
Metals**	100	100	100	100	100	100	100	150	150	
β-Agonists	400	400	400	200	200	400				
Hormones	300	300	300	200	200					
Avermectins	400	400	400	200	200	400	400			150
Arsenic	400	400	400	200	200	400	400	400	400	150
Nitrofurans								300	300	

*Note: *n* denotes the number of samples collected/submitted for each production class (e.g., 800 total samples collected/submitted for beef cows and 400 total samples collected/submitted for heifers).

**Metals are considered Tier 2 sampling, due to the fact there are no established tolerances.

Summary Table 2: No. of Analyses per Production Class by Compound Class
2017 Import Scheduled Sampling: Tier 1

Methods	No. of Chemical Analyses per Production Class											
	Fresh beef	Processed beef	Fresh pork	Processed pork	Fresh veal	Processed veal	Fresh lamb/mutton	Fresh goat	Fresh chicken	Processed chicken	Fresh turkey	Processed turkey
Multi-residue	150		150		60		25		75		40	
Aminoglycosides	150		150		60				75		40	
Pesticides	100		100		50		25	25	75		25	
Hormones	100											
β-Agonists	75		75		50							
Avermectins	75	150	75	25	25	25	20	15				
Arsenic	75	150	75	25	25	25	20	15	75	50	15	50
Metals	35	12	35	12	25	12			35	12	12	12

Summary Table 3: No. of Analyses per Production Class by Compound Class

2017 Domestic Scheduled Sampling: Tier 2

Methods	**No. of Chemical Analyses per Production Class ***						
	Formula-fed Veal (*n*=33)	**Non formula-fed veal (*n*=33)**	**Heavy calf (*n*=33)**	**Old breeder turkeys (*n*=100)**	**Bull/stags (*n*=100)**	**Roaster Pigs (*n*= 150)**	**Sheep (*n*= 150)**
Multi-residue	33	33	33	100	100	150	150
Aminoglycosides	33	33	33		100	150	150
Pesticides				50	50	150	75
Metals				50			
β-Agonists	16	16	16				
Avermectins					50		
Arsenic					50		
Carbadox						150	

*Note: *n* denotes the number of samples collected/submitted for each production class (e.g., 150 total samples collected/submitted for sheep).

Summary Table 4: No. of Analyses of Imported Processed Products Tested for Sulfonamides
2017 Import Scheduled Sampling: Tier 2

Compounds for Analysis	Import Production Class	Import Sample Size
Sulfonamides	Processed beef	25
	Processed pork	15
	Processed turkey	10

Appendix I
List of Chemical Residues by Class/Method

1. Veterinary Drugs

For 2017 domestic sampling, FSIS has scheduled the following classes of veterinary drug analytes:

a. Multi-residue method

2-Aminosulfone Albendazole	DCCD	Gamithromycin	Oxytetracycline	Sulfamethoxypyridazine
2-Amino-Flubendazole	Desethylene Ciprofloxacin	Haloperidol	Penicillin G	Sulfanitran
2-Quinoxaline Carboxylic Acid (QCA)	Diclofenac	Ipronidazole	Phenylbutazone	Sulfapyridine
Abamectin	Dicloxacillin	Ipronidazole - OH	Pirlimycin	Sulfaquinoxaline
Acepromazine	Difloxacin	Ketamine	Prednisone	Sulfathiazole
Albendazole	Dimetridazole	Ketoprofen	Ractopamine	Tetracycline
Amoxicillin	Dimetridazole - OH	Levamisole	Ronidazole	Thiabendazole
Ampicillin	Dipyrone	Lincomycin	Salbutamol	Tildipirosin
Azaperone	Doramectin	Melengestrol Acetate	Sarafloxacin	Tilmicosin
Butorphanol	Doxycycline	Meloxicam	Selamectin	Tolfenamic Acid
Carazolol	Emamectin Benzoate	Metronidazole	Sulfachloropyridazine	Tulathromycin A
Cefazolin	Enrofloxacin	– Metronidazole-OH	Sulfadiazine	Tylosin
Chloramphenicol	Eprinomectin	Morantel tartrate	Sulfadimethoxine	Tyvalosin
Chlortetracycline	Erythromycin A	Moxidectin	Sulfadoxine	Virginiamycin
Cimaterol	Fenbendazole	Nafcillin	Sulfaethoxypyridazine	Xylazine
Ciprofloxacin	Fenbendazole sulphone	Norfloxacin	Sulfamerazine	Zeranol (β-Zearalanol)
Clindamycin	Florfenicol	Orbifloxacin	Sulfamethazine	
Cloxacillin	Flubendazole	Oxacillin	Sulfamethizole	
Danofloxacin	Flunixin	Oxyphenylbutazone	Sulfamethoxazole	

b. Aminoglycoside Method

Amikacin	Gentamycin	Neomycin
Apramycin	Hygromycin B	Spectinomycin
Dihydrostreptomycin	Kanamycin	Streptomycin

c. Hormones Method

Megestrol	Melengestrol Acetate	Hexestrol	Zeranol

d. Beta-Agonist Method

Cimaterol	Ractopamine	Zilpaterol
Clenbuterol	Salbutamol	

e. Avermectin Method

Doramectin	Ivermectin	Moxidectin

f. Nitrofuran Method

3-Amino-2-oxazolidinone (AOZ)	1-Aminohydantoin (AHD)	Semicarbazide (SEM)
3-Amino-5-morpholinomethyl-2-oxazolidinone (AMOZ)		

g. Carbadox Method

Quinoxaline-2-carboxylic acid

2. Pesticides and environmental contaminants

a. Pesticide Method

1-Naphthol	Coumaphos O	Fluroxypyr-1-Methylhepyl-Ester	Pentachlorobenzene (PCB)
3-Hydroxycarbofuran	Coumaphos S	Fluvalinate	Permethrin (cis&trans)
Acephate	DDD o,p’	Heptachlor	Piperonyl butoxide
Acetamiprid	DDD p,p’ + DDT, o,p'	Heptachlor epoxide (cis+ trans) or (B+A)	Pirimiphos methyl
Alachlor	DDE o,p’	Hexachlorobenzene (HCB)	Prallethrin
Aldicarb	DDE p,p’	Hexazinone	Profenofos
Aldicarb sulfone	DDT p,p’	Hexythiazox	Pronamide
Aldicarb sulfoxide	Deethylatrazine	Imazalil	Propachlor
Aldrin	Diazinon	Imidacloprid	Propanil
Atrazine	Dichlorvos (DDVP)	Indoxacarb	Propetamphos
Azinphos methyl	Dieldrin	Lindane (BHC gamma)	Propiconazole
Azoxystrobin	Difenoconazole	Linuron	Pyraclostrobin
Benoxacor	Diflubenzuron	Malathion	Pyrethrin I
Bifenthrin	Dimethoate	Metalaxyl	Pyrethrin II
Boscalid	Diuron	Methamidophos	Pyridaben
Buprofezin	Endosulfan I	Methomyl	Pyriproxyfen
Carbaryl	Endosulfan II	Methoxyfenozide	Resmethrin (cis&trans)
Carbofuran	Endosulfan sulfate	Metolachlor	Simazine
Carfentrazone ethyl	Ethion	Metribuzin	Sulprofos
Chlordane cis	Ethion monoxon	MGK-264 (isomers 1 & 2)	Tebufenozide
Chlordane trans	Ethofumesate	Myclobutanil	Tefluthrin
Chloroneb	Fenoxaprop ethyl	Nonachlor cis	Tetrachlorvinphos
Chlorothalonil	Fenpropathrin	Nonachlor trans	Tetraconazole
Chlorpropham	Fipronil	Norflurazon	Thiabendazole
Chlorpyrifos	Fipronil desulfinyl	Omethoate	Thiamethoxam
Chlorpyrifos methyl	Fipronil sulfide	Oxychlordane	Thiobencarb
Clothianidin	Fluridone	Pentachloroaniline (PCA)	Trifloxystrobin

b. Metals Method

Aluminum (Al)	Copper (Cu)	Selenium (Se)
Barium (Ba)	Iron (Fe)	Strontium (Sr)
Boron (B)	Lead (Pb)	Thallium (Tl)
Cadmium (Cd)	Manganese (Mn)	Vanadium (V)
Chromium (Cr)	Molybdenum (Mo)	Zinc (Zn)
Cobalt (Co)	Nickel (Ni)	

Appendix II

Statistical Table

Scheduled sampling is done to provide some assurance of detection of a violation that affects a given percentage of the sample population.

Prior to FY 2012, FSIS tested 230 to 300 samples from each production class/residue compound class pairing to obtain results that were statistically meaningful. The testing sample sizes of 230 or 300 ensured FSIS a 90 percent or 95 percent probability, respectively, of detecting at least one chemical residue violation if the violation rate is equal to or greater than one percent in the population being sampled. Starting in FY 2012, FSIS stated in its residue sampling plan that the sample size selected/tested would increase to about 800 samples for each of the nine major production class tested under Tier 1.

The statistical table provides the calculated number of samples required to ensure detection of at least one violation that affects a given percentage of the sampled population. Statistically, for a binomial distribution with sample size "*n*" and violation rate "*v*" (in decimal), if *v* is the true violation rate in the population and *n* is the number of samples, the probability, *p*, of finding at least one violation among the *n* samples (assuming random sampling) is $p = 1 - (1 - v)^n$

For example, if the true violation rate is 1% the probability of detecting at least one violation with sample sizes of 230,300,390,460, and 800 are 90%, 95%, 98%, 99%,and 99.97% respectively.

In the table below the probability of detecting at least one violation with a sample size of 800 is italicized and bolded.

Statistical Table – 2017 U.S. National Residue Program

Percentage % Violative in the population (v)	Number of samples required to detect at least one violation in (n) samples with a probability (p)				
	0.90	0.95	0.98	0.99	0.9997
	Sample Size required "n"				
10	22	29	37	44	77
5	45	59	76	90	158
1	230	300	389	459	***807***
0.57	403	525	684	***806***	1,419
0.50	460	598	***780***	919	1,618
0.37	620	***808***	1,055	1,242	2,188
0.29	***793***	1,032	1,347	1,586	2,793
0.10	2,302	2,995	3,910	4,603	8,108

The procedure to calculate the required sample size needed:

$p = 1-(1-v)^n$	← Probability of detecting at least one violation in n sample of binomial distribution with violation rate v
$1-p = (1-v)^n$	← Subtract one from both side of the equation. This gives the probability of detecting No violations in n samples
$\log(1-p) = \log(1-v)^n$	← Apply logarithmic function to both side of the equation
$\log(1-p) = n * \log(1-v)$	← A logarithmic function property
$n = \dfrac{\log(1-p)}{\log(1-v)}$	← Sample size based on violation rate (v) and probability of detecting (p)

Appendix III

FY 2017 NRP: Estimated Amount of Domestically Produced Meat, Poultry, and Egg Products

Production Class	Number of Head Slaughtered /[1]	Pounds per Animal (dressed weight) /[2,3,4]	Total Pounds (dressed weight)	Percent Estimated Relative Consumption
Bull/Stag	492,073	908.32	446,959,513	0.46%
Beef Cow	2,420,693	636.43	1,540,613,177	1.58%
Dairy Cow	2,897,259	656.90	1,903,203,983	1.95%
Heifer	7,375,545	822.79	6,068,503,743	6.22%
Steer	16,148,959	890.22	14,376,076,929	14.74%
Bob Veal	202,159	35.48	7,172,124	0.01%
Formula-fed Veal	232,418	272.96	63,439,837	0.07%
Non Formula-fed Veal	6,724	178.73	1,201,804	0.00%
Heavy Calf	19,988	267.96	5,355,939	0.01%
SUBTOTAL, CATTLE	29,795,818		24,412,527,049	25.02%
Market Swine	112,928,055	208.16	23,507,273,883	24.10%
Roaster Swine	695,524	69.07	48,036,801	0.05%
Boar/Stag Swine	362,694	170.30	61,768,526	0.06%
Sow	2,894,933	296.66	858,822,815	0.88%
SUBTOTAL, SWINE	**116,881,206**		**24,475,902,025**	**25.09%**
Mature Sheep	115,254	60.92	7,021,477	0.01%
Lamb	1,889,275	69.88	132,029,586	0.14%
Goat	439,958	30.64	13,480,278	0.01%
SUBTOTAL, OVINE	**2,444,487**		**154,636,151**	**0.16%**
Bison	53,377	503.92	26,897,817	0.03%
TOTAL, ALL LIVESTOCK	**149,174,888**		**49,069,963,042**	**50.30%**
Young Chicken	8,819,965,970	4.46	39,378,815,433	40.36%
Light Fowl	62,560,815	2.49	155,920,015	0.16%
Heavy Fowl	80,099,480	6.01	481,083,010	0.49%
Capon	152,246	7.17	1,091,800	0.00%
Young Turkey	240,428,870	22.75	5,469,663,368	5.61%
Young Breeder Turkey	1,282,632	22.53	28,891,626	0.03%
Old Breeder Turkey	1,881,013	20.42	38,403,857	0.04%
Fryer Roaster Turkey	9,759	12.24	119,427	0.00%
Duck	27,430,330	5.15	141,249,467	0.14%
Goose	96,193	10.45	1,005,291	0.00%
Squab	909,795	1.12	1,017,181	0.00%
Emu	1,575	32.34	50,929	0.00%
Quail	710,433	0.35	251,012	0.00%
Pheasant	266,910	1.94	516,869	0.00%
Ostrich	691	100.37	69,357	0.00%
Guinea	186,498	3.02	562,583	0.00%
TOTAL,POULTRY	9,235,983,210		45,698,711,226	46.84%
Rabbit	395,773	3.59	1,420,087	0.00%
Egg Products			2,789,633,933	2.86%
GRAND TOTAL in POUNDS, ALL PRODUCTION CLASSES			**97,559,728,287**	**100.00%**

/1 Source - Slaughter Volume Data from September 1, 2015 to August 31, 2016 (Data Source: PHIS, September 29th, 2016)
/2 Young chicken, mature chickens, young turkey, old breeder turkey, duck = 2014 Average Live Weight (USDA, NASS Poultry Slaughter 2014 Summary (February 2015)) * .75 (North Carolina Cooperative Extension (December 2007) Grower Guidelines for Poultry and Fowl Processing)
/3 Bull/stag, beef cow, dairy cow, heifer, steer bob veal, formula-fed veal, non formula-fed veal, heavy calf, roaster swine, goat, bison = Calculated using PHIS
/4 Goose = PHIS Average Live Weight

Appendix IV
FY 2017 NRP: Estimated Annual Amount of Product Imported in the United States

Product	Product Weight in Pounds	Product Imported Percent
Beef, Fresh	2,253,370,927	53.43
Beef, Processed	156,312,213	3.71
Chicken, Fresh	156,950,564	3.72
Chicken, Processed	90,762,652	2.15
Duck, Fresh	2,153,876	0.05
Duck, Processed	311,437	0.01
Egg Products, Fresh	22,790,208	0.54
Goat, Fresh	44,055,387	1.04
Goose, Fresh	126	0.00
Lamb, Fresh	170,122,790	4.03
Lamb, Processed	32,846	0.001
Mutton, Fresh	40,397,202	0.96
Mutton, Processed	331,964	0.01
Ostrich, Fresh	44,296	0.001
Pork, Fresh	1,019,986,656	24.18
Pork, Processed	151,976,472	3.60
Turkey, Fresh	50,975,696	1.21
Turkey, Processed	4,155,361	0.10
Varied Combination, Fresh	114,168	0.00
Varied Combination, Processed	9,871,381	0.23
Veal, Fresh	42,935,044	1.02
Veal, Processed	1,555	0.00004
Grand Total	4,217,652,821	100.00

Appendix V

Chemical Identification and Prioritization Framework for U.S. National Residue Program

FSIS chose to employ techniques and principles from the field of risk assessment to rank chemicals, based on relative public health concern. First, FSIS collated an exhaustive list of pesticides used domestically and internationally (from countries that are eligible to import to the US). FSIS then employed risk assessment techniques and principles to rank candidate pesticides, based on relative public health concern. The pesticides were ranked based on various factors as described below.

The categories of "Usage (S)," "Bioavailability (B)," "Frequency (F)," "Health-Based Guidance Value (H)," and "Carcinogenicity (C)" were employed as predictors of risk per unit of consumption from pesticides in animal products. The model uses a 6-point scale to give variability between overall score. For each chemical, the relative risk assessment can be summarized with the following equation.

$$\boldsymbol{Relative\ public\ health\ risk = Exposure \times Toxicity}$$

The variables **S**, **B,** and **F** represent pesticide exposure and variables **H** and **C** represent the pesticides toxicity. By multiplying weighted average exposure (**S, B,** and **F**) to the weighted average of toxicity (**H** and **C**), a rough estimate of the relative risk per unit of consumption represented by each pesticide or pesticide class is obtained.

$$\boldsymbol{Relative\ public\ health\ risk\ score = \left(\frac{S+B+F}{3}\right) \times \left(\frac{H+C}{2}\right)}$$

Many chemicals in the list below are not included in the FSIS analytical method. Therefore, to reduce the possibility for bias, FSIS decided to normalize the equation by adding a frequency adjustment for lack of testing (L) to the equation as described in the Frequency (F) section.

$$\boldsymbol{Relative\ public\ health\ risk\ score = \left(\frac{S+B+F}{3}\right) \times \left(\frac{H+C}{2}\right) + L}$$

The calculated scores were used to rank pesticides by public health risk.

1. Usage (S)

The U.S. Geological Survey (USGS) publishes the annual county-level pesticide use survey. The survey estimated pesticide usage (in kilograms (kg)) in the US during 2008-2012. FSIS believes this data is important because the increase usage of pesticides increases the probability of the pesticide being present in the food supply, including FSIS-regulated products.

Categorical distribution of pesticide usage (in kg)

6	If usage is > 25,000 kg
5	If usage is > 20,000 and ≤ 25,000 kg
4	If usage is > 15,000 and ≤ 20,000 kg
3	If usage is > 10,000 and ≤ 15,000 kg
2	If usage is > 1,000 and ≤ 10,000 kg
1	If usage is ≤ 1,000 kg

2. Bioavailability (B)

The bioavailability (B) factor has been adopted from the previously published blue book ranking models. This is a measure of a chemical's relative affinity for fat, as measured by the octanol-water coefficient, log K_{ow}. The log K_{ow} is defined as the ratio of a compound's concentration in a known volume of *n*-octanol to its concentration in a known volume of water after the octanol and water have reached equilibrium (Leo 1971). Compounds that have a high affinity for octanol tend to bioaccumulate in body fat and can easily cross the plasma membrane of cells. This is a concern, in that the chemical will stay in the fat of FSIS-regulated products. The log K_{ow} was calculated using EPA's EPISuite (v4.11) for chemicals lacking published log K_{ow}.

Categorical distribution of bioavailability

- 6 If log K_{ow} is > 5
- 5 If log K_{ow} is > 4 and ≤ 5
- 4 If log K_{ow} is > 3 and ≤ 4
- 3 If log K_{ow} is > 2 and ≤ 3
- 2 If log K_{ow} is > 1 and ≤ 2
- 1 If log K_{ow} is < 1

3. Frequency (F)

The frequency (F) of detecting a compound is based on annual sampling data. This includes the screening of FSIS-regulated products for 108 pesticide residues and their unreported positive residue levels, below published minimal limit of applicability (MLA), for the period ranging from 10/01/12 to 09/30/15.

Categorical distribution of the positive frequency (F)

- 6 If positive frequency is > 3.6%
- 5 If positive frequency is > 2.7 and ≤ 3.6%
- 4 If positive frequency is > 1.8 and ≤ 2.7%
- 3 If positive frequency is > 0.9 and ≤ 1.8%
- 2 If positive frequency is > 0 and ≤ 0.9%
- 1 If positive frequency is equal to 0%

Since this factor is only considering chemicals currently being screened by FSIS, the equation was normalized by adding a frequency adjustment **(L)** to the end of the final equation. This adjustment will address any bias. The frequency adjustment **(L)** factor is as follow:

a. Chemicals which have never been considered in the NRP were assigned 2 points.
b. Chemicals regularly screened but not detected were assigned a value of -1**.**

4. Health-Based Guideline Value (H)

Before pesticides are approved by EPA, each pesticide has to go through a rigorous testing process. It is at this stage that EPA determines if the pesticides have the potential to enter our food supply. Based on this possibility, dietary acute reference dose (aRFD) and chronic reference dose (cRFD) are determined.

The cRFD is an estimate (with uncertainty spanning an order of magnitude or greater) of a daily oral exposure level for the human population, including sensitive subpopulations, that is likely to be without an appreciable risk of deleterious effects during a lifetime. The aRFD and cRFD are calculated by dividing the no-observed-adverse-effect-level (NOAEL) (i.e., the highest dose that gave no observable adverse effect) or the lowest-observed-adverse-effect-level (LOAEL) (i.e., the lowest dose at which an adverse effect was seen) by uncertainty factors (UF). UF's are used to account for differences between different humans (intraspecies variability) and for differences between the test animals and humans (interspecies extrapolation). If the LOAEL is used, an additional UF is required. These scores represent EPA's professional assessment of the extent to which the chronic dietary exposure to this compound may exceed EPA's level of concern. For each chemical, the level of regulatory concern was determined by the toxicological endpoint, chronic population adjusted dose (cPAD).

Categorical distribution of the cPAD

6	If HBGV is < 1E-6
5	If HBGV is < 1E-5 and ≥ 1E-6
4	If HBGV is < 1E-4 and ≥ 1E-5
3	If HBGV is < 1E-3 and ≥ 1E-4
2	If HBGV is < 1E-2 and ≥ 1E-3
1	If HBGV is ≥ 1E-2

5. Carcinogenic Potential (C)

The carcinogenic potential (C) factor is based on a report published by EPA's Office of Pesticide Programs, Chemicals Evaluated for Carcinogenic Potential (Dec 2015). The report lists the carcinogenicity hazard for pesticides, with no consideration of exposure information. The ranking is based on an EPA lettering system, designating the degree of carcinogenic potential. Similar to the previously mentioned variables, the carcinogenic potential will be classified based on the weight of evidence narrative in the cancer risk assessment.

Categorical distribution of the carcinogenic potential

4 or 6	Likely to Be Carcinogenic to Humans, Probable Carcinogenic to Humans
3	Suggestive Evidence of Carcinogenic Potential Possible Carcinogenic to Humans
2	Not Classifiable as to Human Carcinogenicity
1	Evidence of Non-carcinogenicity for Humans, Not Likely to Be Carcinogenic to Humans

For chemicals classified as 1) likely to be carcinogenic to humans and 2) probable carcinogenic to humans, the respective cancer slope factors (Q*) were used to determine the score. For Q* > 1, the chemical was given 6 points, and for Q*<1, the chemical was given 4 points.

Pesticide Ranking Based on Relative Public Health Impact

Rank	Chemicals	Type	S	B	F	H	C	L	Score	FSIS Testing	EPA Rank	Current Status
1	Dieldrin	Insecticide	1	6	2	4	6	0	17.5	Y	HH	In 2017 NRP
2	Aldrin	Insecticide	1	6	3	4	6	0	17.5	Y	H	In 2017 NRP
3	Mancozeb	Fungicide	6	2	1	3	4	2	16.0	N	--	
4	Tribufos (Def)	Herbicide	2	6	1	3	4	2	16.0	N	H	Pending Validation
5	Chlordane Cis	Pesticide	1	6	2	3	6	0	15.8	Y	HH	In 2017 NRP
6	Chlordane Trans	Pesticide	1	6	2	3	6	0	15.8	Y	HH	In 2017 NRP
7	Heptachlor	Insecticide	1	6	2	3	6	0	15.8	Y	H	In 2017 NRP
8	Hexachlorobenzene (Hcb)	Fungicide	1	6	2	3	6	0	15.8	Y	HH	In 2017 NRP
9	Trifluralin	Herbicide	5	6	1	2	3	2	15.8	N	H	Pending Validation
10	Alpha-Hexachlorocyclohexane	Insecticide	1	4	1	4	6	2	14.5	N	M	
11	Haloxyfop	Pesticide	1	4	1	4	6	2	14.5	N	--	
12	Triphenyltin Hydroxide	Pesticide	1	4	1	4	6	2	14.5	N	--	
13	Pendimethalin	Herbicide	6	6	1	1	3	2	14.0	N	--	
14	Lactofen	Herbicide	3	5	1	2	4	2	14.0	N	--	
15	Permethrin (Cis&Trans)	Insecticide	5	6	6	1	4	0	13.8	Y	HH	In 2017 NRP
16	Acetochlor	Herbicide	5	4	1	1	4	2	13.3	N	--	
17	Ethalfluralin	Herbicide	5	6	1	1	3	2	13.0	N	H	Pending Validation
18	Mirex	Insecticide	1	6	2	3	3	2	12.5	N	H	Pending Validation
19	Ethoprop	Insecticide	2	4	1	3	4	2	12.5	N	--	
20	Kresoxim-Methyl	Fungicide	2	4	1	3	4	2	12.5	N	--	
21	Bromadiolone	Pesticide	1	6	1	5	1	2	12.5	N	--	
22	Flocoumafen	Pesticide	1	6	1	5	1	2	12.5	N	--	
23	Quintozene (Pentachloronitrobenzene)	Fungicide	2	5	1	3	3	2	12.5	N	M	
24	Diclofop Methyl	Herbicide	2	5	1	2	4	2	12.5	N	--	
25	Tralkoxydim	Herbicide	2	5	1	2	4	2	12.5	N	--	
26	DDD P,P' + DDT O,P'	Insecticide	1	6	2	3	4	0	12.3	Y	HH	In 2017 NRP
27	DDE P,P'	Insecticide	1	6	3	3	4	0	12.3	Y	HH	In 2017 NRP
28	DDT	Insecticide	1	6	2	3	4	0	12.3	Y	HH	In 2017 NRP
29	DDT P,P'	Insecticide	1	6	2	3	4	0	12.3	Y	HH	In 2017 NRP
30	Dicofol (As Dichlorobenzophenone)	Insecticide	2	6	1	2	3	2	12.0	N	H	
31	Captan	Fungicide	5	3	1	1	4	2	12.0	N	L	
32	Propargite	Insecticide	2	6	1	1	4	2	12.0	N	H	Pending Validation

Rank	Chemicals	Type	S	B	F	H	C	L	Score	FSIS Testing	EPA Rank	Current Status
33	Flumiclorac Pentyl	Pesticide	3	5	1	4	1	2	12.0	N	--	
34	Spirodiclofen	Insecticide	2	6	1	1	4	2	12.0	N	H	Pending Validation
35	Chlorothalonil	Fungicide	6	4	1	1	4	-1	11.5	Y	HH	In 2017 NRP
36	Carbaryl (1-Naphthol)	Insecticide	6	3	2	1	4	0	11.3	Y	HH	In 2017 NRP
37	DDD	Insecticide	1	6	1	3	4	-1	11.3	Y	H	In 2017 NRP
38	DDD O,P'	Insecticide	1	6	1	3	4	-1	11.3	Y	H	In 2017 NRP
39	DDE O,P'	Insecticide	1	6	1	3	4	-1	11.3	Y	H	In 2017 NRP
40	Bifenthrin	Insecticide	5	6	5	1	3	0	11.0	Y	HH	In 2017 NRP
41	Clodinafop-Propargyl	Herbicide	2	4	1	3	3	2	11.0	N	--	
42	Tembotrione	Herbicide	3	3	1	3	3	2	11.0	N	--	
43	Chlorpyrifos Oxon	Insecticide	6	3	1	3	1	2	11.0	N	--	
44	Tebuconazole	Fungicide	5	4	1	1	3	2	11.0	N	--	
45	Chlorpyrifos Methyl	Pesticide	6	5	2	3	1	0	11.0	Y	M	In 2017 NRP
46	Cyhalothrin- Lambda	Pyrethroids	6	6	1	2	1	2	11.0	N	--	
47	Diuron	Herbicide	5	3	1	2	4	-1	11.0	Y	L	In 2017 NRP
48	Disulfoton	Pesticide	2	5	1	4	1	2	10.8	N	--	
49	Beta-Hexachloro-Cyclohexane (B-Hch)	Insecticide	1	4	1	4	3	2	10.8	N	M	
50	Terbufos	Insecticide	2	5	1	4	1	2	10.8	N	--	
51	Endrin	Insecticide	1	6	1	3	2	2	10.8	N	H	Pending Validation
52	Amitraz	Insecticide	1	6	1	2	3	2	10.8	N	L	
53	Benfluralin	Herbicide	1	6	1	2	3	2	10.8	N	H	Pending Validation
54	Ethiprole	Pesticide	1	6	1	2	3	2	10.8	N	--	
55	Oxyfluorfen	Herbicide	2	5	1	2	3	2	10.8	N	M	
56	Triallate	Herbicide	2	5	1	2	3	2	10.8	N	--	
57	Tridiphane	Herbicide	1	6	1	2	3	2	10.8	N	H	
58	Pyraflufen	Herbicide	2	5	1	1	4	2	10.8	N	--	
59	Tetraconazole	Fungicide	2	5	2	2	4	0	10.5	Y	M	In 2017 NRP
60	Cypermethrin (All Isomers)	Insecticide	2	6	6	1	3	2	10.0	N	H	Pending Validation
61	Phosmet	Insecticide	5	3	1	1	3	2	10.0	N	L	
62	Propiconazole	Fungicide	6	4	3	1	3	0	10.0	Y	M	In 2017 NRP
63	Pyrethrin I	Pyrethroids	2	6	2	1	3	2	10.0	N	HH	
64	Alachlor	Herbicide	4	4	3	1	4	0	10.0	Y	M	In 2017 NRP
65	Chlorpyrifos-Methyl Oxon	Insecticide	6	2	1	3	1	2	10.0	N	M	
66	Quizalofop Ethyl	Herbicide	3	5	1	2	2	2	10.0	N	M	
67	Cadusafos	Insecticide	1	4	1	5	1	2	9.5	N	--	
68	Etridiazole	Fungicide	1	4	1	2	4	2	9.5	N	L	

Rank	Chemicals	Type	S	B	F	H	C	L	Score	FSIS Testing	EPA Rank	Current Status
69	Fluthiacet-Methyl (Cga-248757)	Pesticide	2	3	1	2	4	2	9.5	N	--	
70	Oxythioquinox	Pesticide	1	4	1	2	4	2	9.5	N	M	
71	Epn (Ethyl P-Nitrophenyl Phenylphosphorothioate)	Pesticide	1	5	1	4	1	2	9.5	N	--	
72	Fenthion (Mpp)	Insecticide	1	5	1	4	1	2	9.5	N	M	
73	Isofenphos	Insecticide	1	5	1	4	1	2	9.5	N	M	
74	Chlorfenapyr	Pesticide	1	5	1	2	3	2	9.5	N	--	
75	Oxadiazon	Herbicide	1	5	1	2	3	2	9.5	N	M	
76	Prochloraz	Fungicide	1	5	1	2	3	2	9.5	N	--	
77	Triadimenol	Fungicide	2	4	1	2	3	2	9.5	N	L	
78	Tribenuron Methyl	Pesticide	5	1	1	2	3	2	9.5	N	--	
79	Ziram	Fungicide	4	2	1	2	3	2	9.5	N	--	
80	Acifluorfen	Herbicide	2	4	1	1	4	2	9.5	N	--	
81	Chlorobenzilate	Pesticide	1	5	1	1	4	2	9.5	N	--	
82	Isoxaflutole	Herbicide	3	3	1	1	4	2	9.5	N	L	
83	Fludioxonil	Fungicide	5	5	1	1	2	2	9.5	N	--	
84	Methoxychlor	Insecticide	1	6	1	2	2	2	9.0	N	H	Pending Validation
85	Fipronil	Insecticide	2	4	2	3	3	0	9.0	Y	HH	In 2017 NRP
86	Fipronil Desulfinyl	Insecticide	1	5	2	3	3	0	9.0	Y	--	In 2017 NRP
87	Fipronil Sulfide	Insecticide	1	5	2	3	3	0	9.0	Y	--	In 2017 NRP
88	Lindane (Gamma-Hexachlorocyclohexane)	Pesticide	2	4	2	3	3	0	9.0	Y	HH	In 2017 NRP
89	Parathion Methyl	Insecticide	1	3	1	4	3	2	9.0	N	M	
90	Carbophenothion	Insecticide	1	6	1	3	1	2	9.0	N	H	Pending Validation
91	Dinocap	Fungicide	1	6	1	3	1	2	9.0	N	--	
92	Mcpa (2-Methyl-4-Chlorophenoxyacetic Acid)	Herbicide	3	4	1	3	1	2	9.0	N	--	
93	Bromoxynil	Herbicide	3	4	1	1	3	2	9.0	N	--	
94	Fenbuconazole	Fungicide	3	4	1	1	3	2	9.0	N	L	
95	Difenoconazole	Fungicide	4	5	3	1	3	0	9.0	Y	M	In 2017 NRP
96	Pentachlorobenzene (Pcb)	Other	1	6	3	3	2	0	8.8	Y	H	In 2017 NRP
97	Linuron	Herbicide	3	4	2	2	3	0	8.8	Y	L	In 2017 NRP
98	Oxychlordane (Chlordane Byproduct)	Insecticide	1	6	2	4	1	0	8.8	Y	HH	In 2017 NRP
99	Resmethrin (Cis& Trans)	Insecticide	1	6	2	1	4	0	8.8	Y	H	In 2017 NRP
100	Atrazine-Desethyl	Herbicide	6	3	1	2	1	2	8.8	N	--	
101	Gamma-Cyhalothrin	Pyrethroids	3	6	1	2	1	2	8.8	N	--	

Rank	Chemicals	Type	S	B	F	H	C	L	Score	FSIS Testing	EPA Rank	Current Status
102	2,4-D (2,4-Dichlorophenoxyacetic Acid)	Herbicide	6	3	1	1	2	2	8.8	N	--	
103	Dicamba	Herbicide	6	3	1	1	2	2	8.8	N	--	
104	Iprodione	Fungicide	2	3	1	1	4	2	8.3	N	L	
105	Chlorpyrifos	Insecticide	6	5	2	2	1	0	8.3	Y	HH	In 2017 NRP
106	Dinoseb	Fungicide	1	4	1	2	3	2	8.3	N	--	
107	Molinate	Pesticide	1	4	1	2	3	2	8.3	N	--	
108	Parathion (Parathion-Ethyl)	Insecticide	1	4	1	2	3	2	8.3	N	M	
109	Terbutryn	Herbicide	1	4	1	2	3	2	8.3	N	--	
110	Cyproconazole	Fungicide	2	3	1	1	4	2	8.3	N	--	
111	Epoxiconazole	Fungicide	1	4	1	1	4	2	8.3	N	--	
112	Iprovalicarb	Fungicide	1	4	1	1	4	2	8.3	N	--	
113	Nitrapyrin	Microbiocide	1	4	1	1	4	2	8.3	N	L	
114	Procymidone	Fungicide	1	4	1	1	4	2	8.3	N	--	
115	Tolyfluanid	Insecticide	1	4	1	1	4	2	8.3	N	--	
116	Clofentezine	Pesticide	2	4	2	1	3	2	8.0	N	L	
117	Dichlorprop-P	Herbicide	2	4	1	3	1	2	8.0	N	--	
118	Ethion Dioxon	Insecticide	1	5	1	3	1	2	8.0	Y	H	In 2017 NRP
119	Flufenacet	Herbicide	2	4	1	3	1	2	8.0	N	L	
120	Glufosinate-Ammonium	Herbicide	5	1	1	3	1	2	8.0	N	--	
121	Phorate (Thimet)	Insecticide	2	4	1	3	1	2	8.0	N	M	
122	Pirimiphos Ethyl	Pesticide	1	5	1	3	1	2	8.0	N	--	
123	Chlorthal Dimethyl	Pesticide	1	5	1	1	3	2	8.0	N	--	
124	Dimethenamid	Herbicide	3	3	1	1	3	2	8.0	N	--	
125	Fluazinam	Fungicide	2	4	1	1	3	2	8.0	N	--	
126	Metrafenone	Herbicide	1	5	1	1	3	2	8.0	N	--	
127	Penthiopyrad	Fungicide	1	5	1	1	3	2	8.0	N	--	
128	Pyrimethanil	Fungicide	2	4	1	1	3	2	8.0	N	--	
129	Tetramethrin	Insecticide	1	5	1	1	3	2	8.0	N	M	
130	Hexythiazox	Insecticide	2	6	3	1	3	0	8.0	Y	H	In 2017 NRP
131	Metolachlor	Herbicide	5	4	1	1	3	-1	8.0	Y	L	In 2017 NRP
132	2,4-Db	Herbicide	4	4	1	2	1	2	8.0	N	--	
133	Famoxadone	Fungicide	3	5	1	2	1	2	8.0	N	M	
134	Fluazifop-P-Butyl	Herbicide	3	5	1	2	1	2	8.0	N	M	
135	Flumethrin	Pyrethroids	2	6	1	2	1	2	8.0	N	--	
136	Cyfluthrin (All Isomers)	Insecticide	6	6	1	1	1	2	8.0	N	HH	Pending Validation
137	Esfenvalerate	Insecticide	6	6	1	1	1	2	8.0	N	H	Pending Validation

Rank	Chemicals	Type	S	B	F	H	C	L	Score	FSIS Testing	EPA Rank	Current Status
138	Imazalil	Fungicide	2	4	3	1	4	0	7.5	Y	M	In 2017 NRP
139	Profenofos	Insecticide	1	5	2	4	1	0	7.5	Y	M	In 2017 NRP
140	Propanil	Herbicide	2	4	3	2	3	0	7.5	Y	L	In 2017 NRP
141	Dodine	Pesticide	2	5	1	2	1	2	7.3	N	--	
142	Dicrotophos	Insecticide	2	1	1	4	3	2	7.3	N	--	
143	Fenvalerate (Also See Esfenvalerate)	Insecticide	1	6	3	2	1	2	7.3	N	H	Pending Validation
144	Dimoxystrobin	Fungicide	1	6	1	2	1	2	7.3	N	--	
145	Fomesafen	Herbicide	4	3	1	2	1	2	7.3	N	--	
146	Mesotrione	Pesticide	5	2	1	2	1	2	7.3	N	--	
147	Paraquat	Herbicide	6	1	1	2	1	2	7.3	N	--	
148	Phenothrin	Insecticide	1	6	1	2	1	2	7.3	N	H	Pending Validation
149	Picolinafen	Pesticide	1	6	1	2	1	2	7.3	N	--	
150	Tolfenpyrad	Insecticide	1	6	1	2	1	2	7.3	N	--	
151	Hydroprene	Insecticide	1	6	1	1	2	2	7.3	N	H	
152	Thifensulfuron-Methyl	Herbicide	5	2	1	1	2	2	7.3	N	--	
153	Triclopyr	Herbicide	4	3	1	1	2	2	7.3	N	--	
154	Dichlobenil	Pesticide	2	3	1	1	3	2	7.0	N	--	
155	Famphur	Pesticide	1	3	1	4	1	2	7.0	N	--	
156	Fenthion Sulfone	Insecticide	1	3	1	4	1	2	7.0	N	M	
157	Methidathion	Insecticide	1	3	1	2	3	2	7.0	N	L	
158	Triadimefon	Fungicide	1	3	1	2	3	2	7.0	N	L	
159	Folpet	Pesticide	1	3	1	1	4	2	7.0	N	--	
160	Metiram	Pesticide	3	1	1	1	4	2	7.0	N	--	
161	Thiacloprid	Insecticide	2	2	1	1	4	2	7.0	N	L	
162	Thiodicarb	Pesticide	2	2	1	1	4	2	7.0	N	--	
163	Abamectin (Avermectin B1)	Insecticide	4	1	1	3	1	2	7.0	N	--	
164	Chlorfenvinphos	Insecticide	1	4	1	3	1	2	7.0	N	M	
165	Endrin Ketone	Insecticide	1	4	1	3	1	2	7.0	N	--	
166	Fenamiphos	Insecticide	1	4	1	3	1	2	7.0	N	L	
167	Pyraclostrobin	Fungicide	6	4	2	1	1	2	7.0	N	M	
168	Terbuthylazine	Herbicide	1	4	1	2	2	2	7.0	N	--	
169	Fluometuron	Fungicide	2	3	1	1	3	2	7.0	N	--	
170	Hexaconazole	Fungicide	1	4	1	1	3	2	7.0	N	--	
171	Isoxaben	Herbicide	1	4	1	1	3	2	7.0	N	--	
172	Picoxystrobin	Fungicide	1	4	1	1	3	2	7.0	N	--	
173	Pyrasulfotole	Herbicide	2	3	1	1	3	2	7.0	N	--	
174	Sulfoxaflor	Insecticide	1	4	1	1	3	2	7.0	N	--	
175	Triflusulfuron-Methyl	Pesticide	1	4	1	1	3	2	7.0	N	--	

Rank	Chemicals	Type	S	B	F	H	C	L	Score	FSIS Testing	EPA Rank	Current Status
176	Vinclozolin	Fungicide	1	4	1	1	3	2	7.0	N	L	
177	Ethion	Insecticide	1	6	3	3	1	0	7.0	Y	H	In 2017 NRP
178	Nonachlor -Trans	Insecticide	1	6	2	3	1	0	7.0	Y	H	In 2017 NRP
179	Boscalid	Fungicide	4	3	2	1	3	0	7.0	Y	HH	In 2017 NRP
180	Buprofezin	Insecticide	2	5	3	1	3	0	7.0	Y	M	In 2017 NRP
181	Fenoxaprop Ethyl	Herbicide	2	5	2	1	3	0	7.0	Y	M	In 2017 NRP
182	Clethodim	Herbicide	5	5	1	1	1	2	7.0	N	M	
183	Ethion Monoxon	Insecticide	1	6	2	3	1	0	7.0	Y	HH	In 2017 NRP
184	Tefluthrin	Insecticide	3	6	2	2	1	0	6.8	Y	H	In 2017 NRP
185	Pirimicarb	Carbamate	1	2	1	2	4	2	6.5	N	--	
186	Cyhalothrin (All Isomers)	Insecticide	3	6	6	1	1	2	6.5	N	HH	Pending Validation
187	Prometryn	Herbicide	2	4	1	2	1	2	6.5	N	--	
188	Bicyclopyrone	Herbicide	1	2	1	3	3	2	6.5	N	--	
189	Maneb	Pesticide	2	1	1	2	4	2	6.5	N	--	
190	Propoxur	Insecticide	1	2	1	2	4	2	6.5	N	--	
191	Pymetrozine	Insecticide	2	1	1	2	4	2	6.5	N	--	
192	Bitertanol	Fungicide	1	5	1	2	1	2	6.5	N	--	
193	Diquat	Herbicide	3	3	1	2	1	2	6.5	N	--	
194	Fenarimol	Fungicide	2	4	1	2	1	2	6.5	N	M	
195	Flusilazole	Fungicide	2	4	1	2	1	2	6.5	N	--	
196	Furathiocarb	Pesticide	1	5	1	2	1	2	6.5	N	--	
197	Penconazole	Fungicide	1	5	1	2	1	2	6.5	N	--	
198	Phosalone	Insecticide	1	5	1	2	1	2	6.5	N	M	
199	Propaquizafop	Herbicide	1	5	1	2	1	2	6.5	N	--	
200	Propazine	Herbicide	2	4	1	2	1	2	6.5	N	--	
201	Prosulfocarb	Herbicide	1	5	1	2	1	2	6.5	N	--	
202	Triflumuron	Pesticide	1	5	1	2	1	2	6.5	N	--	
203	Naptalam	Herbicide	2	4	1	1	2	2	6.5	N	--	
204	Acephate	Insecticide	4	1	2	2	3	0	6.3	Y	HH	In 2017 NRP
205	Dimethoate	Insecticide	4	1	3	2	3	0	6.3	Y	L	In 2017 NRP
206	Tetrachlorvinphos	Insecticide	1	4	2	1	4	0	6.3	Y	M	In 2017 NRP
207	Piperonyl Butoxide	Synergist	1	5	6	1	3	0	6.0	Y	HH	In 2017 NRP
208	Malathion Oxon	Insecticide	3	1	1	1	3	2	6.0	N	L	
209	Diazinon	Insecticide	2	4	3	3	1	0	6.0	Y	HH	In 2017 NRP
210	Malathion	Insecticide	3	3	2	1	3	0	6.0	Y	L	In 2017 NRP
211	Fenbutatin Oxide	Insecticide	2	6	1	1	1	2	6.0	N	--	
212	Simazine	Herbicide	5	3	2	2	1	0	6.0	Y	L	In 2017 NRP
213	Etu (Ethylene Thiourea)	Pesticide	1	1	1	4	4	2	6.0	N	--	
214	Fentin Hydroxide	fungicide	3	1	1	3	1	2	6.0	N	--	

Rank	Chemicals	Type	S	B	F	H	C	L	Score	FSIS Testing	EPA Rank	Current Status
215	Phorate Oxon	Insecticide	2	2	1	3	1	2	6.0	N	M	
216	Phorate Sulfone	Insecticide	2	2	1	3	1	2	6.0	N	M	
217	Phorate Sulfoxide	Insecticide	2	2	1	3	1	2	6.0	N	M	
218	Ethephon	Herbicide	3	1	1	2	2	2	6.0	N	--	
219	Methiocarb	Insecticide	1	3	1	2	2	2	6.0	N	L	
220	Bromacil	Pesticide	1	3	1	1	3	2	6.0	N	--	
221	Triforin	Fungicide	1	3	1	1	3	2	6.0	N	--	
222	Etoxazole	Insecticide	2	6	1	1	1	2	6.0	N	--	
223	Fenpyroximate	Pesticide	2	6	1	1	1	2	6.0	N	H	Pending Validation
224	Florasulam	Pesticide	2	6	1	1	1	2	6.0	N	--	
225	Flumioxazin	Herbicide	5	3	1	1	1	2	6.0	N	--	
226	Imazethapyr	Herbicide	5	3	1	1	1	2	6.0	N	--	
227	Novaluron	Herbicide	2	6	1	1	1	2	6.0	N	H	Pending Validation
228	Pyridaben	Insecticide	2	6	2	2	1	0	6.0	Y	H	In 2017 NRP
229	Nonachlor -Cis	Insecticide	1	6	1	3	1	-1	6.0	Y	H	In 2017 NRP
230	Emamectin	Insecticide	2	1	1	4	1	2	5.8	N	--	
231	Sulfosulfuron	Herbicide	2	1	1	1	4	2	5.8	N	--	
232	Azinphos-Ethyl	Insecticide	1	4	1	2	1	2	5.8	N	L	
233	Chloroxuron	Herbicide	1	4	1	2	1	2	5.8	N	--	
234	Fenitrothion (Mep)	Insecticide	1	4	1	2	1	2	5.8	N	L	
235	Fluquinconazole	Fungicide	1	4	1	2	1	2	5.8	N	--	
236	Fpyriproxyfen	Fungicide	1	4	1	2	1	2	5.8	N	M	
237	Thiram	Pesticide	3	2	1	2	1	2	5.8	N	--	
238	Aminopyralid	Herbicide	4	1	1	1	2	2	5.8	N	--	
239	Paclobutrazol	Fungicide	1	4	1	1	2	2	5.8	N	--	
240	Phenmedipham	Pesticide	1	4	1	1	2	2	5.8	N	--	
241	Quinclorac	Herbicide	2	3	1	1	2	2	5.8	N	--	
242	Eptc (S-Ethyl Dipropylthiocarbamate)	Herbicide	3	4	1	1	1	2	5.5	N	--	
243	Amitrole	Herbicide	1	1	1	3	4	2	5.5	N	--	
244	2,6-Diisopropylnaphthalene (2,6-Dipn)	Herbicide*	1	6	1	1	1	2	5.5	N	L	
245	Acequinocyl	Insecticide	1	6	1	1	1	2	5.5	N	--	
246	Bentazon	Herbicide	4	3	1	1	1	2	5.5	N	--	
247	Beta Cyfluthrin	Pesticide	1	6	1	1	1	2	5.5	N	--	
248	Bromophos	Insecticide	1	6	1	1	1	2	5.5	N	--	
249	Bromopropylate	Insecticide	1	6	1	1	1	2	5.5	N	--	
250	Butralin	Herbicide	2	5	1	1	1	2	5.5	N	--	
251	Carbosulfan	Carbamate	1	6	1	1	1	2	5.5	N	--	

Rank	Chemicals	Type	S	B	F	H	C	L	Score	FSIS Testing	EPA Rank	Current Status
252	Chlorantraniliprole	Insecticide	3	4	1	1	1	2	5.5	N	--	
253	Chlorimuron-Ethyl	Pesticide	4	3	1	1	1	2	5.5	N	--	
254	Clomazone	Herbicide	4	3	1	1	1	2	5.5	N	--	
255	Cloquintocet-Mexyl	Pesticide	1	6	1	1	1	2	5.5	N	--	
256	Cyhalofop-Butyl	Herbicide	2	5	1	1	1	2	5.5	N	--	
257	Cyhexatin	Pesticide	1	6	1	1	1	2	5.5	N	--	
258	Cyphenothrin	Insecticide	1	6	1	1	1	2	5.5	N	H	Pending Validation
259	Cyprodinil	Fungicide	3	4	1	1	1	2	5.5	N	--	
260	Etofenprox	Insecticide	1	6	1	1	1	2	5.5	N	--	
261	Fenazaquin	Insecticide	1	6	1	1	1	2	5.5	N	--	
262	Flucythrinate	Pyrethroids	1	6	1	1	1	2	5.5	N	--	
263	Flufenoxuron	Insecticide	1	6	1	1	1	2	5.5	N	H	Pending Validation
264	Fluopicolide	Fungicide	2	5	1	1	1	2	5.5	N	--	
265	Fluopyram	Fungicide	2	5	1	1	1	2	5.5	N	--	
266	Glyphosate	Herbicide	6	1	1	1	1	2	5.5	N	--	
267	Ipconazole	Fungicide	2	5	1	1	1	2	5.5	N	--	
268	Isoxadifen-Ethyl	Herbicide	1	6	1	1	1	2	5.5	N	--	
269	Methoprene	Insecticide	1	6	1	1	1	2	5.5	N	H	
270	Metsulfuron-Methyl	Herbicide	4	3	1	1	1	2	5.5	N	--	
271	Napropamide	Herbicide	3	4	1	1	1	2	5.5	N	--	
272	Prothioconazole	Fungicide	3	4	1	1	1	2	5.5	N	--	
273	Pyridate	Pesticide	1	6	1	1	1	2	5.5	N	--	
274	Quinoxyfen	Pesticide	2	5	1	1	1	2	5.5	N	--	
275	Sethoxydim	Herbicide	5	2	1	1	1	2	5.5	N	L	
276	S-Methoprene	Pesticide	1	6	1	1	1	2	5.5	N	--	
277	Spiromesifen	Insecticide	2	5	1	1	1	2	5.5	N	M	
278	Spiroxamine	Pesticide	1	6	1	1	1	2	5.5	N	--	
279	Temephos	Insecticide	1	6	1	1	1	2	5.5	N	--	
280	Tridemorph	Fungicide	1	6	1	1	1	2	5.5	N	--	
281	Trifloxystrobin	Fungicide	6	5	2	1	1	0	5.5	Y	M	In 2017 NRP
282	Azinphos Methyl	Insecticide	4	3	5	2	1	0	5.3	Y	L	In 2017 NRP
283	Metribuzin	Herbicide	5	2	2	1	2	0	5.3	Y	L	In 2017 NRP
284	Sulprofos	Insecticide	1	6	2	2	1	0	5.3	Y	H	In 2017 NRP
285	Heptachlor Epoxide (Cis&Trans) Or (B+A)	Insecticide	1	1	3	4	6	0	5.0	Y	HH	In 2017 NRP
286	Deltamethrin	Insecticide	1	5	6	1	1	2	5.0	N	M	
287	Thiabendazole	Fungicide	1	3	3	1	4	0	5.0	Y	HH	In 2017 NRP
288	MGK-264 (Isomers 1&2)	Synergist	1	4	3	1	3	0	5.0	Y	HH	In 2017 NRP
289	Norflurazon	Herbicide	2	3	2	1	3	0	5.0	Y	L	In 2017 NRP

Rank	Chemicals	Type	S	B	F	H	C	L	Score	FSIS Testing	EPA Rank	Current Status
290	Oxydemeton Methyl	Insecticide	2	1	1	3	1	2	5.0	N	L	
291	Carbendazim	Fungicide	1	2	1	1	3	2	5.0	N	L	
292	Trichlorfon	Pesticide	1	1	1	3	3	2	5.0	N	--	
293	Propachlor	Herbicide	1	3	3	1	4	0	5.0	Y	L	In 2017 NRP
294	Propetamphos	Insecticide	1	4	3	3	1	0	5.0	Y	M	In 2017 NRP
295	Fenamiphos Sulfone	Insecticide	1	2	1	3	1	2	5.0	N	L	
296	Fenamiphos Sulfoxide	Insecticide	1	2	1	3	1	2	5.0	N	L	
297	Formetanate	Pesticide	2	1	1	3	1	2	5.0	N	--	
298	Formetanate Hydrochloride	Pesticide	1	2	1	3	1	2	5.0	N	--	
299	Fosthiazate	Nematocide	1	2	1	3	1	2	5.0	N	--	
300	Clofencet	Pesticide	1	2	1	1	3	2	5.0	N	--	
301	Flonicamid	Insecticide	2	1	1	1	3	2	5.0	N	L	
302	Pyrithiobac Sodium	Pesticide	2	1	1	1	3	2	5.0	N	--	
303	4-Chlorophenoxyacetic Acid (4-Cpa)	Pesticide	1	3	1	2	1	2	5.0	N	--	
304	Ametryn	Herbicide	1	3	1	2	1	2	5.0	N	--	
305	Cyclanilide	Herbicide	2	2	1	2	1	2	5.0	N	--	
306	Dichloran	Pesticide	1	3	1	2	1	2	5.0	N	--	
307	Fensulfothion	Insecticide	1	3	1	2	1	2	5.0	N	--	
308	Guazatine	Fungicide	1	3	1	2	1	2	5.0	N	--	
309	Topramezone	Herbicide	2	2	1	2	1	2	5.0	N	--	
310	Trifloxysulfuron	Herbicide	2	2	1	2	1	2	5.0	N	--	
311	Imazamethabenz-Methyl	Herbicide	2	2	1	1	2	2	5.0	N	--	
312	Tebuthiuron	Herbicide	2	2	1	1	2	2	5.0	N	L	
313	Bifenazate	Acaricide	2	4	1	1	1	2	5.0	N	L	
314	Clopyralid	Herbicide	4	2	1	1	1	2	5.0	N	--	
315	Diclosulam	Pesticide	2	4	1	1	1	2	5.0	N	--	
316	Didecyldimethylammonium Chloride	Pesticide	1	5	1	1	1	2	5.0	N	--	
317	Diflufenican	Herbicide	1	5	1	1	1	2	5.0	N	--	
318	Diflufenzopyr	Herbicide	4	2	1	1	1	2	5.0	N	HH	
319	Fenhexamid	Fungicide	2	4	1	1	1	2	5.0	N	--	
320	Fenpropimorph	Pesticide	1	5	1	1	1	2	5.0	N	--	
321	Flubendiamide	Insecticide	2	4	1	1	1	2	5.0	N	--	
322	Fluroxypyr	Herbicide	3	3	1	1	1	2	5.0	N	L	
323	Flutolanil	Fungicide	2	4	1	1	1	2	5.0	N	M	
324	Iodosulfuron Methyl	Pesticide	2	4	1	1	1	2	5.0	N	--	
325	Mandipropamid	Fungicide	2	4	1	1	1	2	5.0	N	--	

Rank	Chemicals	Type	S	B	F	H	C	L	Score	FSIS Testing	EPA Rank	Current Status
326	Mcpb (4-(2-Methyl-4-Chlorophenoxy) Butyric Acid)	Herbicide	2	4	1	1	1	2	5.0	N	--	
327	Mefenpyr-Diethyl	Herbicide	1	5	1	1	1	2	5.0	N	--	
328	Metconazole	Fungicide	2	4	1	1	1	2	5.0	N	--	
329	Pinoxaden	Herbicide	2	4	1	1	1	2	5.0	N	--	
330	Prosulfuron	Herbicide	2	4	1	1	1	2	5.0	N	--	
331	Rimsulfuron	Herbicide	5	1	1	1	1	2	5.0	N	--	
332	Spirotetramat	Insecticide	2	4	1	1	1	2	5.0	N	--	
333	Tecnazene	Fungicide	1	5	1	1	1	2	5.0	N	--	
334	Tetradifon	Pesticide	1	5	1	1	1	2	5.0	N	--	
335	Tolclofos-Methyl	Fungicide	1	5	1	1	1	2	5.0	N	--	
336	Triticonazole	Fungicide	2	4	1	1	1	2	5.0	N	--	
337	Endosulfan	Pesticide	4	4	1	2	1	-1	5.0	Y	HH	In 2017 NRP
338	Dichlorvos (Ddvp)	Pesticide	1	2	3	3	3	0	4.5	Y	L	In 2017 NRP
339	Monocrotophos	Insecticide	1	1	1	4	1	2	4.5	N	--	
340	Diphenylamine (Dpa)	Fungicide	1	4	1	1	1	2	4.5	N	HH	Pending Validation
341	O-Phenylphenol	Microbiocide	1	4	1	1	1	2	4.5	N	--	
342	Phosphine (Hydrogen Phosphide)	Pesticide	1	1	1	3	2	2	4.5	N	--	
343	Captan Epoxide	Pesticide	1	1	1	1	4	2	4.5	N	--	
344	Daminozide	Herbicide	1	1	1	1	4	2	4.5	N	--	
345	Propylene Oxide	Fungicide	1	1	1	1	4	2	4.5	N	--	
346	Propyzamide	Herbicide	1	4	3	1	1	2	4.5	N	--	
347	Acibenzolar-S-Methyl	Fungicide	1	4	1	1	1	2	4.5	N	--	
348	Benalaxyl	Pesticide	1	4	1	1	1	2	4.5	N	--	
349	Butafenacil	Herbicide	1	4	1	1	1	2	4.5	N	--	
350	Carboxin	Pesticide	2	3	1	1	1	2	4.5	N	L	
351	Chlorsulfuron	Herbicide	3	2	1	1	1	2	4.5	N	--	
352	Chlorsulfuron, 5-Hydroxy-	Pesticide	3	2	1	1	1	2	4.5	N	--	
353	Cyantraniliprole	Insecticide	1	4	1	1	1	2	4.5	N	--	
354	Cyazofamid	Fungicide	2	3	1	1	1	2	4.5	N	--	
355	Desmedipham	Herbicide	1	4	1	1	1	2	4.5	N	--	
356	Dimethomorph	Pesticide	2	3	1	1	1	2	4.5	N	--	
357	Ethoxyquin	Fungicide	1	4	1	1	1	2	4.5	N	--	
358	Flucarbazone	Pesticide	2	3	1	1	1	2	4.5	N	--	
359	Flumetsulam	Herbicide	3	2	1	1	1	2	4.5	N	--	
360	Fluoxastrobin	Fungicide	2	3	1	1	1	2	4.5	N	L	
361	Flutriafol	Fungicide	2	3	1	1	1	2	4.5	N	--	
362	Fluxapyroxad	fungicide	1	4	1	1	1	2	4.5	N	--	

Rank	Chemicals	Type	S	B	F	H	C	L	Score	FSIS Testing	EPA Rank	Current Status
363	Halosulfuron-Methyl	Herbicide	4	1	1	1	1	2	4.5	N	--	
364	Imazapic-Ammonium	Herbicide	2	3	1	1	1	2	4.5	N	--	
365	Imazaquin	Herbicide	2	3	1	1	1	2	4.5	N	--	
366	Lenacil	Herbicide	1	4	1	1	1	2	4.5	N	--	
367	Nicosulfuron	Herbicide	4	1	1	1	1	2	4.5	N	--	
368	Picloram	Herbicide	4	1	1	1	1	2	4.5	N	--	
369	Propoxycarbazone	Herbicide	2	3	1	1	1	2	4.5	N	--	
370	Tepraloxydim	Herbicide	1	4	1	1	1	2	4.5	N	--	
371	Terbacil	Herbicide	3	2	1	1	1	2	4.5	N	L	
372	Triazophos	Pesticide	1	4	1	1	1	2	4.5	N	--	
373	Endosulfan I	Insecticide	1	5	2	2	1	0	4.5	Y	HH	In 2017 NRP
374	Azamethiphos	Pesticide	1	2	1	2	1	2	4.3	N	--	
375	Bendiocarb	Pesticide	1	2	1	2	1	2	4.3	N	--	
376	Endothall	Herbicide	1	2	1	2	1	2	4.3	N	--	
377	Imazapyr	Herbicide	2	1	1	2	1	2	4.3	N	--	
378	Naled	Pesticide	1	2	1	2	1	2	4.3	N	--	
379	Phosalone Oxon	Pesticide	1	2	1	2	1	2	4.3	N	--	
380	Pentachloroaniline (Pca)	Other	1	6	1	2	1	-1	4.3	Y	H	In 2017 NRP
381	Phosmet Oxon	Insecticide	1	1	1	1	3	2	4.0	N	--	
382	Oxamyl	Insecticide	3	1	1	1	1	2	4.0	N	--	
383	Demeton-S-Methyl Sulfone	Insecticide	1	1	1	3	1	2	4.0	N	L	
384	Asulam	Herbicide	1	1	1	1	3	2	4.0	N	--	
385	Bifenthrin, 4'-Hydroxy	Pesticide	1	1	1	1	3	2	4.0	N	--	
386	Dimethipin	Pesticide	1	1	1	1	3	2	4.0	N	--	
387	Ferbam	Pesticide	1	1	1	1	3	2	4.0	N	--	
388	Bupirimate	Fungicide	1	3	1	1	1	2	4.0	N	--	
389	Chloroneb, Hydroxy-	Pesticide	1	3	1	1	1	2	4.0	N	--	
390	Cloransulam-Methyl	Pesticide	1	3	1	1	1	2	4.0	N	--	
391	Cymoxanil	Fungicide	3	1	1	1	1	2	4.0	N	--	
392	Diphenamid	Herbicide	1	3	1	1	1	2	4.0	N	L	
393	Diphenamid, Desmethyl	Pesticide	1	3	1	1	1	2	4.0	N	--	
394	Ethoxysulfuron	Pesticide	1	3	1	1	1	2	4.0	N	--	
395	Fenamidone	Fungicide	1	3	1	1	1	2	4.0	N	L	
396	Flucarbazone-Sodium	Herbicide	1	3	1	1	1	2	4.0	N	--	
397	Imazamox	Herbicide	3	1	1	1	1	2	4.0	N	--	
398	Imiprothrin	Insecticide	1	3	1	1	1	2	4.0	N	L	
399	Mesosulfuron Methyl	Herbicide	2	2	1	1	1	2	4.0	N	--	
400	Propamocarb	Fungicide	2	2	1	1	1	2	4.0	N	--	
401	Propamocarb Hydrochloride	Fungicide	2	2	1	1	1	2	4.0	N	--	
402	Propham	Herbicide	1	3	1	1	1	2	4.0	N	L	

Rank	Chemicals	Type	S	B	F	H	C	L	Score	FSIS Testing	EPA Rank	Current Status
403	Propoxycarbazone-Sodium	Herbicide	1	3	1	1	1	2	4.0	N	--	
404	Pyroxsulam	Herbicide	2	2	1	1	1	2	4.0	N	--	
405	Saflufenacil	Herbicide	3	1	1	1	1	2	4.0	N	--	
406	Thidiazuron	Herbicide	2	2	1	1	1	2	4.0	N	--	
407	Thiencarbazone-Methyl	Pesticide	2	2	1	1	1	2	4.0	N	--	
408	Triasulfuron	Herbicide	2	2	1	1	1	2	4.0	N	--	
409	Triflumazole	Fungicide	2	2	1	1	1	2	4.0	N	L	
410	Carfentrazone Ethyl	Herbicide	4	4	2	1	1	0	4.0	Y	L	In 2017 NRP
411	Fenpropathrin	Pyrethroids	2	6	3	1	1	0	4.0	Y	H	In 2017 NRP
412	Pyriproxyfen	Insecticide	2	6	2	1	1	0	4.0	Y	H	In 2017 NRP
413	Carbofuran	Insecticide	2	3	3	2	1	0	3.8	Y	L	In 2017 NRP
414	Endosulfan Ii	Insecticide	1	4	2	2	1	0	3.8	Y	HH	In 2017 NRP
415	Endosulfan Sulfate	Insecticide	1	4	2	2	1	0	3.8	Y	HH	In 2017 NRP
416	Ethofumesate	Herbicide	2	3	3	1	2	0	3.8	Y	L	In 2017 NRP
417	Cyromazine	Insecticide	1	1	1	2	1	2	3.5	N	--	
418	Diquat Dibromide	Herbicide	1	1	1	2	1	2	3.5	N	--	
419	Flupropanate	Pesticide	1	1	1	2	1	2	3.5	N	--	
420	Paraquat Dichloride	Herbicide	1	1	1	2	1	2	3.5	N	--	
421	Sulfuryl Fluoride	Pesticide	1	1	1	2	1	2	3.5	N	--	
422	Atrazine	Herbicide	6	3	1	1	1	-1	3.5	Y	L	In 2017 NRP
423	Amicarbazone	Herbicide	1	2	1	1	1	2	3.5	N	--	
424	Carbetamide	Pesticide	1	2	1	1	1	2	3.5	N	--	
425	Chloridazon	Herbicide	1	2	1	1	1	2	3.5	N	--	
426	Coumaphos	Insecticide	1	2	1	1	1	2	3.5	N	L	
427	Dinotefuran	Insecticide	2	1	1	1	1	2	3.5	N	L	
428	Ethametsulfuron Methyl	Herbicide	1	2	1	1	1	2	3.5	N	--	
429	Fosetyl	Fungicide	2	1	1	1	1	2	3.5	N	--	
430	Maleic Hydrazide	Pesticide	2	1	1	1	1	2	3.5	N	--	
431	Mepiquat	Herbicide	2	1	1	1	1	2	3.5	N	--	
432	Prohexadione Calcium	Fungicide	1	2	1	1	1	2	3.5	N	--	
433	Pyroxasulfone	Pesticide	1	2	1	1	1	2	3.5	N	--	
434	Spinetoram	Insecticide	2	1	1	1	1	2	3.5	N	--	
435	Trinexapac Ethyl	Herbicide	1	2	1	1	1	2	3.5	N	--	
436	Zineb	Fungicide	1	2	1	1	1	2	3.5	N	--	
437	Imidacloprid	Insecticide	6	1	3	1	1	0	3.5	Y	L	In 2017 NRP
438	Indoxacarb	Insecticide	2	5	2	1	1	0	3.5	Y	M	In 2017 NRP
439	Methoxyfenozide	Insecticide	3	4	2	1	1	0	3.5	Y	M	In 2017 NRP
440	Myclobutanil	Fungicide	4	3	2	1	1	0	3.5	Y	L	In 2017 NRP
441	Tebufenozide	Insecticide	2	5	2	1	1	0	3.5	Y	M	In 2017 NRP
442	Thiamethoxam	Insecticide	6	1	3	1	1	0	3.5	Y	L	In 2017 NRP
443	Thiobencarb	Herbicide	2	4	1	1	2	-1	3.5	Y	L	In 2017 NRP

Rank	Chemicals	Type	S	B	F	H	C	L	Score	FSIS Testing	EPA Rank	Current Status
444	Azoxystrobin	Fungicide	6	3	1	1	1	-1	3.5	Y	L	In 2017 NRP
445	Omethoate (Dimethoate Byproduct)	Insecticide	1	1	2	3	3	0	3.0	Y	L	In 2017 NRP
446	Diflubenzuron	Insecticide	2	4	2	1	1	0	3.0	Y	M	In 2017 NRP
447	Metalaxyl	Fungicide	4	2	2	1	1	0	3.0	Y	L	In 2017 NRP
448	Aldicarb	Carbamate	2	2	2	2	1	0	3.0	Y	L	In 2017 NRP
449	Benoxacor	Herbicide	1	3	2	2	1	0	3.0	Y	L	In 2017 NRP
450	Hexazinone	Herbicide	2	2	3	1	2	0	3.0	Y	L	In 2017 NRP
451	Azimsulfuron	Herbicide	1	1	1	1	1	2	3.0	N	--	
452	Azinphos-Methyl Oxon	Insecticide	1	1	1	1	1	2	3.0	N	L	
453	Chlormequat	Pesticide	1	1	1	1	1	2	3.0	N	--	
454	Dalapon (2,2-Dpa)	Herbicide	1	1	1	1	1	2	3.0	N	--	
455	Difenzoquat	Pesticide	1	1	1	1	1	2	3.0	N	--	
456	Fosetyl-Aluminum	Fungicide	1	1	1	1	1	2	3.0	N	--	
457	Glyphosate-Trimethylsulfonium (Sulfosate)	Pesticide	1	1	1	1	1	2	3.0	N	--	
458	Mepiquat Chloride	Herbicide	1	1	1	1	1	2	3.0	N	--	
459	Piperazine	Fungicide	1	1	1	1	1	2	3.0	N	--	
460	Spinosad	Insecticide	1	1	1	1	1	2	3.0	N	--	
461	Fluvalinate (T-Fluvalinate)	Insecticide	1	5	2	1	1	0	3.0	Y	M	In 2017 NRP
462	Pirimiphos Methyl	Insecticide	1	5	2	1	1	0	3.0	Y	M	In 2017 NRP
463	Methamidophos	Insecticide	2	1	1	4	1	-1	2.8	Y	L	In 2017 NRP
464	Prallethrin	Insecticide	1	4	1	1	2	-1	2.8	Y	M	In 2017 NRP
465	Chlorpropham	Herbicide	1	4	2	1	1	0	2.5	Y	L	In 2017 NRP
466	Methomyl	Insecticide	4	1	2	1	1	0	2.5	Y	L	In 2017 NRP
467	Chloroneb	Fungicide	1	4	3	1	1	0	2.5	Y	L	In 2017 NRP
468	Aldicarb Sulfoxide	Carbamate	1	2	2	2	1	0	2.3	Y	L	In 2017 NRP
469	Deethylatrazine	Herbicide	1	2	3	2	1	0	2.3	Y	--	In 2017 NRP
470	Aldicarb Sulfone	Carbamate	1	2	2	2	1	0	2.3	Y	L	In 2017 NRP
471	3-Hydroxycarbofuran	Insecticide	1	1	3	3	1	0	2.0	Y	L	In 2017 NRP
472	Acetamiprid	Insecticide	3	1	2	1	1	0	2.0	Y	L	In 2017 NRP
473	Fluroxypyr-1-Methylhepyl-Ester	Herbicide	1	3	3	1	1	0	2.0	Y	L	In 2017 NRP
474	Pronamide	Herbicide	1	4	1	1	1	-1	1.5	Y	L	In 2017 NRP
475	Coumaphos S	Pesticide	1	2	2	1	1	0	1.5	Y	L	In 2017 NRP
476	Fluridone	Herbicide	1	2	2	1	1	0	1.5	Y	L	In 2017 NRP
477	Clothianidin	Insecticide	1	1	3	1	1	0	1.0	Y	L	In 2017 NRP
478	Coumaphos O	Pesticide	1	1	2	1	1	0	1.0	Y	L	In 2017 NRP
479	Pyrazon	Herbicide	2	2	1	1	1	-1	1.0	Y	--	In 2017 NRP