

MILK & DAIRY BEEF DRUG RESIDUE PREVENTION

REFERENCE MANUAL 2020





National Milk Producers Federation (NMPF) does not endorse any of the veterinary drugs or tests identified on the lists in this manual. The lists of veterinary drugs and tests are provided only to inform producers and veterinarians what products may be available, and the producer and veterinarian are responsible for determining whether to use any of the veterinary drugs or tests. All information regarding the veterinary drugs or tests was obtained from the products' manufacturers or sponsors, and NMPF has made no further attempt to validate or corroborate any of that information. NMPF urges producers to consult with their veterinarians before using any veterinary drug or test, including any of the products identified on the lists in this manual. In the event that there might be any injury, damage, loss or penalty that results from the use of these products, neither the manufacturer of the product or the producer using the product shall be responsible. NMPF is not responsible for, and shall have no liability for, any injury, damage, loss or penalty.



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This manual is not a legal document and is intended for educational purposes only.

Dairy farmers are individually responsible for determining and complying with all requirements of local, state and federal laws and regulations regarding animal care.

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Foreword

The goal of our nation's dairy farmers is to produce the best tasting and most wholesome milk possible. Our consumers demand the best from us and our goal, through continuous improvement, is to meet their needs and exceed their expectations every day.

Day in and day out, our dairy farmers provide the best in animal husbandry. As part of continuous improvement, we evaluate our best management practices and disease prevention protocols to keep our animals healthy and comfortable. There are occasions when animals may get sick and need antimicrobial therapy to overcome a specific disease challenge. As dairy producers, we strategically and prudently use antimicrobial therapies to help an individual animal that has been threatened with a disease. We take this responsibility of prudent antimicrobial use seriously and take many precautions with our antibiotic-treated animals to ensure that their milk or meat does not enter the food supply.

The avoidance of milk and meat residues takes an on-farm team effort that begins with the VCPR – the Veterinarian-Client-Patient Relationship. Dairy farm owners, managers and herdsman work with their veterinarians to develop treatment protocols that ensure that antimicrobials are used correctly. Once a decision is made to use antimicrobials, protocols are in place to guide employees on the safe way to handle the animal to prevent an inadvertent milk or meat residue from occurring. Proper identification of treated animals and accurate recording of drug use are essential to prevent residues.

For 30 years, each revision of the Milk & Dairy Beef Drug Residue Prevention Reference Manual has served as the U.S. dairy industry's commitment to antimicrobial stewardship – the prudent and responsible use of antibiotics and other drugs in dairy animals. This year's revised manual is a quick resource to review those drugs approved for dairy animals and can also be used as an educational tool and resource for farm managers as they develop on-farm best management practices. I encourage all dairy farmers to sit down with their veterinarians and employees to review this manual as you will find the information useful, practical and easily applied to your individual farms.

Sincerely,

A handwritten signature in black ink, appearing to read "Karen Jordan". The signature is fluid and cursive, with a long horizontal stroke at the end.

Karen Jordan, DVM
Dairy Producer Chair
NMPF Animal Health and Well-Being Committee

Introduction

The U.S. dairy industry is committed to producing the highest quality, safe, abundant and affordable milk and dairy beef. Healthy animals help make for safe food, and disease prevention is the key to keeping cows healthy. When dairy animals get sick and treatment is necessary, producers and veterinarians utilize antibiotics and other drugs prudently. Antimicrobials must be used appropriately under veterinary guidance to prevent residues from occurring in milk and dairy beef. The marketing of milk or dairy beef with drug residues, even unintentionally, is illegal and can result in financial and criminal penalties.

Antimicrobial Stewardship

Antimicrobial stewardship goes beyond an individual dairy farmer's actions. It extends across all livestock production, and includes use of antimicrobials in companion animals and humans, even extending to some types of crop production systems. Misuse and overuse of antimicrobials is one of the world's most pressing public health concerns. Infectious organisms adapt to antimicrobials designed to kill them, making the drugs less effective. The Food and Drug Administration Center for Veterinary Medicine (FDA CVM) has committed to antimicrobial stewardship for use in animals through [principles and key initiatives](#).

According to the [American Veterinary Medical Association \(AVMA\)](#): "Antimicrobial stewardship cannot be ranked by intent of use for prevention, control or treatment. Strategic uses of antimicrobials for the purposes of prevention, control and treatment of disease may each meet the requirements of antimicrobial stewardship. Stewardship is better defined by decisions that influence the need for antimicrobial therapy in the first place and that maintain the effectiveness of antimicrobials when they are used."

Factors include the following:

- Systems of husbandry that reduce the risk of disease
- Careful diagnostic evaluation
- Good decision-making to use or not use antimicrobials
- Prudent choice of drugs, dosage and duration
- Records indicating appropriate follow-up and re-evaluation

AVMA Definitions of Antimicrobial Use for Treatment, Control and Prevention

AVMA believes antimicrobial stewardship can be achieved whether the intent is prevention, control or treatment, and attempts to prioritize antimicrobial stewardship by therapeutic purpose are misguided. Stewardship is better demonstrated by the clinical rationale for antimicrobial therapy. We provide the following definitions for treatment, prevention and control in the context of antimicrobial use in individual animals or populations of animals.



Antimicrobial prevention of disease

(Synonym: prophylaxis)

1. Prevention is the administration of an antimicrobial to an individual animal to mitigate the risk for acquiring disease or infection that is anticipated based on history, clinical judgment or epidemiological knowledge.
2. On a population basis, prevention is the administration of an antimicrobial to a group of animals, none of which have evidence of disease or infection, when transmission of existing undiagnosed infections, or the introduction of pathogens, is anticipated based on history, clinical judgment or epidemiological knowledge.



Antimicrobial control of disease

(Synonym: metaphylaxis)

1. Control is the administration of an antimicrobial to an individual animal with a subclinical infection to reduce the risk of the infection becoming clinically apparent, spreading to other tissues or organs or being transmitted to other individuals.
2. On a population basis, control is the use of antimicrobials to reduce the incidence of infectious disease in a group of animals that already has some individuals with evidence of infectious disease or evidence of infection.



Antimicrobial treatment of disease:

1. Treatment is the administration of an antimicrobial as a remedy for an individual animal with evidence of infectious disease.
2. On a population basis, treatment is the administration of an antimicrobial to those animals within the group with evidence of infectious disease.

Residue Prevention Best Practices

Causes of Antibiotic Residues in Milk and Meat

Drug residues can be avoided with implementation of a well-planned drug use program. Reasons given for milk and meat residues result from many on-farm situations. These include, but are not limited to, the following:

- Not working under a valid Veterinarian-Client-Patient Relationship
- Failure to keep accurate and adequate drug use records
- Not following the manufacturer or veterinarian prescribed label directions for correct treatment for the appropriate withdrawal time
- Not following veterinarian's recommendation when using any drug
- Poor identification of all cattle including bull calves
- Accidentally milking a treated cow into the bulk tank or not diverting from the bulk tank
- Long-term residue following treatment as a calf
- Use of medicated milk replacers in calves that may be sold for human consumption
- The use of prohibited drugs or aminoglycosides (e.g. , gentamicin) in cattle. The USDA and FDA are still detecting gentamicin residues in cattle.
- The use of compounded medications in cattle, including the intentional use of multiple drugs in a single animal, including both simultaneous and consecutive dosing. Animal liver and kidney function, particularly in unhealthy animals where drug metabolism may be compromised, may not be able to keep up with multiple circulating drugs potentially resulting in poorly defined and significantly extended drug withholding times.
- The practice of spraying hairy heel warts with antibiotic sprays in the **milking parlor** during milk harvest is a potential source for antibiotic contamination of milk. This practice should be avoided.
- The use of sulfonamide (e.g. sulfadimethoxine) products extra-label in lactating dairy cows.

Examples of Products and Risk Factors for Residues

Ceftiofur (also known as Ceftiflex®, Excede®, Excenel®, Naxcel®, Spectramast LC®, Spectramast DC)	<ul style="list-style-type: none"> • Failure to keep accurate records and note the exact product given (Excede versus Excenel). • Using the withholding time for one product when using another. • The withholding times for each product and formulation are different. • Using the drug in an unapproved route of administration. Excede is labeled to be given at the base of the ear only. Spectramast is the only ceftiofur product labeled for intramammary administration. Using these drugs in a route of administration not listed on the label is prohibited. • All products have a preslaughter withdrawal period, please consult the manufacturer's label for approved withdrawal times.
Enrofloxacin (Baytril 100*)	<ul style="list-style-type: none"> • Only labeled for non-lactating dairy animals 20 months of age or less and beef animals for pneumonia.* • Extra-label use in food animals is prohibited.
Florfenicol (Nuflor®)	<ul style="list-style-type: none"> • Not approved for dairy cattle over 20 months of age. • Sustained release has a longer withdrawal time. • No tolerance level for dairy cattle.
Flunixin (also known as Banamine®, Flu-Nix™, Flunixin meglumine**, Prevail™)	<ul style="list-style-type: none"> • These drugs are only approved for intravenous administration. • Using another administration route (e.g. IM or SQ) results in extended withdrawal times, well beyond the labeled withholding time.
Gentamicin	<ul style="list-style-type: none"> • Use of gentamicin is discouraged by AVMA, AABP and AVC because of extremely long retention in the kidneys, which results in very extended withdrawal times use. • Use of gentamicin in lactating dairy cows for intramammary use is not recommended. • FARAD recommends not less than a TWO-YEAR withdrawal period and, therefore, the use of this drug should not be considered.
Neomycin	<ul style="list-style-type: none"> • Feeding medicated milk replacer to calves to be processed for slaughter. • Not following withdrawal time on the bag. • Extra-label use of oral neomycin products.
Penicillin	<ul style="list-style-type: none"> • Use at non-labeled doses can only be done by prescription and with the oversight of the prescribing veterinarian. • Increasing the dose without using an extended withdrawal period. • Increasing the frequency or duration of administration without using an extended withdrawal period. • Using the drug in a route of administration not approved, such as intramammary or subcutaneous. • Giving more than 10 CC/injection site (as per label instructions).
Sulfas	<ul style="list-style-type: none"> • Using any sulfonamide product not labeled for lactating dairy cows is illegal. • Using a higher dose or frequency of administration will result in extended withdrawal times. • This drug is only approved for the treatment of respiratory disease. Application for treatment of mastitis is illegal. • Inadvertently administering a sustained release product when intending to use a daily use product.
Tetracycline	<ul style="list-style-type: none"> • Single-site, large-volume injection through non-intravenous route. • Extra-label use such as uterine infusion to treat an infected post-partum uterus.

*Bovine respiratory disease (BRD); consult product label for actual indications.

**Due to the high risk of a violative residue, flunixin must only be used intravenously and not be given by either subcutaneous or intramuscular routes of administration.

Minimizing Drug Risk

Steps to Prevent Drug Residues

Dairy producers realize the importance of eliminating the possibilities of having drug residues in milk and dairy beef. Producers can take the following steps to mitigate or lessen the chances of antibiotic residues:

1. Establish a valid Veterinarian-Client-Patient Relationship (VCPR) to ensure proper diagnosis and treatment of disease. The agreement should be reviewed at least annually with a Veterinarian of Record (VOR) who makes routine visits to the farm.
2. Keep accurate records of antibiotic use and identify all treated animals, including treatment protocols.
3. Implement a preventive Herd Health Plan to reduce the incidence of disease.
4. Maintain milk quality and implement an effective mastitis management program to reduce the need for antibiotics, including protocol development and review.
5. Implement employee training and awareness of proper animal drug use.
6. Use drugs approved for specific disease indications according to labeled directions and withdrawal periods. If extra label drug use is indicated by a veterinarian's prescription, that veterinarian must establish and document appropriate withdrawal periods.
7. Do not use drugs that are not specifically approved for use in a specific class of cattle (milking, dry or growing animals).
8. Segregate and milk treated animals after, or in a separate facility from, all non-treated animals to ensure that milk is not accidentally commingled.
9. Use drug residue screening tests specific for the drug utilized before marketing milk and/or meat from treated animals. Ensure detailed understanding of the test being used. The majority of tests are developed for use in bulk milk and are not designed for application in individual animals.
10. If in doubt about residue status, do not market milk and/or cull treated animals and seek input from your veterinarian and/or your milk handler.



Food Animal Residue Avoidance Databank (FARAD)

FARAD is a university-based national program that serves as the primary source for scientifically-based recommendations regarding safe withdrawal intervals of drugs and chemicals in food-producing animals. As such, FARAD is a key resource for protection of our nation's food supply, including meat, milk and eggs, against accidental contamination of animal-derived foods with violative residues of drugs, pesticides or other agents that could compromise food safety.

Modern animal agriculture relies heavily on the use of therapeutic drugs, pesticides and other agents that improve overall animal health and promote safe, efficient and humane production practices. Through the assimilation of a comprehensive drug database and the use of state-of-the-art pharmacokinetic modeling, FARAD scientists determine appropriate withdrawal periods for a wide array of chemical entities and provide this information to veterinarians, extension specialists and livestock producers through a toll-free call center as well as a publicly-accessible website (FARMWeb).

In addition, FARAD provides rapid response assistance regarding extra-label use of drugs in animal agriculture, and during food contamination emergencies which might arise from accidental exposure to environmental toxins, particularly pesticides, or intentional efforts to contaminate the food supply. Finally, FARAD provides assistance in trade matters related to foreign drug approvals and trains future veterinarians in the principles of residue avoidance.

FARAD is a USDA-funded university-based consortium that is overseen and operated by faculty and staff within the Colleges of Veterinary Medicine at the University of California-Davis, the University of Florida, Kansas State University, North Carolina State University and Virginia-Maryland College of Veterinary Medicine.

Visit **WWW.FARAD.ORG** for more information.

Record Keeping and Herd Health Protocols

Veterinarians must maintain written (or electronic) records for all animals treated for at least two years (or as otherwise mandated by federal or state law) to document that the drugs were supplied to clients in line with federal and state rules and policies. Dairy farmers should have a records system that is easily accessible to everyone who works with the animals. Records should be permanent and maintained in written or computer records for at least two years, so veterinarians have a history to which they can refer to prescribe effective therapy and to serve as information in case of regulatory follow-up. The producer needs to show how all drugs purchased were used or disposed. The treatment record should contain the following basic information:

- Date of treatment
- Animal treated identification
- Name of treatment used
- Disease/condition being treated
- Dosage administered
- Route of administration
- Duration of the treatment
- Specified withdrawal times for milk and meat to ensure food safety

Code of Federal Regulations 21 CFR 530.5. Food and Drug Administration. April 1, 2019.
<http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/CFRSearch.cfm?fr=530.5>

References

Code of Federal Regulations 21 CFR 530.5. Food and Drug Administration. April 1, 2019.
<http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/CFRSearch.cfm?fr=530.5>

8-STEP PLAN for Keeping Records

■ **Step 1: Recommended or Approved Drug List**

Early in your discussion with your herd health veterinarian you need to make a narrow list of drugs to be used on your dairy. The intent is to reduce the scope of drugs used. A short list will permit you to focus your knowledge and will help to prevent a violation of antibiotic residue laws.

■ **Step 2: Animal Treatment Plan**

In order to prevent, control or treat disease or infection, while promoting public health and food safety through residue prevention, it is important to be consistent. The second step is for you to establish a treatment plan for your herd health practices. The treatment plan should be written in consultation with your herd health veterinarian.

■ **Step 3: Beginning Inventory**

You and your herd health veterinarian should properly discard all expired drugs, all drugs no longer utilized as part of a treatment plan and all drugs not on your approved drug list. (Step 1) Conduct an inventory of drugs and other appropriate information annually.

■ **Step 4: Record Medicated Feed Purchases**

Antibiotic residues can occur from feeding practices as well as injections or other medical treatments. Be sure to clean feed equipment between batches. Carefully avoid disposing of leftover feed from feeder calves, hogs, etc., to lactating dairy cattle. Be aware that feeding medicated milk replacer or waste milk to calves intended for sale can be a cause of violative tissue residues.

■ **Step 5: Record of Drug Purchases**

Most successful dairy producers will record every purchase of drugs the day they are purchased. The FDA requires a paper trail of all drugs used on your dairy, so it is important to record the purchase of drugs promptly.

■ **Step 6: Daily Treatment Record**

If a drug is used, keep track of it in the Daily Treatment Record. In hindsight, dairy producers who have marketed milk or dairy beef with violative residues state that keeping better treatment records and properly identifying treated cows could have prevented the residue. Develop good habits to properly manage all medications.

■ **Step 7: Monthly Economic Comparison**

When do you “cull” a market cow from your herd? Every month you should review the investment you are making in each cow in the milking string. Compare your expenses by using the Daily Treatment Records.

■ **Step 8: Disposal**

Periodic review of drugs in storage will mean you occasionally throw away drugs that have expired. By recording your daily animal treatments and any discarded drugs, you create a paper trail of what has happened to all drugs purchased. This eight-step drug management system may prevent you from incurring a costly and embarrassing antibiotic accident!

Herd Health Plan

The dairy industry's commitment to antibiotic stewardship begins on the farm with coordinated animal health and care programs, including a Herd Health Plan developed in consultation with the Veterinarian of Record (VOR) and reviewed annually. Even with the best prevention programs, animals can become sick or injured, and prudent and responsible use of antimicrobials (including antibiotics) under veterinary supervision may be necessary to improve the health outcome of the animal.

An effective written Herd Health Plan focuses on:

- Disease and Injury
 - Prevention
 - Rapid diagnosis
 - Necessary treatment
- Animal Caretakers
 - Training
 - Defined responsibilities
- Annual Review with the Veterinarian of Record
 - Timely updates

Record Keeping, Protocol and Antibiotic Stewardship Templates

Please visit www.nationaldairyfarm.com for free record keeping and drug management record forms:

- Veterinarian-Client-Patient Relationship (VCPR) Form
- Recommended or Approved Drug List
- Sample Animal Treatment Plan
- Beginning Drug Inventory
- Record of Drug Purchases
- Daily Treatment Record
- Drug Disposal Record
- Considerations for Culling Poster
- Draft Herd Health Plan



Food Armor Foundation

The Food Armor Foundation is a non-profit 501(c)3 organization with a passionate team of food industry professionals ranging from producers and veterinarians to packers, processors and food marketers. The beginnings of the program go back to 2010 in Wisconsin where, through education and a grass-roots approach, Food Armor was able to reduce an unacceptably high incidence of tissue residues to near zero levels, while gaining respect across the veterinary community, maintaining a broad stakeholder perspective (including veterinarians) and building years of experience in translating guidelines into education. Food Armor strives to provide a solid educational foundation for every food animal veterinarian signing a VCPR for a farming operation and is working together with industry leaders to strengthen the meaning of the VCPR. Food Armor's online educational learning system is designed to provide every veterinarian with the knowledge and skills necessary to build a robust antimicrobial stewardship program, one farm at a time.


Drug Administration

Sites and Techniques

Injections should be given in the neck to prevent costly damage to economically important cuts of beef. This is particularly important when administering intramuscular (IM) products. It also makes it easier for packers to identify lesions at the plant level, so they do not inadvertently end up on a consumer's plate. To lessen injection site defects, the preferred site for all injections has now been reduced to the smaller injection area of the neck region (Fig. 2). In the 2016 National Beef Quality Audit injection site lesions found in the rounds of dairy animals had fallen to 15 percent, compared to 60 percent in 1998.

Several animal health products are now approved for injection into the ear of cattle. This location is excellent from a quality assurance perspective as ears are removed at harvest and do not enter the food chain. Certain antibiotics are approved for the ear injection site. The exact location on the ear depends on the product. However, the route approved for lactating dairy cows is the base of the ear. The ear must be very clean, and care must be taken to avoid blood vessels. Read product labels carefully. An example of the base of ear (BOE) injection technique can be found at: <https://www.zoetisus.com/products/beef/excede/dosing-administration.aspx>.

Types of Injections



- IM – Intramuscular (Administered in the muscle)**
- IMM – Intermammary (Administered in the udder and does not use needle)**
- IV – Intravenous (Administered in the vein)**
- SQ – Subcutaneous (Administered under the skin)**

Whenever possible, choose products formulated and labeled for injection under the skin (subcutaneous/SQ) rather than intramuscular (IM).

Figure 1: SQ Injection “Tent” Technique. The “tent” technique ensures that the product is truly being administered in the subcutaneous region.

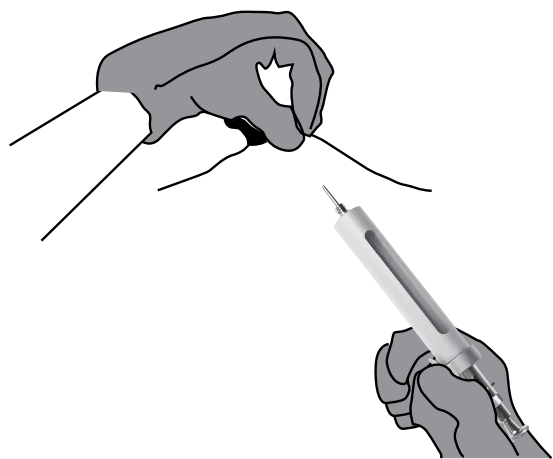
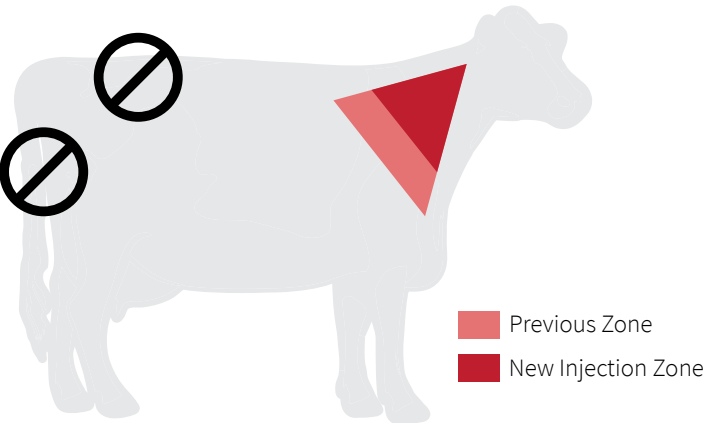


Figure 2: IM Injection Zone. To lessen injection site defects, the preferred injection site has been reduced to the smaller (dark red) injection area shown above — particularly with IM products. This has become necessary to ensure the quality of new value-added products from the chuck. Even in the absence of blemishes, case-ready packaging processes can cause discoloration of meat near an injection site.



INJECTABLE VISCOSITY	ROUTE OF ADMINISTRATION VIA NEEDLE								
	SQ (1/2 - 3/4" Needle)			IV (1 1/2" Needle)			IM (1-1 1/2" Needle)		
	Cattle Weight lbs.			Cattle Weight lbs.			Cattle Weight lbs.		
	<300	300 to 700	>700	<300	300 to 700	>700	<300	300 to 700	>700
	18 gauge	18-16 gauge	16 gauge	18-16 gauge	16 gauge	16-14 gauge	20-18 gauge	18-16 gauge	18-16 gauge
Thin (Example: Saline)									
Thick (Example: Tetracycline)	18-16 gauge	18-16 gauge	16 gauge	16 gauge	16-14 gauge	16-14 gauge	18 gauge	16 gauge	16 gauge
Select the needle to fit the cattle size (the smallest practical size without bending)									
Primary considerations in needle selection are:					Secondary considerations include:				
• Route of administration					• Viscosity of the fluid (how thick and tenacious the fluid is)				
• Size of the animal					• Volume injected				
• Location or site of the injection									



Drug Administration Best Practices

Cleaning Syringes and Needles

The use of disposable equipment is recommended and preferred. If reusable syringes, needles and other injection equipment are used, they should be heat-sterilized by boiling. If any disinfectants are used — including alcohol — they must be thoroughly rinsed from equipment because they neutralize vaccines and chemically react with some antibiotics.

Syringes should be thoroughly rinsed with sterile water before use. Sterile water can be purchased. Please note that distilled water is not sterile water. Consult your veterinarian before sterilizing equipment to ensure proper techniques. Improper sterilization can reduce the effectiveness of future injections and result in infection at the injection site. Do not contaminate modified live virus products with disinfectants as effectiveness will be decreased or even eliminated.

Needle Quality Control and Safety

Single-use needles are preferred to help prevent the spread of blood-borne diseases like

Leukosis. This virus is a leading cause of carcass condemnation in slaughter facilities. At a minimum, be sure to change needles at a maximum of every 10 head to prevent using a dull needle. Change needles immediately if the needle bends. Do not straighten it or use it again. Obtain a new needle if the needle in use becomes contaminated with feces or an irritating chemical.

A broken needle is an emergency and time is of the essence. Broken needles migrate in tissue. If not immediately handled, they will be impossible to find — requiring the animal to be destroyed. Under no circumstances should animals with broken needles be sold or sent to a packer. If necessary, contact your veterinarian to assist in determining how animals will be handled should a needle break in the neck muscle.

Needle Storage and Disposal

Store used needles in a protected area using these disposal guidelines:

- Place in puncture resistant container with secure lid
- Place container in rigid container lined with plastic
- Dispose of as solid waste

When treating animals with any product take the following precautions:

- Read both the product label and insert and consult your veterinarian before administering drugs.
- Be sure the injection site is clean and use a sterile needle for all injections.
- Use the labeled dosage and method of administration least likely to create a drug residue.
- Discard milk from all four quarters even when treating only one quarter with an IMM infusion.
- Milk treated cows last or use a segregated facility (divert milk from bulk tank or saleable milk).
- Thoroughly wash all equipment (inflations, hoses, weigh jars, etc.) that has come in contact with milk from treated cows.
- Make certain that any procedure used to divert milk from treated cows cannot accidentally send contaminated milk into the pipeline.
- Keep medicated feeds separated from non-medicated feeds.
- Ensure that calves fed antibiotic waste milk or medicated milk replacer are not sent to sale or slaughter until withdrawal times are met.
- Train employees on proper injection site selection.
- Clean transfer needles regularly to avoid contamination.
- Do not go back into the vaccine bottle with a needle once it has been used for anything else.
- When vaccinating groups, change needles frequently.
- When using killed vaccines, keep a saucer or sponge of alcohol or disinfectant nearby and wipe off the needle after each use. However, do not disinfect needles between injections when using a modified live vaccine, as the disinfectant can destroy the vaccine.
- Make sure the injection site is clean. Injecting into a wet or muddy site increases the risk for spreading disease and it increases the incidence of injection site lesions.

Drug Storage

It is in best practice to maintain complete control over the drug inventory on your dairy, limiting the access to drugs to authorized persons who are trained in proper drug use, and keep complete records of treatment.

Animal health products usually have specific storage requirements. All products should be stored in a clean place where they cannot become dirty or contaminated. Observe and obey the manufacturer's recommended storage instructions for each product. Where refrigeration is needed, be sure it is kept clean and located in a safe place — not likely to be overheated or contaminated by dirt or manure.

Animal health products should be stored away from feed ingredients or mixing areas unless regularly mixed feed additives. Storage of partially used medication or vaccine bottles is discouraged because they may become contaminated and could cause infections or tissue reactions if re-used. Please note, the **Grade "A" Pasteurized Milk Ordinance** requires that drugs intended for treatment of non-lactating dairy animals be segregated from those drugs used for lactating animals.

References

2017 Grade "A" Pasteurized Milk Ordinance
PMO - Drug Residue Testing and Farm Surveillance
<https://www.fda.gov/media/114169/download>

Culling of Animals

Culling animals should involve a decision-making process to ensure the animal is in appropriate health and condition to send to market including avoidance of residues. The risk of tissue residue violations should be minimized if treatment protocols and appropriate withdrawal times are carefully followed, and approved animal drugs are used for the class of animal being treated. If treatment records are well maintained and proper doses, routes and frequencies of administration are heeded, the risk of violative tissue residues will be minimized.

Culling Animals

Please keep the National Dairy FARM Top 11

Considerations for Culling in mind when culling animals:

1. Do not move non-ambulatory animals to market under any circumstances.
2. Make the decision to treat, to cull or to euthanize animals promptly. Sick and injured animals should be segregated from the herd.
3. Delay transport of an animal that appears to be exhausted or dehydrated until the animal is rested, fed and hydrated.
4. Milk all cows that are still lactating just prior to transporting to a packing plant or a processing facility.
5. Use a transportation company that is knowledgeable about your animal care expectations and provides for the safety and comfort of the animals during transport.
6. Do not transport animals to a packing or processing facility until all proper treatment withdrawal times have been followed.
7. Do not transport animals with a poor body condition, generally a Body Condition Score of less than 2 (1 - 5 scale)
8. Do not transport heifers or cows where calving is imminent and likely to occur during the transportation or marketing process.
9. Do not transport animals that require mechanical assistance to rise and walk, except to receive veterinary treatment. When using any handling device, abuse is never tolerated.
10. Do not transport animals with bone fractures of the limbs or injuries to the spine. Animals with a recent fracture unrelated to mobility should be culled and transported directly to a packing or processing facility.
11. Do not transport animals with conditions that will not pass pre-slaughter inspection at a packing or processing facility. If unsure, consult with your veterinarian before transporting an animal to a packing or processing facility.

Know Your Transporter

Residue issues associated with animals sent to slaughter might occur after the animal leaves the farm. Use a transportation company that is knowledgeable about your animal care expectations and provides for the safety and comfort of the animals during transport. Communicate with the hauler about where the animals are destined to go, especially when selling bull calves. If medicated milk replacers have been given, that animal should be withheld from sale, or the hauler should be clear that the animal has been treated and can affirm that the animal will not go to a terminal market. When not selling animals directly to a terminal market, sell your animals to intermediate owners who have instituted residue prevention programs consistent with those defined in this document. Be sure to document chain-of-custody as you may be held responsible for residues caused outside of your facility.



Beef Quality Assurance Transportation Program

BQA Transportation Quality Assurance plays a critical role in the health and welfare of cattle. The proper handling and transport of cattle can reduce illness in cattle, prevent bruises and improve the quality of the meat from these animals. By using best practices, transporters can save the beef industry millions of dollars each year. When transporters participate in the program they are showing consumers they are ready to take every step possible to keep cattle as healthy and safe as possible.

Veal and Bull Calves

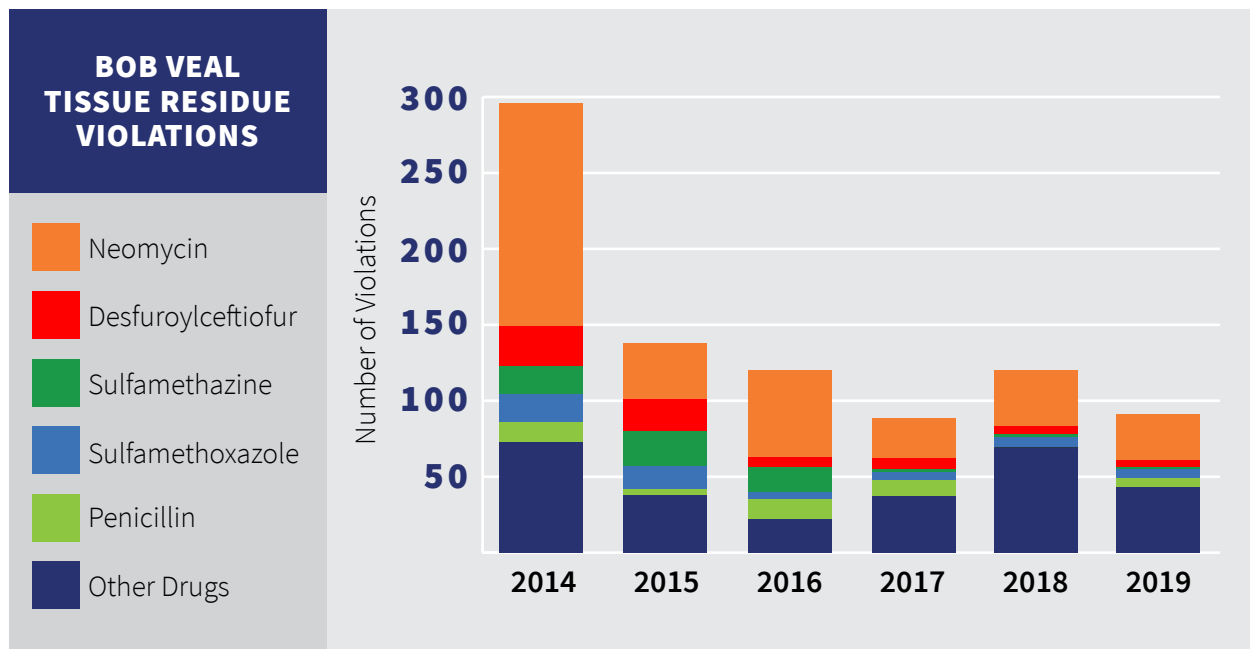
For veal producers or dairy bull calves that may be marketed soon, use only products that are approved in pre-ruminant calves. Avoid any products with the statement “not for use in calves to be processed for veal.”

Bob veal is the meat from young calves up to 150 pounds, typically marketed directly from a dairy farm. About 15 percent of all veal processed in the U.S. is bob veal. Bob veal is the second largest category of tissue residue violations in the U.S.



Veal Quality Assurance Program

The Veal Quality Assurance program is a collection of science-based best practices to ensure that veal calves receive quality care through every stage of life and are raised using production standards that result in a safe, wholesome, high quality product that meets regulatory and customer expectations. The success of all calves entering the veal market is highly dependent on early care at the dairy farm. The same principles of calf care used for dairy heifers should be applied to the care of bull calves, regardless if they are entering the beef or veal market. To learn more about the VQA program and access certification resources visit this website. <https://www.vealfarm.com/certification-resources>



after cull cows, representing 15 percent of all of the violations reported under the USDA FSIS inspector-generating sampling plan. USDA FSIS has reported a 70 percent decline in the number of tissue residues in bob veal since 2014. Feeding medicated milk replacer or milk from treated cows may be a source of antibiotic residues in bob veal.

Even if you're following all protocols to ensure calves taken from your dairy won't have any tissue residues, additional safety measures can be taken. There seems to be a tattered history of bull calves being misidentified at slaughter. Properly identifying animals that leave the dairy strengthens documentation in our food chain.

Every calf should have a durable form of identification (e.g., ear tag) and a written bull calf sales log on your dairy should be used to prevent errors. A written log should include the following information for each calf leaving your dairy:

- Identification
- Date of transaction
- Signature of calf hauler
- Intent of hauling each calf (is it going to a calf ranch or to slaughter?)

Make sure you or one of your employees are present when the calf hauler picks up market calves. This is a crucial practice that is easily adopted with today's modern technology. Also, consider collecting a receipt from the hauler. A receipt should include the following:

- Calf hauler business name
- Calf hauler license number
- Calf hauler's name
- Calves received on that day
- Identification of each calf

Carefully manage details of your market animals. Even the slightest misstep in dairy management could cause residue violations and potentially damage your dairy's reputation. Work with your veterinarian to help prevent residues in your young bull calves leaving your dairy.

References

"Prevent Residues in Market Bull Calves" written by Jessica Light, DVM, MA, Senior Veterinarian, Dairy Technical Services, Zoetis. <https://www.dairywellness.com/authors/jessica-light/2015/prevent-residues-in-market-bull-calves.aspx#close>

Residue Testing

Tolerance Limits

The regulatory tolerances for milk and tissue residues vary depending on the drug and whether the drug was found in milk, muscle (meat), liver or kidney. The withdrawal times are **only valid if a drug is used according to the label directions and in the class of animal listed on the label.**

If a drug is used in a class of animal **not** on the label, then there is **NO TOLERANCE** established for that drug and any trace amount, even if it is below the target testing/tolerance level established for the labeled class, is a violation.

Drugs not approved for use in lactating dairy cattle do not have FDA-established tolerances for residues in milk. Further, the tissue tolerances for drugs approved for beef cattle do not apply to lactating dairy cattle. Extra-label drug use in unapproved classes of animals is discouraged and if used, must be prescribed by a veterinarian. A complete list of the tolerances can be found in the **FDA Green Book**, which lists all approved animal drugs. If you have questions or concerns about potential residues or withdrawal times, please contact your herd veterinarian.

References

FDA Green Book, for tissue residue thresholds <http://www.fda.gov/AnimalVeterinary/Products/ApprovedAnimalDrugProducts/>

Malicious Contamination

Dairy producers should recognize and remember that drug residues in milk may occur because of intentional, malicious contamination. Ensure that medications and other potential contaminants are stored securely and monitor your farm for any suspicious activity.

Milk Drug Residue Testing

Pasteurized Milk Ordinance (PMO)

The Grade “A” Pasteurized Milk Ordinance (PMO), the rules that state regulatory agencies use to implement their Grade “A” milk programs, requires that all bulk milk tankers be sampled and analyzed for beta-lactam drug residues before the milk is processed. The PMO also requires states to test farm-level milk samples at least four times every six months for antibiotics (called Section 6 testing). Most states use an “inhibitor” test, which shows sensitivity to any antibiotic in milk. Additionally, customers (e.g., processors) may require additional testing for quality assurance purposes. **Any tanker found positive for any antibiotic residue is rejected for human consumption.**

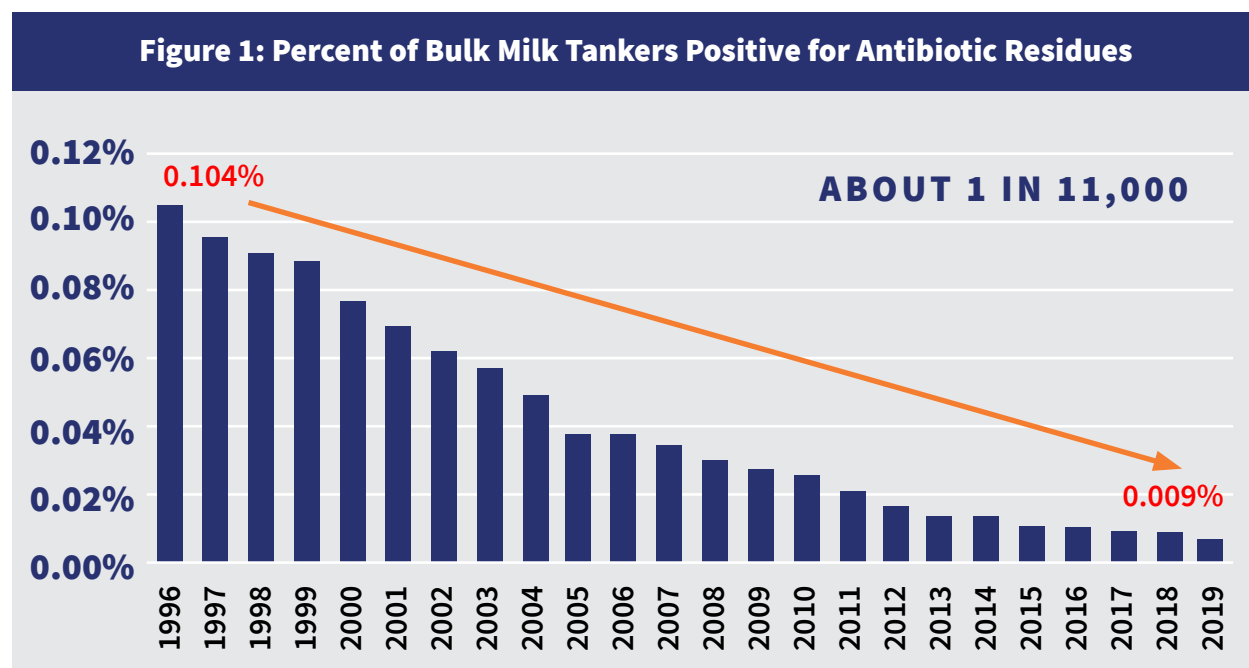
In 1996, of the 3,384,779 bulk milk pick-up tankers tested, 0.104 percent tested positive (<https://www.nmdrd.com/fy-96.pdf>). Through increased education and industry advancements, of the 3,572,766 bulk milk pick-up tankers tested by industry and state regulatory agencies from October 2018 to September 2019, 0.009 percent tested positive for drug residues. This signifies a dramatic decrease from an already low level of occurrence (<https://www.nmdrd.com/fy-19.pdf>). See Figure 1.

Multi-Drug Screening Test for Bulk Tank Milk

In 2010, the Food and Drug Administration developed a multi-class, multi-residue liquid chromatography/tandem mass spectrometry (LC-MS/MS) screening and confirmation method for drug residues in milk. The procedure is detailed in *FDA Laboratory Information Bulletin #4443*. The purpose of this method is to screen samples to determine if a residue is present at the level of interest (i.e., target testing/tolerance levels or established levels of detection) and also to confirm the identity of the compound. An exact quantitative determination of any residue is not addressed with this procedure and is obtained using other methodology. Milk cooperatives and dairy processors are not required to perform this test, but they may perform this test at times for additional knowledge about potential milk residues.

Tissue (Meat) Residue Testing

The United States Department of Agriculture Food Safety Inspection Service (USDA FSIS) conducts tests for chemicals – including antibiotics and other drugs, pesticides and environmental chemicals – in meat, poultry and egg products



This method tests for the following drugs:		
Ampicillin	Penicillin G	Cloxacillin
Cephapirin	Sulfamethazine	Sulfadiazine
Sulfadimethoxine	Sulfathiazole	Sulfaquinoxaline
Sulfapyridine	Sulfachloropyridazine	Sulfamerazine
Oxytetracycline	Tetracycline	Chlortetracycline
Doxycycline	Tylosin	Tilmicosin
Erythromycin	Sarafloxacin	Enrofloxacin
Ciprofloxacin	Flunixin	Bacitracin
Thiabendazole	Virginiamycin	Tripelennamine
Some testing laboratories have modified this method to include additional drugs.		

destined for human consumption. **USDA Food Safety and Inspection Service Annual Sampling Program Plan Fiscal Year 2020** tests for these chemicals through a random sampling of tissue from healthy-appearing food animals. The development of the plan by USDA FSIS includes:

- Determining the compounds are of food safety concern
- Using algorithms to rank the selected compounds
- Pairing these compounds with appropriate production classes
- Establishing the number of samples to be collected

The USDA FSIS Hazard Analysis and Critical Control Point (HACCP) program implemented at slaughter facilities identifies the animals most likely to have drug residues. Animals that display lameness, injection site lesions or signs of illness are targeted for testing. See the National Dairy FARM Top 11 Considerations for Culling, Page 14.

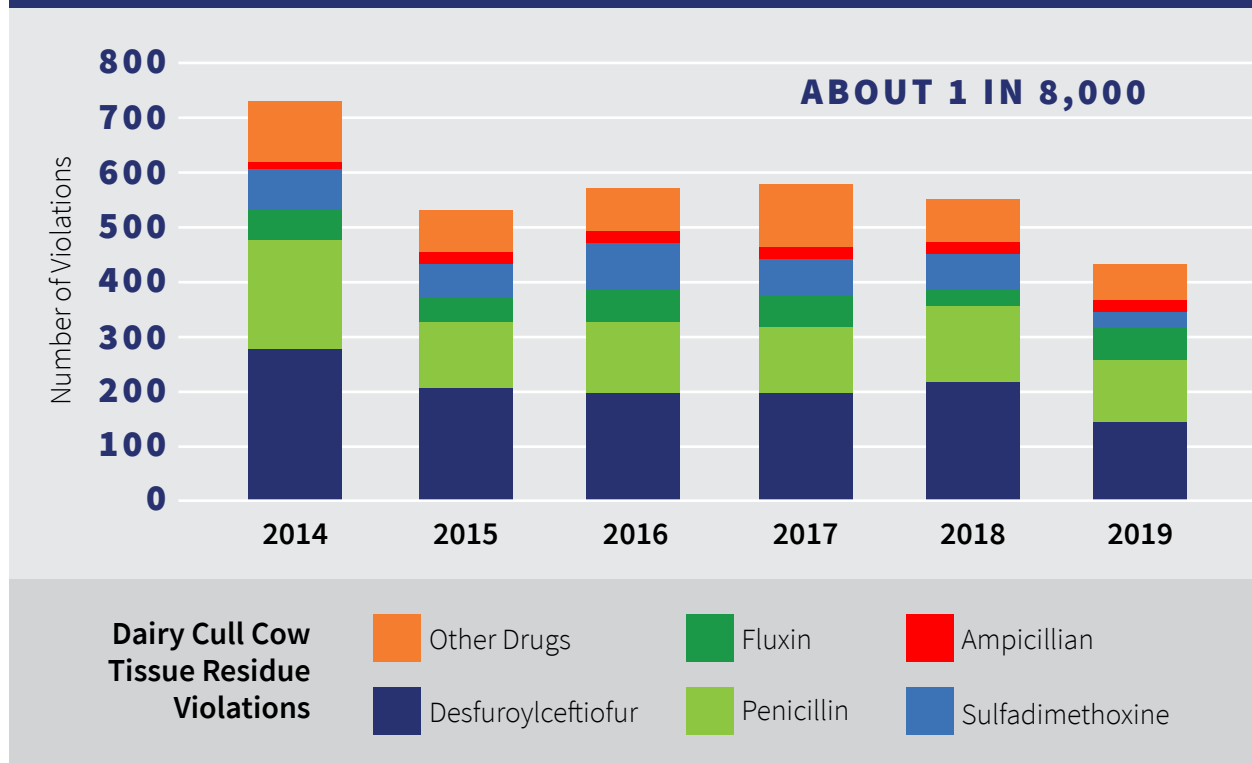
Factors that can contribute to higher risk of residues are found in Figure 2 on Page 20 and can be useful in assessing animals destined for slaughter. If there is any doubt about the potential for drug residues in an animal, it should be withheld from market. Each year, about 3.25 million adult dairy cows are slaughtered for beef. Of that amount, a very small percentage tests positive for a residue. USDA FSIS has reported a 45 percent decline in the number of tissue residues in market dairy cows since 2014, however, this represents 68 percent of all violations reported under the USDA FSIS inspector-generating sampling plan.

Conditions That Warrant Additional Testing at USDA Slaughter Facilities

The following list contains descriptions, directly from USDA documents, of conditions that may warrant testing of carcasses for drug residues:

Mastitis Signs of mastitis can vary based on the severity and duration of infection and may exhibit

Figure 2: USDA-FSIS Cull Cow Tissue Residues



varying degrees of clinical signs, from pus-like or discolored discharge from the teats and redness and swelling of the udder, to no visible change in the udder.

Metritis USDA inspectors will look for this postmortem indication. Be mindful of sending animals to slaughter that show signs of metritis such as high fever, major drops in milk production, or eye or nasal discharge.

Peritonitis and Surgery Signs of recent surgical procedures or findings of surgical devices (e.g., suture, toggles, fistula devices) are only significant if they are associated with active peritoneal or subcutaneous inflammation.

Injection Sites Live animals and carcasses with lesions or abscesses associated with injections on any part of the animal are of potential concern.

Other Disease Symptoms Any signs of the following diseases or conditions can lead to an animal being tested for potential chemical residues or to determine fitness for harvest: depression, an elevated or subnormal body temperature, hyperemic skin, congested mucous membranes, dehydration, or poor body condition in association with an injury or inflammatory condition, such as abscesses, arthritis, pneumonia, mastitis, metritis or diamond skin.

Signs of Treatment Indicated by leakage around jugular veins, subcutaneously, intramuscularly or intraperitoneally, or clinical signs indicative of treatment by mouth, such as discoloration from particles found in any part of the digestive tract, are important signs when examining veal calves for testing. Additionally, inspectors are aware of common industry practices that could indicate an animal was recently treated. Dairy cows arriving for slaughter with fetlock or ankle bands indicate that

the animal has previously received treatment for a medical condition. When observed, inspectors are instructed to determine the appropriateness of additional testing or removal from the food supply.

USDA FSIS Residue Repeat Violator Lists

The USDA FSIS maintains a “Residue Repeat Violator List for Use by FSIS Inspection Personnel” that contains the names and addresses of producers who have more than one meat residue violation in a 12-month period in animals presented for slaughter. Specific information about the violation can also be found in this list, including the plant where the violation was determined, the drug residues identified and their concentrations and tolerances. Violators listed may have had multiple violations documented in the same processing facility or in separate facilities. This list is intended to aid inspectors in discovering residue tolerance violations before they reach consumers. The USDA FSIS provides a [user guide](#) that explains the information contained in the list.

The USDA FSIS also maintains a “Residue Repeat Violator List for Use by Livestock Markets and Establishments” that contains similar information intended to assist plant owners and operators in identifying residue history of livestock suppliers. This list documents only the source name and address information of repeat violators, so that livestock marketers and buyers may use precaution when marketing and processing animals from listed suppliers. The USDA FSIS provides a [user guide](#) that explains the information contained in the list.

References

FSIS Residue Repeat Violator Lists
<https://www.fsis.usda.gov/wps/portal/fsis/topics/data-collection-and-reports/chemistry/residue-chemistry>

07

Drug Classes

CLASSES OF ANIMAL DRUGS		
Over-the Counter (OTC)	Prescription (Rx)	Veterinary Feed Directive (VFD)
Can be sold by any person or establishment without a veterinary prescription	Can only be sold to the producer by a veterinarian or pharmacist	A drug intended for use in or on feed, which is limited by an approved application to use under the professional supervision of a licensed veterinarian

Antibiotics Administered Through Feed or Water

In 2015, the FDA finalized the Veterinary Feed Directive (VFD), which mandates the rules and responsibilities of licensed veterinarians in prescribing and administering medically important antibiotics in feed. A licensed veterinarian must have an established Veterinarian-Client-Patient Relationship to prescribe a VFD drug. The final VFD rules also prohibit any “extra-label drug use” so a VFD prescription must conform exactly to the drug manufacturer’s label indications, including the specific disease or condition being treated. At the same time, FDA made all medically important antibiotics administered through water as prescription only.

There are no legal extra-label uses of VFD drugs.

There are no VFD drugs approved for use in lactating dairy cattle.

Medically important antibiotics subject to the VFD when administered in feed or requiring prescription if administered through water:

- Aminoglycosides
- Lincosamides
- Macrolides
- Penicillins
- Streptogramins
- Sulfonamides
- Tetracyclines

Ionophores, like monensin, are not affected by the guidance since they have no human medical relevance. Thus, the actions have no effect on the use of ionophore additives in lactating and dry cows or as coccidiostats in growing heifers.

References

CVM GFI #152 Evaluating the Safety of Antimicrobial New Animal Drugs with Regard to Their Microbiological Effects on Bacteria of Human Health Concern FDA Guidance for Industry #152

Drugs Not Approved for Use in Food-Producing Animals

The following drugs are **not approved for use in any species of food-producing animal**:

- Chloramphenicol
- Clenbuterol
- Diethylstilbestrol (DES)
- Dipyrone
- Gentian violet
- Glycopeptides (example vancomycin)
- Nitrofurans (including topical use)
- Nitroimidazoles (including metronidazole)

Following a thorough literature review, the American Veterinary Medical Association (AVMA), the American Association of Bovine Practitioners (AABP) and the Academy of Veterinary Consultants (AVC) recommend that veterinarians

refrain from using aminoglycosides (Amikacin, Gentamicin, Kanamycin and Neomycin) in cattle except where approved for use by the Food and Drug Administration, as these antibiotics can cause very prolonged tissue residues.

Extra Label Drug Use

“Federal law restricts this drug to use by or on the order of a licensed veterinarian.”

This statement is on every prescription drug sold. Any use of a drug not specifically listed on the label is called “extra-label drug use” and is regulated by the FDA under the Animal Medicinal Drug Use Clarification Act (AMDUCA) of 1994. Using a prescription or over-the-counter drug in an extra-label manner is illegal unless it is specifically prescribed with withdrawal times by a veterinarian working in the context of a Veterinarian-Client-Patient Relationship (VCPR). A veterinarian must always use drugs approved in the class of animal to which the drug is being administered as a first line of therapy.

Any extra-label use of drugs must be used as a prescription and must include the written instructions for the specific lifecycle of animals to be treated, including dose, route of administration, frequency of use and withdrawal times for milk and/or meat. Extra-label use will generally require an extended withdrawal time. List of animal drugs prohibited for use in food animals including extra-label use can be found on Page 25.

Examples of extra-label drug use:

- Changing the dose, such as giving more penicillin than is listed on the label.
- Changing the route of administration, such as giving flunixin intramuscularly (IM) or subcutaneously (SQ) instead of intravenously (IV).
- Giving a drug to a different production class of animal, such as using Nuflor® in a lactating dairy cow.
- Giving a drug for an indication (disease) not listed on the label, such as using Excede® for diarrhea.

- Changing the withholding times, such as not following milk withholding times for fresh cows after dry treatment administration.
- Changing the amount of drug per injection site.
- Changing the duration of therapy.

Potential Residue Violations will likely occur from Extra-Label Drug Use when:

- ANY detectable level above zero (0) for a drug not approved for lactating dairy cattle.
- Current on-farm or bulk tank milk at a processing facility tests cannot detect levels low enough to assure the absence of residues.
- Animals that are sick or compromised may metabolize drugs at a slower rate than healthy animals, which may result in a significantly extended withdrawal time for both meat and milk.
- The labeled withdrawal times do not apply to an unapproved production class. While FARAD (see Page 6) can provide withdrawal

Euthanasia Decision Making and Considerations

Actions involving compromised cattle include treatment, slaughter or euthanasia. The following criteria should be considered when making a decision:

- **Pain and distress of animal**
- **Likelihood of recovery**
- **Ability to get to feed and water**
- **Drug withdrawal time**
- **Economic considerations**
- **Condemnation potential**
- **Diagnostic information**

Indications for Euthanasia

The following conditions or situations may lead to an animal being compromised to such an extent that euthanasia is indicated:

- **Fracture, trauma or disease of the limbs, hips or spine resulting in immobility or inability to stand**
- **Loss of production and quality of life (advanced age, severe mastitis, etc.)**
- **Disease conditions for which no effective treatment is known (i.e. Johne's disease, lymphoma)**
- **Diseases that involve a significant threat to human health (i.e. rabies)**
- **Advanced ocular neoplastic conditions ("cancer eye")**
- **Disease conditions that produce a level of pain and distress that cannot be managed adequately**
- **Emaciation and/or debilitation from disease, age or injury that result in an animal being too compromised to be transported or marketed**
- **Disease conditions for which treatment is cost prohibitive**
- **Extended drug withdrawal time for clearance of tissue residue**
- **Poor prognosis or prolonged expected recovery**

recommendations for ELDU, they generally do not have enough information to project a “zero detectable level,” particularly with the sensitivity of current testing methodologies. Veterinarians and cattle producers should exercise extreme caution using drugs not approved for that production class of animal and consider avoiding such use due to unknown withdrawal times.

Drugs Prohibited From Extra-Label Use in Animals (21 CFR Sec. 530.41)⁵

21 CFR Section 530.41(a):

The following drugs, families of drugs and substances are prohibited for extra-label animal drug uses in food-producing animals.

- Chloramphenicol
- Clenbuterol
- Diethylstilbestrol (DES)
- Dimetridazole
- Iprnidazole
- Other nitroimidazoles
- Furazolidone
- Nitrofurazone
- Sulfonamide drugs in lactating dairy cattle (except approved use of sulfadimethoxine, sulfabromomethazine and sulfaethoxypyridazine)
- Fluoroquinolones (examples: ciprofloxacin, enrofloxacin)
- Glycopeptides
- Phenylbutazone in female dairy cattle 20 months of age or older
- Cephalosporins (not including cephalixin) in cattle, swine, chickens or turkeys:
 - For disease prevention purposes;
 - At unapproved doses, frequencies, durations or routes of administration; or
 - If the drug is not approved for that species and production class.

The list table is subject to change. Consult the current version of 21 CFR Sec. 530.41 for the most up-to-date list.

Conditions That Will Not Pass Pre-slaughter Inspection

Dairy producers should not transport animals with conditions that are unlikely to pass pre-slaughter inspection.

These conditions include, but are not limited to:

- Cancer eye
- Blindness in both eyes
- Fever greater than 103°F
- Drug residues
- Peritonitis
- Fractures or lameness (3 on the NDFP scale)
- Unreduced prolapses
- Cows that are calving or have a high likelihood of calving during transport
- Distended udders causing pain and ambulatory issues
- Suspected central nervous system symptoms
- Visible open wounds

References

5. Code of Federal Regulations. 21CFR 530.41. Food and Drug Administration. April 1, 2018. <https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/cfrsearch.cfm?fr=530.41>

Cephalosporin Extra-Label Use Prohibitions

Cephalosporins Examples

Cephapirin
(Tomorrow Infusion, Today®)

Ceftiofur
(EXCEDE®, EXCENEL® RTU
EZ, Naxcel® Sterile Powder,
SPECTRAMAST™ DC,
SPECTRAMAST™ LC)

The U.S. Food and Drug Administration Order of Prohibition of Cephalosporins became effective in 2012. The FDA order prohibits certain “extra-label” or unapproved uses of the cephalosporin (excluding cephapirin) class of antimicrobial drugs in cattle, swine, chickens and turkeys.

Prohibited uses in dairy animals include:

- Using cephalosporin drugs at unapproved dose levels, frequencies, durations or routes of administration
- Using cephalosporin drugs in cattle that are not approved for use in that species (e.g., cephalosporin drugs intended for humans, companion animals or a different species or class of food animal)
- Using cephalosporin drugs for disease prevention

Exceptions to the prohibition:

- Extra-label use of approved cephapirin products in food-producing animals
- Use to treat or control an extra-label disease indication, as long as this use adheres to a labeled dosage regimen (i.e., dose, route, frequency and duration of administration) approved for that particular species and production class
- Extra-label use in food-producing minor species, such as sheep, goats, ducks or rabbits
- **Cephapirin** drug products are excluded from the prohibition order. Cephapirin is currently only approved for use in food-producing animals as an intramammary infusion formulation for dairy cattle and there are currently no approved cephapirin drug products approved for use in humans. All cephapirin given to dairy animals must be used for specific disease indications according to label recommendations and withdrawal periods. In dairy animals, cephalosporins can be used in an extra-label manner only for disease indication and only under the recommendation of a veterinarian for which the farm has a current VCPR. Any use of cephapirin in a manner not listed on the label without a VCPR is illegal.

Approved Drugs and Screening Tests

NMPF does not endorse any of the veterinary drugs or tests identified on the lists in this manual. The lists of veterinary drugs and tests are provided only to inform producers what products may be available. The producer is responsible for determining whether to use any of the veterinary drugs or tests. All information regarding the veterinary drugs or tests was obtained from the products' manufacturers or sponsors, and NMPF has made no further attempt to validate or corroborate any of that information. NMPF urges producers to consult with their veterinarians before using any veterinary drug or test, including any of the products identified on the lists in this manual. Data provided by the manufacturer or marketer is current as of January 2019. Veterinarians needing extra-label information should consult the FDA Green Book or contact the Food Animal Residue Avoidance Databank (FARAD) at 888-873-2723 or www.FARAD.org.

FDA-Approved Drugs for Injectable Use

Non-Lactating Cattle**

Active Ingredient	Drug Type	Meat Withholding Time	Product Name	Manufacturer/Marketer
Ampicillin trihydrate	Rx	6 days	Polyflex®	Boehringer Ingelheim Vetmedica, Inc.
Ceftiofur crystalline free acid	Rx	13 days	EXCEDE®	Zoetis, Inc.
Ceftiofur hydrochloride	Rx	4 days	EXCENEL® RTU EZ	Zoetis, Inc.
Ceftiofur sodium	Rx	4 days	Naxcel® Sterile Powder	Zoetis, Inc.
Cloprostenol injection	Rx	None	Estrumate®	Merck Animal Health
Dinoprost tromethamine	Rx	None	Lutalyse® Sterile Solution	Zoetis, Inc.
	Rx	None	Prostamate®	Bayer HealthCare LLC, Animal Health
Doramectin	OTC	35 days	Dectomax® Injectable	Zoetis, Inc.
Enrofloxacin	Rx	28 Days	Baytril® 100	Bayer HealthCare LLC, Animal Health
	Rx	28 Days	Enroflox® 100	MWI Veterinary Supply
Erythromycin	Rx	21 days	Gallimycin-100	Bimeda, Inc.
Florfenicol	Rx	28 or 33 days## (See label)	Norfenicol®	MWI Veterinary Supply
	Rx	28 or 38 days## (See label)	Nuflor® Injectable Solution	Merck Animal Health
Florfenicol and Flunixin meglumine	Rx	38 days	Resflor Gold®	Merck Animal Health
Flunixin meglumine	Rx	4 days	Banamine®	Merck Animal Health
	Rx	4 days	Flunazine	Bimeda, Inc.
	Rx	4 days	Flunixin Injection	Norbrook Laboratories, Ltd.
	Rx	4 days	Flu-Nix	Agri Laboratories, Ltd.
	Rx	4 days	Prevail	MWI Veterinary Supply
	Rx	4 days	VetaMeg™	Aspen Veterinary Resources
Gamithromycin	Rx	35 days	Zactran	Meril, Inc.
Gonadorelin diacetate tetrahydrate	Rx	None	Cystorelin	Meril, Inc.
	Rx	None	Fertagyl®	Merck Animal Health
	Rx	None	OvaCyst®	Bayer HealthCare LLC, Animal Health
Gonadorelin hydrochloride	Rx	None	Factrel®	Zoetis, Inc.
Gonadotropin (chorionic)	Rx	None	Chorulon®	Merck Animal Health
Isoflupredone acetate	Rx	7 days	Predef® 2x	Zoetis, Inc.
Ivermectin*	OTC	35 days	Agrimectin 1% Injectable	Agri Laboratories, Ltd.
	OTC	35 days	Ivermax®	Aspen Veterinary Resources
	OTC	35 days	IVOMEC 1% Injection for Cattle	Meril, Inc.
	OTC	35 days	Noromectin® Injection for Cattle and Swine	Norbrook Laboratories, Ltd.
	OTC	35 days	Vetrimect™ 1%	MWI Veterinary Supply

** The term non-lactating cattle is defined as dairy bulls, dairy calves, and replacement heifers. Read label indications carefully. Some products are not approved for non-ruminating calves and female dairy cattle 20 months of age and older. Some products cannot be used with veal calves. Carefully consult the labels.

Withholding times depend upon labeled dosage used.

* Ivermectin is not approved for female dairy cattle of breeding age.

FDA-Approved Drugs for Injectable Use

Non-Lactating Cattle** (continued)

Active Ingredient	Drug Type	Meat Withholding Time	Product Name	Manufacturer/Marketer
Ivermectin/Clorsulon*	OTC	49 days	Agrimectin plus Clorsulon	Agri Laboratories, Ltd.
	OTC	21 days	Ivermax® Plus	Aspen Veterinary Resources
	OTC	49 days	IVOMEC Plus Injection for Cattle	Merial, Inc.
	OTC	21 days	Noromectin® Plus Injection	Norbrook Laboratories, Ltd.
	OTC	35 days	Vetrimect™ Plus	MWI Veterinary Supply
Oxytetracycline	Rx	28 days	300 PRO® LA	Norbrook Laboratories, Ltd.
	OTC	28 days	Agrimycin 200	Agri Laboratories, Ltd.
	Rx	28 days	Bio-Mycin® 200	Boehringer Ingelheim Vetmedica, Inc.
	OTC	28 days	Duramycin 72-200	Durvet, Inc.
	Rx	28 days	Liquamycin® LA200-®	Zoetis, Inc.
	OTC	28 days	Noromycin® 300 LA	Norbrook Laboratories, Ltd.
	OTC	28 days	Oxytetracycline Injection 200	Norbrook Laboratories, Ltd.
	OTC	28 days	Terra-Vet™ 200 Injection	Aspen Veterinary Resources
	Rx	28 days	Tetroxy LA	Bimeda, Inc.
	Rx	28 days	Tetroxy LA	Bimeda, Inc.
	OTC	28 days	Vetrimycin™ 200	MWI Veterinary Supply
Oxytetracycline hydrochloride	Rx	18 days	Bio-Mycin® C	Boehringer Ingelheim Vetmedica, Inc.
	OTC	22 days	Duramycin-100	Durvet, Inc.
	OTC	18 days	Oxy-Tet™ 100	Boehringer Ingelheim Vetmedica, Inc.
	OTC	22 days	Oxytet 100	Norbrook Laboratories, Ltd.
	OTC	22 days	Terra-Vet™ 100	Aspen Veterinary Resources
	OTC	22 days	Vetrimycin™ 100	MWI Veterinary Supply
Pegbovigrastim injection	Rx	None	Imrestor™	Elanco Animal Health
Penicillin G (benzathine)	OTC	30 days	Combi-Pen™-48	Bimeda, Inc.
Penicillin G (procaine)	OTC	14 days	Agricillin®	Agri Laboratories, Ltd.
	OTC	14 days	Bactracillin G®	Aspen Veterinary Resources
	OTC	14 days	Norocillin	Norbrook Laboratories, Ltd.
	OTC	14 days	Penicillin Injectable	Durvet, Inc.
	OTC	14 days	PenOne Pro™	MWI Veterinary Supply
	OTC	4 days	Pro-Pen-G™ Injection	Bimeda, Inc.
Selenium (sodium selenite)	Rx	30 days	BO-SE®	Merck Animal Health
Sulfachlorpyridazine (sodium)	OTC	5 days	Vetisulid Injection	Boehringer Ingelheim Vetmedica, Inc.
Sulfadimethoxine	Rx	5 days	Di-Methox Injection 40%	Agri Laboratories, Ltd.

** The term non-lactating cattle is defined as dairy bulls, dairy calves, and replacement heifers. Read label indications carefully. Some products are not approved for non-ruminating calves and female dairy cattle 20 months of age and older. Some products cannot be used with veal calves. Carefully consult the labels.

* Do not use within 4 weeks (28 days) of calving.

FDA-Approved Drugs for Injectable Use

Non-Lactating Cattle** (continued)

Active Ingredient	Drug Type	Meat Withholding Time	Product Name	Manufacturer/Marketer
Tilidipirosin	Rx	21 days	Zuprevo 18%®	Merck Animal Health
Tilmicosin phosphate*	Rx	42 days	Micotil Injection	Elanco Animal Health
Tripelennamine HCL	Rx	4 days	Recovr Injectable	Kinetic Technologies
Tulathromycin	Rx	22 days	DRAXXIN 25™	Zoetis, Inc.
Tulathromycin	Rx	18 days	DRAXXIN™	Zoetis, Inc.
Tylosin	OTC	21 days	Tylan Injection 50/200	Elanco Animal Health
	OTC	21 days	Tylosin Injection	Boehringer Ingelheim Vetmedica, Inc.
Vitamin E	Rx	30 days	BO-SE®	Merck Animal Health
	OTC	None	Vitamin E 300	Agri Laboratories, Ltd.

FDA-Approved Drugs for Intramammary Use

Non-Lactating Cattle**

Active Ingredient	Drug Type	Milk Withholding Time	Meat Withholding Time	Product Name	Manufacturer/Marketer
Ceftiofur hydrochloride	Rx	None*	16 days	SPECTRAMAST™ DC	Zoetis, Inc.
Cephapirin (benzathine)	OTC	72 hours	42 days	Tomorrow Infusion	Boehringer Ingelheim Vetmedica, Inc.
Cloxacillin (benzathine)	Rx	None	30 days	Dry-Clox®	Boehringer Ingelheim Vetmedica, Inc.
	Rx	None*	28 days	Orbenin-DC®	Merck Animal Health
Penicillin G (procaine)	OTC	72 hours post-calving	14 days	Hanford's/US Vet go-dry™	G.C. Hanford Mfg. Co.
Penicillin G (procaine) / dihydrostreptomycin	Rx	96 hours post-calving	60 days	Quartermaster® Dry Cow	Treatment West Agro Inc.
Penicillin G (procaine) / Novobiocin	OTC	72 hours post-calving	30 days	AlbaDry® Plus Suspension	Zoetis, Inc.

FDA-Approved Drugs for Oral Use

Non-Lactating Cattle**

Active Ingredient	Drug Type	Meat Withholding Time	Product Name	Manufacturer/Marketer
Albendazole	OTC	27 days	Valbazen® Suspension	Zoetis, Inc.
Amprolium	OTC	1 day	CORID 20% Powder	Merial, Inc.
	OTC	1 day	CORID 9.6% Oral Solution	Merial, Inc.
Chlortetracycline hydrochloride	Rx	1 day	Chlortetracycline Soluble Powder Concentrate	Boehringer Ingelheim Vetmedica, Inc.
	Rx	1 day	Pennchlor 64 Soluble Powder	Pharmgate Animal Health LLC
Citric acid	OTC	None	Re-Sorb® Powder	Zoetis, Inc.
Decoquinat	OTC	None	Deccox-M	Zoetis, Inc.
Dextrose	OTC	None	Re-Sorb® Powder	Zoetis, Inc.
Fenbendazole	Rx	8 days	Panacur 10% Suspension	Merck Animal Health
	OTC	8 days	Safe-Guard 10% Paste	Merck Animal Health
	OTC	8 days	Safe-Guard 10% Suspension	Merck Animal Health
Glycine	OTC	None	Re-Sorb® Powder	Zoetis, Inc.
Lasalocid	OTC	None	Crystalx® Iono-Lyx® B300	Ridley Block Operations
Levamisole hydrochloride	OTC	2 days	Prohibit Soluble Drench Powder	Agri Laboratories, Ltd.
Monensin (sodium)	OTC	None	Rumensin 90	Elanco Animal Health
Neomycin sulfate	Rx	1 day	Biosol® Liquid	Zoetis, Inc.
	Rx	1 day	Neo-Sol 50	Zoetis, Inc.
	Rx	1 day	NeoMed 325 Soluble Powder	Bimeda, Inc.
	Rx	1 day	Neomix® 325	Zoetis, Inc.
	Rx	1 day	Neomix® Ag 325	Zoetis, Inc.
Oxfendazole	OTC	7 days	Synanthic® Bovine Dewormer Suspensions, 22.5 % and 9.06%	Boehringer Ingelheim Vetmedica, Inc.
Oxytetracycline dihydrate	Rx	5 days	Pennox 343 Soluble Powder	Pharmgate Animal Health LLC
Oxytetracycline hydrochloride	Rx	None	Oxy 500 Calf Bolus and Oxy 1000 Calf Bolus	Boehringer Ingelheim Vetmedica, Inc.
	Rx	5 days	Terramycin® 343 Soluble Powder	Zoetis, Inc.
	Rx	7 days	Terramycin® Scours Tablets	Zoetis, Inc.
	Rx	5 days	Terramycin® Soluble Powder	Zoetis, Inc.
Potassium citrate	OTC	None	Re-Sorb® Powder	Zoetis, Inc.
Potassium dihydrogen phosphate	OTC	None	Re-Sorb® Powder	Zoetis, Inc.
Sodium chloride	OTC	None	Re-Sorb® Powder	Zoetis, Inc.
Streptomycin sulfate	OTC	2 days	Strep Sol 25%	Huvepharma
Sulfachlorpyridazine (sodium)	Rx	7 days	Vetisulid® Powder	Boehringer Ingelheim Vetmedica, Inc.
Sulfadimethoxine	Rx	7 days	Albon® Concentrated Solution %12.5	Zoetis, Inc.
	Rx	12 days	Albon® S.R. (Sustained Release Bolus)	Zoetis, Inc.
	Rx	7 days	Di-Methox 12.5% Oral Solution	Agri Laboratories, Ltd.
	Rx	7 days	Di-Methox Soluble Powder	Agri Laboratories, Ltd.
	Rx	7 days	SulfaMed-G	Bimeda, Inc.
Sulfamethazine	Rx	10 days	Sulmet® Oblets	Boehringer Ingelheim Vetmedica, Inc.
	Rx	12 days	Sustain III - Calf	Bimeda, Inc.
	Rx	12 days	Sustain III - Cattle	Bimeda, Inc.

FDA-Approved Drugs for Oral Use

Non-Lactating Cattle** (continued)

Active Ingredient	Drug Type	Meat Withholding Time	Product Name	Manufacturer/Marketer
Sulfamethazine (sodium)	Rx	10 days	SMZ-Med	Bimeda, Inc.
	Rx	10 days	Sulmet® Drinking Water Solution	Boehringer Ingelheim Vetmedica, Inc.
	Rx	10 days	Sulmet® Soluble Powder	Boehringer Ingelheim Vetmedica, Inc.
Sulfaquinoxaline (sodium)	Rx	10 days	Liquid Sul-Q-Nox	Boehringer Ingelheim Vetmedica, Inc.
Tetracycline hydrochloride	Rx	4 days	Polyotic® Soluble Powder	Boehringer Ingelheim Vetmedica, Inc.
	Rx	7 days	Polyotic® Soluble Powder Concentrate	Zoetis, Inc.
	Rx	5 days	Tet-Sol 10	Zoetis, Inc.
	Rx	5 days	Tet-Sol 324	Zoetis, Inc.
	Rx	5 days	Tetra-Bac 324	Agri Laboratories, Ltd.
	Rx	5 days	TetraMed 324 HCA	Bimeda, Inc.

** The term non-lactating cattle is defined as dairy bulls, dairy calves, and replacement heifers. Read label indications carefully. Some products are not approved for non-ruminating calves and female dairy cattle 20 months of age and older. Some products cannot be used with veal calves. Carefully consult the labels.

FDA-Approved Drugs for Topical Use

Non-Lactating Cattle**

Active Ingredient	Drug Type	Meat Withholding Time	Product Name	Manufacturer/Marketer
Doramectin	OTC	45 days	Dectomax® Pour-On	Zoetis, Inc.
Eprinomectin	OTC	None	EPRINEX Pour-On for Beef and Dairy Cattle	Merial, Inc.
	OTC	None	Eprizero™ Pour-On for Beef and Dairy Cattle	Norbrook Laboratories, Ltd.
Ivermectin*	OTC	48 days	Agri-Mectin® Pour-On	Agri Laboratories, Ltd.
	OTC	48 days	Ivermax® Pour-On	Aspen Veterinary Resources
	OTC	48 days	Ivermectin Pour-On	Durvet, Inc.
	OTC	48 days	IVOMEC (Ivermectin) Pour-On	Merial, Inc.
	OTC	48 days	Noromectin® Pour-On	Norbrook Laboratories, Ltd.
	OTC	48 days	Vetrimect™ Pour-On	MWI Veterinary Supply
Moxidectin	OTC	None	Cydetin® (moxidectin) %0.5 Pour-On for Cattle	Boehringer Ingelheim Vetmedica, Inc.
Oxytetracycline hydrochloride / Polymyxin B sulfate	Rx	None	Terramycin® Ophthalmic Ointment with Polymyxin	Zoetis, Inc.

** The term non-lactating cattle is defined as dairy bulls, dairy calves, and replacement heifers. Read label indications carefully. Some products are not approved for non-ruminating calves and female dairy cattle 20 months of age and older. Some products cannot be used with veal calves. Carefully consult the labels.

* Not for use in female dairy cattle 20 months of age or older.

FDA-Approved Drugs for Feed Additive Use

Non-Lactating Cattle**

Active Ingredient	Drug Type	Meat Withholding Time	Product Name	Manufacturer/Marketer
Amprolium	OTC	24 hours	Corid 1.25% Type C	Merial, Inc.
	OTC	24 hours	Corid 2.5% Type B	Merial, Inc.
	OTC	24 hours	Corid 25% Type A	Merial, Inc.
Bacitracin zinc	OTC	None	Baciferm	Zoetis, Inc.
Chlortetracycline	VFD	None	Aureomycin G	Zoetis, Inc.
	VFD	1 day	ChlorMax 50	Zoetis, Inc.
Chlortetracycline calcium	VFD	None	Pennchlor™	Pharmgate Animal Health LLC
Chlortetracycline hydrochloride	VFD	0-10 days**	CLTC 100 MR	Phibro Animal Health
	VFD	0-10 days**	Pennchlor™ 100-MR	Pharmgate Animal Health LLC
Decoquinat	OTC	None	Deccox	Zoetis, Inc.
Fenbendazole	OTC	13 days	Safe-Guard 0.5% Top Dress Pellets	Merck Animal Health
	OTC	13 days	Safe-Guard 1.96% Free-Choice Mineral	Merck Animal Health
	OTC	13 days	Safe-Guard 20% Salt Free-Choice Mineral	Merck Animal Health
	OTC	11 days	Safe-Guard En-Pro-Al	Molasses Blade
Lasalocid	OTC	None	Bovatec Premix***	Zoetis, Inc.
Monensin (sodium)	OTC	None	Rumensin 90	Elanco Animal Health
Morantel tartrate	OTC	14 days	Rumatel® 88	Phibro Animal Health
Neomycin sulfate	VFD	1 day	Neomix Ag® 325 Medicated Premix	Zoetis, Inc.
	VFD	1 day	Neomix® 325 Medicated Premix	Zoetis, Inc.
Neomycin-oxytetracycline	VFD	0-30 days**	Neo-Oxy 100/100	Pharmgate Animal Health LLC
	VFD	0-30 days**	Neo-Oxy 100/50	Pharmgate Animal Health LLC
	VFD	30 days	Neo-Oxy 100/50 MR	Pharmgate Animal Health LLC
	VFD	0-30 days**	Neo-Oxy 50/50	Pharmgate Animal Health LLC
	VFD	0-5 days**	Neo-Terramycin® 100/100	Phibro Animal Health
	VFD	0-5 days**	Neo-Terramycin® 100/100D	Phibro Animal Health
	VFD	0-5 days**	Neo-Terramycin® 50/50	Phibro Animal Health
	VFD	0-5 days**	Neo-Terramycin® 50/50D	Phibro Animal Health
Oxytetracycline (quaternary salt)	VFD	0-5 days**	Pennox™	Pharmgate Animal Health LLC
Oxytetracycline dihydrate	VFD	None	Terramycin® 100	Phibro Animal Health
	VFD	None	Terramycin® 100MR	Phibro Animal Health
	VFD	None	Terramycin® 200	Phibro Animal Health
	VFD	None	Terramycin® 50	Phibro Animal Health
Oxytetracycline hydrochloride	OTC	0-5 days**	Pennox™ 100-MR	Pharmgate Animal Health LLC
Poloxalene	OTC	None	Bloat Guard® Liquid Type A Medicated Article	Phibro Animal Health
	OTC	None	Bloat Guard® Medicated Top Dressing	Phibro Animal Health
	OTC	None	Bloat Guard® Type A Medicated Article	Phibro Animal Health
Virginiamycin	VFD	None	V-Max™	Phibro Animal Health
	VFD	None	V-Max™ M	Phibro Animal Health

★★ The term non-lactating cattle is defined as dairy bulls, dairy calves, and replacement heifers. Read label indications carefully. Some products are not approved for non-ruminating calves and female dairy cattle 20 months of age and older. Some products cannot be used with veal calves. Carefully consult the labels.

Withholding times depend upon labeled dosage used.

* Ivermectin is not approved for female dairy cattle of breeding age.

FDA-Approved Drugs for Injectable Use

Lactating Cows

Active Ingredient	Drug Type	Milk Withholding Time	Meat Withholding Time	Product Name	Manufacturer/Marketer
Ampicillin trihydrate	Rx	48 hours	6 days	Polyflex®	Boehringer Ingelheim Vetmedica, Inc.
Ceftiofur crystalline-free acid	Rx	None	13 days	EXCEDE®	Zoetis, Inc.
Ceftiofur hydrochloride	Rx	None	4 days	EXCENEL® RTU EZ	Zoetis, Inc.
Ceftiofur sodium	Rx	None	4 days	Naxcel® Sterile Powder	Zoetis, Inc.
Cloprostenol sodium	Rx	None	None	Estrumate	Merck Animal Health
	Rx	None	None	SynchSure	Merial, Inc.
Dexamethasone	Rx	None	None	Dexamethasone Solution	Phoenix/Clipper Distributing Co., LLC
	Rx	None	None	Dexium	Bimeda, Inc.
Dinoprost tromethamine	Rx	None	None	Lutalyse® HighCon Injection	Zoetis, Inc.
	Rx	None	None	Lutalyse® Sterile Solution	Zoetis, Inc.
	Rx	None	None	ProstaMate®	Bayer HealthCare LLC, Animal Health
Flunixin meglumine	Rx	36 hours	4 days	Banamine®	Merck Animal Health
	Rx	36 hours	4 days	Flu-Nix™ - D	Agri Laboratories, Ltd.
	Rx	36 hours	4 days	Flunazine	Bimeda, Inc.
	Rx	36 hours	4 days	Flunixin Injection	Norbrook Laboratories, Ltd.
	Rx	36 hours	4 days	Prevail™	MWI Veterinary Supply
	Rx	36 hours	4 days	VetaMeg™	Aspen Veterinary Resources
Gonadorelin diacetate tetrahydrate	Rx	None	None	Cystorelin Injectable	Merial, Inc.
	Rx	None	None	Fertagyl®	Merck Animal Health
	Rx	None	None	OvaCyst®	Bayer HealthCare LLC, Animal Health
Gonadorelin hydrochloride	Rx	None	None	Factrel®	Zoetis, Inc.
Gonadotropin (chorionic)	Rx	None	None	Chorulon®	Merck Animal Health
Isoflupredone acetate	Rx	None	7 days	Predef® 2x	Zoetis, Inc.
Oxytetracycline	OTC	96 hours	28 days	Agrimycin 200	Agri Laboratories, Ltd.
	OTC	96 hours	28 days	Bio-Mycin® 200	Boehringer Ingelheim Vetmedica, Inc.
	OTC	96 hours	28 days	Duramycin 72-200	Durvet, Inc.
	OTC	96 hours	28 days	Liquamycin® LA-200®	Zoetis, Inc.
	OTC	96 hours	28 days	Oxytetracycline Injection 200	Norbrook Laboratories, Ltd.
	OTC	96 hours	28 days	Terra-Vet™ 200 Injection	Aspen Veterinary Resources
	OTC	96 hours	28 days	Vetrimycin™ 200	MWI Veterinary Supply
Oxytocin	Rx	None	None	Oxytocin Injection	Bimeda, Inc.
Pegbovigrastim injection	Rx	None	None	Imrestor™	Elanco Animal Health
Penicillin G (procaine)	OTC	48 hours	14 days	Agricillin®	Agri Laboratories, Ltd.
	OTC	48 hours	14 days	Bactracillin G®	Aspen Veterinary Resources
	OTC	48 hours	14 days	Norocillin	Norbrook Laboratories, Ltd.
	OTC	48 hours	14 days	Penicillin Injectable	Durvet, Inc.
	OTC	48 hours	14 days	PenOne Pro™	MWI Veterinary Supply
	OTC	48 hours	4 days	Pro-Pen-G™ Injection	Bimeda, Inc.
Sometribove zinc	OTC	None	None	Posilac	Elanco Animal Health
Sulfadimethoxine	Rx	60 hours	5 days	Di-Methox Injection 40%	Agri Laboratories, Ltd.
Tripelennamine hydrochloride	Rx	24 hours	4 days	Recovr Injectable	Kinetic Technologies

FDA-Approved Drugs for Intramammary Use

Lactating Cows

Active Ingredient	Drug Type	Milk Withholding Time	Meat Withholding Time	Product Name	Manufacturer/Marketer
Amoxicillin trihydrate	Rx	60 hours	12 days	Amoxi-Mast®	Merck Animal Health
Ceftiofur hydrochloride	Rx	72 hours	2 days	SPECTRAMAST™ LC	Zoetis, Inc.
Cephapirin (sodium)	OTC	96 hours	4 days	Today®	Boehringer Ingelheim Vetmedica, Inc.
Cloxacillin (sodium)	Rx	48 hours	10 days	Dariclox®	Merck Animal Health
Hetacillin (potassium)	Rx	72 hours	10 days	Hetacin®K	Boehringer Ingelheim Vetmedica, Inc.
Penicillin G (procaine)	OTC	60 hours	3 days	Hanford's/US Vet MASTICLEAR®	G.C. Hanford Mfg. Co.
Pirlimycin	Rx	36 hours	9 days*	Pirsue® Sterile Solution	Zoetis, Inc.

* 9-day meat withhold following infusion twice at a 24-hour interval 21-day meat withhold following any extended duration of therapy (infusion longer than twice at 24-hour interval up to 8 consecutive days).

FDA-Approved Drugs for Oral Use

Lactating Cows

Active Ingredient	Drug Type	Milk Withholding Time	Meat Withholding Time	Product Name	Manufacturer/Marketer
Fenbendazole	OTC	None	8 days	Safe-Guard 10% Paste	Merck Animal Health
	OTC	None	8 days	Safe-Guard 10% Suspension	Merck Animal Health
Magnesium hydroxide	OTC	12 hours	None	Carmilax Bolus	Zoetis, Inc.
	OTC	12 hours	None	Carmilax Powder	Zoetis, Inc.
Poloxalene	OTC	None	None	Bloat Guard® Top Dressing	Phibro Animal Health
	OTC	None	None	TheraBloat® Drench Concentrate	Zoetis, Inc.
Sulfadimethoxine	Rx	60 hours	7 days	ALBON® Bolus	Zoetis, Inc.

FDA-Approved Drugs for Feed Additive Use Lactating Cows

Active Ingredient	Drug Type	Milk Withholding Time	Meat Withholding Time	Product Name	Manufacturer/Marketer
Fenbendazole	OTC	None	13 days	Safe-Guard 0.5% Top Dress Pellets	Merck Animal Health
	OTC	None	13 days	Safe-Guard 1.96%	Merck Animal Health
Monensin (sodium)	OTC	None	14 days	Rumatel® 88	Phibro Animal Health
	OTC	None	None	Rumensin 90	Elanco Animal Health
Poloxalene	OTC	None	None	Bloat Guard® Liquid - Type A Medicated Article	Phibro Animal Health
	OTC	None	None	Bloat Guard® Medicated Top Dressing	Phibro Animal Health
	OTC	None	None	Bloat Guard® Type A Medicated Article	Phibro Animal Health

FDA-Approved Drugs for Intravaginal Administration Use Lactating Cows

Active Ingredient	Drug Type	Milk Withholding Time	Meat Withholding Time	Product Name	Manufacturer/Marketer
Progesterone	OTC	None	None	EAZI-Breed™ CIDR® Cattle Insert	Zoetis, Inc.

FDA-Approved Drugs for Topical Use Lactating Cows

Active Ingredient	Drug Type	Milk Withholding Time	Meat Withholding Time	Product Name	Manufacturer/Marketer
Balsam peru oil	OTC	None	None	Granulex Aerosol Spray	Mylan Institutional, Inc.
Castor oil	OTC	None	None	Granulex Aerosol Spray	Mylan Institutional, Inc.
Eprinomectin	OTC	None	None	EPRINEX Pour-On for Beef & Dairy Cattle	Merial, Inc.
	OTC	None	None	Eprizero™ Pour-On for Beef and Dairy Cattle	Norbrook Laboratories Limited
Moxidectin	OTC	None	None	Cydetin® (moxidectin) 0.5% Pour-On for Cattle	Boehringer Ingelheim Vetmedica, Inc.
Oxytetracycline hydrochloride/ Polymyxin B sulfate	Rx	None	None	Terramycin® Ophthalmic Ointment with Polymyxin	Zoetis, Inc.
Trypsin	OTC	None	None	Granulex Aerosol Spray	Mylan Institutional, Inc.

Serum and Urine Screening Tests

Screening Tests Available as of January 2018

Can be used in any dairy animal for detecting drug residues in serum and urine.[§]

Residues Detected	Test Name	Sponsor	Specimen	Sensitivity (ppb)
Amoxicillin	Charm II Beta-lactam Test	Charm Sciences	Serum	500
	Charm II Beta-lactam Test	Charm Sciences	Urine	2000
	Charm KIS Test	Charm Sciences	Serum	100
	Charm KIS Test	Charm Sciences	Urine	100
	Charm SL Beta-lactam Test for Urine	Charm Sciences	Urine	40
	Meatsafe™ β-Lactam One-Step Test	Silver Lake Research Corporation	Urine	‡
	Premi®test	R-Biopharm AG	Urine	5
Ampicillin	Charm II Beta-lactam Test	Charm Sciences	Serum	200
	Charm II Beta-lactam Test	Charm Sciences	Urine	800
	Charm KIS Test	Charm Sciences	Serum	100
	Charm KIS Test	Charm Sciences	Urine	100
	Charm SL Beta-lactam Test for Urine	Charm Sciences	Urine	55
	Meatsafe™ β-Lactam One-Step Test	Silver Lake Research Corporation	Urine	‡
	Premi®test	R-Biopharm AG	Urine	5
Ceftiofur	Charm II Beta-lactam Test	Charm Sciences	Serum	500
	Charm II Beta-lactam Test	Charm Sciences	Urine	2000
	Charm KIS Test	Charm Sciences	Serum	1000
	Charm KIS Test	Charm Sciences	Urine	1000
	Charm SL Beta-lactam Test for Urine	Charm Sciences	Urine	300
	Premi®test	R-Biopharm AG	Urine	100
Cephalexin	Charm II Beta-lactam Test	Charm Sciences	Serum	500
	Charm II Beta-lactam Test	Charm Sciences	Urine	2000
	Charm KIS Test	Charm Sciences	Serum	1000
	Charm KIS Test	Charm Sciences	Urine	1000
	Charm SL Beta-lactum Test for Urine	Charm Sciences	Urine	300
	Charm SL Beta-lactum Test for Urine	Charm Sciences	Urine	1000
Cephapirin	Charm II Beta-lactam Test	Charm Sciences	Serum	200
	Charm II Beta-lactam Test	Charm Sciences	Urine	800
	Charm KIS Test	Charm Sciences	Serum	100
	Charm KIS Test	Charm Sciences	Urine	100
	Charm SL Beta-lactam Test for Urine	Charm Sciences	Urine	85
	Premi®test	R-Biopharm AG	Urine	100

[§] Inclusion of product names and associated information does not constitute an endorsement by the NMPF. Unless otherwise noted, all information contained herein was provided by the product's sponsor and no further attempts were made to validate or corroborate the sponsor's information. Neither the AVMA, NMPF, FDA, nor FARAD assumes any responsibility for penalties which may result from the use of this table or any of the products listed herein.

[‡] Predicts pass or fail on USDA tissue residue tests.

[Ⓢ] The use of chloramphenicol in any food-producing animal is strictly forbidden under federal law. Consider testing for chloramphenicol in purchased new additions to the lactating herd or in other instances where the drug-treatment history is unknown.

Serum and Urine Screening Tests

Screening Tests Available as of January 2018

Residues Detected	Test Name	Sponsor	Specimen	Sensitivity (ppb)
Chloramphenicol D	Charm II Amphenicol Test	Charm Sciences	Serum	10
	Charm II Amphenicol Test	Charm Sciences	Urine	10
	Charm II Chloramphenicol Test	Charm Sciences	Serum	0.3
	Charm II Chloramphenicol Test	Charm Sciences	Urine	10
Chlortetracycline	Charm II Tetracycline Test	Charm Sciences	Serum	200
	Charm II Tetracycline Test	Charm Sciences	Urine	3000
	Charm KIS Test	Charm Sciences	Serum	10,000
	Charm KIS Test	Charm Sciences	Urine	10,000
	Premi®test	R-Biopharm AG	Urine	50
	Veratox for Tetracycline	Neogen Corporation	Serum	2
	Veratox for Tetracycline	Neogen Corporation	Urine	2
Cloxacillin	Charm II Beta-lactam Test	Charm Sciences	Serum	2500
	Charm II Beta-lactam Test	Charm Sciences	Urine	10,000
	Charm KIS Test	Charm Sciences	Serum	500
	Charm KIS Test	Charm Sciences	Urine	500
	Charm SL Beta-lactam Test for Urine	Charm Sciences	Urine	300
	Meatsafe™ β-Lactam One-Step Test	Silver Lake Research Corporation	Urine	‡
	Premi®test	R-Biopharm AG	Urine	50
Danofloxacin	Premi®test	R-Biopharm AG	Urine	600
	Veratox for Fluoroquinolone	Neogen Corporation	Serum	1
	Veratox for Fluoroquinolone	Neogen Corporation	Urine	1
Dihydrostreptomycin	Charm II Streptomycin Test	Charm Sciences	Serum	100
	Charm II Streptomycin Test	Charm Sciences	Urine	2000
	Charm KIS Test	Charm Sciences	Serum	5000
	Charm KIS Test	Charm Sciences	Urine	5000
	Premi®test	R-Biopharm AG	Urine	3000
Enrofloxacin *	Charm Enroflox Test (ROSA Test)	Charm Sciences	Urine	100
	Premi®test	R-Biopharm AG	Urine	600
	Veratox for Enrofloxacin	Neogen Corporation	Serum	1
	Veratox for Enrofloxacin	Neogen Corporation	Urine	1
	Veratox for Fluoroquinolone	Neogen Corporation	Serum	1
	Veratox for Fluoroquinolone	Neogen Corporation	Urine	1

‡ Predicts pass or fail on USDA tissue residue tests.

* Prohibited from use in any kind of lactating cattle.

Serum and Urine Screening Tests

Screening Tests Available as of January 2018

Residues Detected	Test Name	Sponsor	Specimen	Sensitivity (ppb)
Erythromycin	Charm II Macrolide Test	Charm Sciences	Serum	500
	Charm II Macrolide Test	Charm Sciences	Urine	500
	Charm KIS Test	Charm Sciences	Serum	500
	Charm KIS Test	Charm Sciences	Urine	500
	Premi®test	R-Biopharm AG	Urine	100
Florfenicol	Charm II Amphenicol Test	Charm Sciences	Serum	400
	Charm II Amphenicol Test	Charm Sciences	Urine	400
	Veratox for Florfenicol	Neogen Corporation	Serum	2
	Veratox for Florfenicol	Neogen Corporation	Urine	?
Gentamicin	Charm II Gentamicin and Neomycin Test	Charm Sciences	Urine	2000
	Charm KIS Test	Charm Sciences	Serum	600
	Charm KIS Test	Charm Sciences	Urine	600
	Meatsafe™ Gentamicin Strip Test	Silver Lake Research Corporation	Urine	‡
	Premi®test	R-Biopharm AG	Urine	100
	Veratox for Gentamicin	Neogen Corporation	Serum	5
	Veratox for Gentamicin	Neogen Corporation	Urine	5
	Charm II Gentamicin and Neomycin Test	Charm Sciences	Serum	250
Hetacillin	Charm II Beta-lactam Test	Charm Sciences	Serum	200
	Charm II Beta-lactam Test	Charm Sciences	Urine	1000
	Charm KIS Test	Charm Sciences	Serum	100
	Charm KIS Test	Charm Sciences	Urine	100
	Charm SL Beta-lactam Test for Urine	Charm Sciences	Urine	250
	Meatsafe™ β-Lactam One-Step Test	Silver Lake Research Corporation	Urine	‡
Kanamycin	Charm II Gentamicin and Neomycin Test	Charm Sciences	Urine	2000
	Charm KIS Test	Charm Sciences	Serum	5000
	Charm KIS Test	Charm Sciences	Urine	5000
	Charm II Gentamicin and Neomycin Test	Charm Sciences	Serum	>2000
Lincomycin	Charm II Macrolide Test	Charm Sciences	Serum	2000
	Charm II Macrolide Test	Charm Sciences	Urine	2000
	Charm KIS Test	Charm Sciences	Serum	2000
	Charm KIS Test	Charm Sciences	Urine	2000
	Premi®test	R-Biopharm AG	Urine	100
Neomycin	Charm II Gentamicin and Neomycin Test	Charm Sciences	Serum	50
	Charm II Gentamicin and Neomycin Test	Charm Sciences	Urine	10,000

‡ Predicts pass or fail on USDA tissue residue tests.

Serum and Urine Screening Tests

Screening Tests Available as of January 2018

Residues Detected	Test Name	Sponsor	Specimen	Sensitivity (ppb)
Neomycin	Charm KIS Test	Charm Sciences	Serum	1000
	Charm KIS Test	Charm Sciences	Urine	1000
	Premi®test	R-Biopharm AG	Urine	300
	Veratox for Neomycin	Neogen Corporation	Urine	40
Oxacillin	Charm II Beta-lactam Test	Charm Sciences	Serum	2500
	Charm II Beta-lactam Test	Charm Sciences	Urine	10,000
	Charm KIS Test	Charm Sciences	Serum	1000
	Charm KIS Test	Charm Sciences	Urine	1000
	Charm SL Beta-lactam Test for Urine	Charm Sciences	Urine	300
Oxytetracycline	Charm II Tetracycline Test	Charm Sciences	Serum	100
	Charm II Tetracycline Test	Charm Sciences	Urine	2500
	Charm KIS Test	Charm Sciences	Serum	3500
	Charm KIS Test	Charm Sciences	Urine	3500
	Premi®test	R-Biopharm AG	Urine	50
	Veratox for Oxytetracycline	Neogen Corporation	Serum	6
	Veratox for Oxytetracycline	Neogen Corporation	Urine	6
Penicillin	Charm II Beta-lactam Test	Charm Sciences	Serum	200
	Charm II Beta-lactam Test	Charm Sciences	Urine	800
	Charm KIS Test	Charm Sciences	Serum	30
	Charm KIS Test	Charm Sciences	Urine	30
	Charm SL Beta-lactam Test for Urine	Charm Sciences	Urine	25
Sulfamethoxazole*	Charm II Sulfonamide Test	Charm Sciences	Serum	120
	Charm II Sulfonamide Test	Charm Sciences	Urine	300
	Charm KIS Test	Charm Sciences	Serum	5000
	Charm KIS Test	Charm Sciences	Urine	5000
	Veratox for Sulfonamides	Neogen Corporation	Serum	2.5
Sulfanilamide*	Charm II Sulfonamide Test	Charm Sciences	Serum	1600
	Charm II Sulfonamide Test	Charm Sciences	Urine	4000
	Charm KIS Test	Charm Sciences	Serum	10,000
	Charm KIS Test	Charm Sciences	Urine	10,000
	Veratox for Sulfonamides	Neogen Corporation	Serum	3
Sulfapyridine*	Charm II Sulfonamide Test	Charm Sciences	Serum	400
	Charm II Sulfonamide Test	Charm Sciences	Urine	1000
	Charm KIS Test	Charm Sciences	Serum	10,000
	Veratox for Sulfonamides	Neogen Corporation	Serum	3

* Prohibited from use in any kind of lactating cattle.

Serum and Urine Screening Tests

Screening Tests Available as of January 2018

Residues Detected	Test Name	Sponsor	Specimen	Sensitivity (ppb)
Sulfaquinoxaline*	Charm II Sulfonamide Test	Charm Sciences	Serum	150
	Charm II Sulfonamide Test	Charm Sciences	Urine	500
	Charm KIS Test	Charm Sciences	Serum	5000
	Charm KIS Test	Charm Sciences	Urine	5000
	Veratox for Sulfonamides	Neogen Corporation	Serum	2.5
Sulfathiazole*	Charm II Sulfonamide Test	Charm Sciences	Serum	100
	Charm II Sulfonamide Test	Charm Sciences	Urine	1000
	Charm KIS Test	Charm Sciences	Serum	250
	Charm KIS Test	Charm Sciences	Serum	2500
	Charm KIS Test	Charm Sciences	Serum	5000
	Charm KIS Test	Charm Sciences	Urine	600
	Veratox for Sulfonamides	Neogen Corporation	Serum	2.5
Sulfonamides	Veratox for Sulfonamides	Neogen Corporation	Serum	2.5
Tetracycline	Charm II Tetracycline Test	Charm Sciences	Serum	40
	Charm II Tetracycline Test	Charm Sciences	Urine	600
	Charm KIS Test	Charm Sciences	Serum	10,000
	Charm KIS Test	Charm Sciences	Urine	10,000
Tilmicosin	Charm KIS Test	Charm Sciences	Serum	1000
	Charm KIS Test	Charm Sciences	Urine	1000
	Premi®test	R-Biopharm AG	Urine	50
Tulathromycin*	Charm II Macrolide Test	Charm Sciences	Serum	500
	Charm II Macrolide Test	Charm Sciences	Urine	500
	Charm KIS Test	Charm Sciences	Serum	500
	Charm KIS Test	Charm Sciences	Urine	500
	Premi®test	R-Biopharm AG	Urine	18,000
Tylosin	Charm II Macrolide Test	Charm Sciences	Serum	2000
	Charm II Macrolide Test	Charm Sciences	Urine	2000
	Charm KIS Test	Charm Sciences	Serum	200
	Charm KIS Test	Charm Sciences	Urine	200
	Premi®test	R-Biopharm AG	Urine	50
	Veratox for Tylosin	Neogen Corporation	Serum	20

⊕ Predicts pass or fail on USDA tissue residue tests.

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A ^{GOOD} DRY COW PROGRAM

includes → A DRY TUBE,
AN INTERNAL TEAT SEALANT
& AN *E.coli* MASTITIS VACCINE.

A REALLY ^{GOOD} DRY COW PROGRAM

includes → A PRODUCER
WILLING *to* USE
ALL THREE.

Investing in proactive mastitis management at dry off can pay dividends by improving milk quality, herd health and production. And only Zoetis offers a comprehensive approach with SPECTRAMAST® DC (*ceftiofur hydrochloride*) Sterile Suspension, ORBESEAL® and ENVIRACOR® J-5. When you use these products, you'll be doing better for your herd and your operation. See how producers are doing better for their dry cows at dairywellness.com/milkquality.

IMPORTANT SAFETY INFORMATION: People with known hypersensitivity to penicillin or cephalosporins should avoid exposure to SPECTRAMAST DC. Product requires a 30-day dry cow period, and has a 16-day pre-slaughter withdrawal period following last treatment. Use of this product in a manner other than indicated on the label, or failure to adhere to the proper milk discard period, will result in violative residues. See Brief Summary of Prescribing Information on p. X.

Refer to the ORBESEAL label for complete instructions on proper administration at dry off and removal at freshening.

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Milk Screening Tests

Not all of the tests listed below have been evaluated by FDA and accepted by the National Conference on Interstate Milk Shipments (NCIMS) for residue testing. Refer to M-a-85 (latest revision) or M-1-92-11. These tests are believed to be reliable indicators of antibiotic contamination in milk and should be viewed as tools to screen bulk tank milk.

Residues Detected	Tolerance (ppb)	Test Name	Sponsor	Sensitivity (ppb)
2, 4-D	100 #	2,4-D RaPID Assay®	Strategic Diagnostics, Inc.	50
Aflatoxin M1	0.5	Charm II Aflatoxin Test (Competitive)	Charm Sciences	0.5
	0.5	Charm II Aflatoxin Test (Quantitative)	Charm Sciences	0.02
	0.5	Charm II Aflatoxin Test (Sequential)	Charm Sciences	0.5
	0.5	Charm ROSA MRL Aflatoxin Quantitative Test	Charm Sciences	0.05
	0.5	Charm ROSA SL Aflatoxin Test (Quantitative)	Charm Sciences	0.5
	0.5	Reveal for Aflatoxin M1 (Quantitative)	Neogen Corporation	0.5
	0.5	Reveal® Q+ HS for Aflatoxin M1 (Quantitative)	Neogen Corporation	
	0.5	SNAP Aflatoxin M1	IDEXX Labs, Inc.	0.5
Amoxicillin	10 #	BetaStar® Advanced for Beta-lactams	Neogen Corporation	9.2
	10 #	Charm 3 SL3 Beta-lactam Test*	Charm Sciences	8.4 •
	10 #	Charm <i>B. stearothersophilus</i> Tablet Disc Assay*	Charm Sciences	7.5 •
	10 #	Charm Beta-lactam 30 Second Test	Charm Sciences	5.8
	10 #	Charm Blue Yellow II Test	Charm Sciences	3
	10 #	Charm Cowside II Test	Charm Sciences	4
	10 #	Charm Flunixin and Beta-lactam Test*	Charm Sciences	5.9 •
	10 #	Charm HPLC-Receptogram	Charm Sciences	10
	10 #	Charm II Beta-lactam Test* (Competitive)	Charm Sciences	7.5 •
	10 #	Charm II Beta-lactam Test* (Quantitative)	Charm Sciences	8.1 •
	10 #	Charm II Beta-lactam Test* (Sequential)	Charm Sciences	8.1 •
	10 #	Charm MRL Beta-lactam 1 Minute Test	Charm Sciences	4
	10 #	Charm MRL Beta-lactam 3 Minute Test	Charm Sciences	5
	10 #	Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Charm Sciences	5
	10 #	Charm MRL Beta-lactam and Tetracycline Test	Charm Sciences	4
	10 #	Charm MRL Beta-lactam RF Tetracycline 2 Minute Test	Charm Sciences	4
	10 #	Charm MRL Beta-lactam Test	Charm Sciences	4
	10 #	Charm Quad 1 Test	Charm Sciences	4
	10 #	Charm Quad Test	Charm Sciences	4
	10 #	Charm SL Beta-lactam Test*	Charm Sciences	5.6 •
	10 #	Charm TRIO Test	Charm Sciences	3.5
	10 #	Delvotest P 5 Pack*	DSM Food Specialties USA, Inc	4.6 •
	10 #	Delvotest P/Delvotest P Mini*	DSM Food Specialties USA, Inc	7.7 •
	10 #	Delvotest SP-NT	DSM Food Specialties USA, Inc	2-3.0
	10 #	Delvotest T	DSM Food Specialties USA, Inc	4

Tolerance is the maximum legally allowable level or concentration of a drug or chemical in a food product at the time milk is marketed or the animal is slaughtered.

• Evaluated by FDA and Accepted by National Conference on Interstate Milk Shipments (NCIMS).

• Sensitivities based on evaluation of raw commingled bovine milk samples by test sponsors, independent laboratories, and FDA and reported in FDA memo M-a-85 Revision #16 and FDA memoranda (1/30/18, 11/27/18, and 12/20/18).

Milk Screening Tests

Not all of the tests listed below have been evaluated by FDA and accepted by the National Conference on Interstate Milk Shipments (NCIMS) for residue testing. Refer to M-a-85 (latest revision) or M-1-92-11. These tests are believed to be reliable indicators of antibiotic contamination in milk and should be viewed as tools to screen bulk tank milk.

Residues Detected	Tolerance (ppb)	Test Name	Sponsor	Sensitivity (ppb)
Amoxicillin	10 #	Eclipse® 3G	ZEU-Inmunotec	3
	10 #	New SNAP Beta-lactam (Visual)	IDEXX Labs, Inc.	6.9
	10 #	New SNAP Beta-lactam*	IDEXX Labs, Inc.	7.3
	10 #	SNAP Beta-Lactam ST	IDEXX Laboratories, Inc.	4
	10 #	SNAP Beta-Lactam ST Plus	IDEXX Labs, Inc.	2
	10 #	SNAP duo ST Plus	IDEXX Labs, Inc.	3
	10 #	SNAP TRIO JAPAN	IDEXX Labs, Inc.	5
Ampicillin	10 #	BetaStar® Advanced for Beta-lactams	Neogen Corporation	8.6
	10 #	Charm 3 SL3 Beta-lactam Test*	Charm Sciences	8.0 •
	10 #	Charm <i>B. stearothermophilus</i> Tablet Disc Assay*	Charm Sciences	6.7 •
	10 #	Charm Beta-lactum 30 Second Test	Charm Sciences	5.9
	10 #	Charm Blue Yellow II Test	Charm Sciences	3
	10 #	Charm Cowside II Test	Charm Sciences	4
	10 #	Charm Flunixin and Beta-lactam Test*	Charm Sciences	6.8 •
	10 #	Charm HPLC-Receptogram	Charm Sciences	2
	10 #	Charm II Beta-lactam Test* (Competitive)	Charm Sciences	5.7 •
	10 #	Charm II Beta-lactam Test* (Quantitative)	Charm Sciences	6.6 •
	10 #	Charm II Beta-lactam Test* (Sequential)	Charm Sciences	6.6 •
	10 #	Charm MRL Beta-lactam 1 Minute Test	Charm Sciences	4
	10 #	Charm MRL Beta-lactam 3 Minute Test	Charm Sciences	4
	10 #	Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Charm Sciences	4
	10 #	Charm MRL Beta-lactam and Tetracycline Test	Charm Sciences	4
	10 #	Charm MRL Beta-lactam RF Tetracycline 2 Minute Test	Charm Sciences	4
	10 #	Charm MRL Beta-lactam Test	Charm Sciences	4
	10 #	Charm Quad 1 Test	Charm Sciences	4
	10 #	Charm Quad Test	Charm Sciences	4
	10 #	Charm SL Beta-lactam Test*	Charm Sciences	8.5 •
	10 #	Charm TRIO Test	Charm Sciences	8.5
	10 #	Delvotest P 5 Pack*	DSM Food Specialties USA, Inc	4.0 •
	10 #	Delvotest P/Delvotest P Mini*	DSM Food Specialties USA, Inc	5.1 •
	10 #	Delvotest SP-NT	DSM Food Specialties USA, Inc	2
	10 #	Delvotest T	DSM Food Specialties USA, Inc	3
	10 #	Eclipse® 3G	ZEU-Inmunotec	3
	10 #	New SNAP Beta-lactam (Visual)	IDEXX Labs, Inc.	6.2

¥ No official tolerance or target testing levels have been established by the FDA.

◆ Evaluated by FDA and Accepted by National Conference on Interstate Milk Shipments (NCIMS).

Tolerance is the maximum legally allowable level or concentration of a drug or chemical in a food product at the time milk is marketed or the animal is slaughtered.

• Sensitivities based on evaluation of raw commingled bovine milk samples by test sponsors, independent laboratories, and FDA and reported in FDA memo M-a-85 Revision #16 and FDA memoranda (1/30/18, 11/27/18, and 12/20/18).

Milk Screening Tests

Not all of the tests listed below have been evaluated by FDA and accepted by the National Conference on Interstate Milk Shipments (NCIMS) for residue testing. Refer to M-a-85 (latest revision) or M-1-92-11. These tests are believed to be reliable indicators of antibiotic contamination in milk and should be viewed as tools to screen bulk tank milk.

Residues Detected	Tolerance (ppb)	Test Name	Sponsor	Sensitivity (ppb)
Ampicillin	10 #	New SNAP Beta-lactam*	IDEXX Labs, Inc.	5.8 •
	10 #	SNAP Beta-Lactam ST	IDEXX Laboratories, Inc.	4
	10 #	SNAP Beta-Lactam ST Plus	IDEXX Labs, Inc.	4
	10 #	SNAP duo ST Plus	IDEXX Labs, Inc.	4
	10 #	SNAP TRIO JAPAN	IDEXX Labs, Inc.	4
Atrazine	20 #	Atrazine RaPID Assay®	Strategic Diagnostics, Inc.	5
Bacitracin	500 #	Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	>1000
	500 #	Delvotest SP-NT	DSM Food Specialties USA, Inc	580
	500 #	Eclipse® 3G	ZEU-Inmunotec	600
Carbendazim	20 #	Benomyl RaPID Assay®	Strategic Diagnostics, Inc.	5
Cefoperazone	None ¥	Charm 3 SL3 Beta-lactam Test	Charm Sciences	1
	None ¥	Charm <i>B. stearothersophilus</i> Tablet Disc Assay	Charm Sciences	5
	None ¥	Charm Beta-lactum 30 Second Test	Charm Sciences	1
	None ¥	Charm Blue Yellow II Test	Charm Sciences	30
	None ¥	Charm Cowside II Test	Charm Sciences	30
	None ¥	Charm Flunixin and Beta-lactam Test	Charm Sciences	9
	None ¥	Charm II Beta-lactam Test (Competitive)	Charm Sciences	20
	None ¥	Charm II Beta-lactam Test (Quantitative)	Charm Sciences	20
	None ¥	Charm II Beta-lactam Test (Sequential)	Charm Sciences	5
	None ¥	Charm MRL Beta-lactam 1 Minute Test	Charm Sciences	3
	None ¥	Charm MRL Beta-lactam 3 Minute Test	Charm Sciences	2
	None ¥	Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Charm Sciences	3
	None ¥	Charm MRL Beta-lactam and Tetracycline Test	Charm Sciences	8
	None ¥	Charm MRL Beta-lactam RF Tetracycline 2 Minute Test	Charm Sciences	2
	None ¥	Charm MRL Beta-lactam Test	Charm Sciences	9
	None ¥	Charm Quad 1 Test	Charm Sciences	3
	None ¥	Charm Quad Test	Charm Sciences	3
	None ¥	Charm SL Beta-lactam Test	Charm Sciences	15
	None ¥	Charm TRIO Test	Charm Sciences	40
	None ¥	Delvotest SP-NT	DSM Food Specialties USA, Inc	580
	None ¥	Delvotest T	DSM Food Specialties USA, Inc	40

¥ No official tolerance or target testing levels have been established by the FDA.

♣ Evaluated by FDA and Accepted by National Conference on Interstate Milk Shipments (NCIMS).

£ The tolerance was established for the marker residue, not the parent compound. The ceftiofur tolerance has been changed from 50 ppb ceftiofur (parent drug) to 100 ppb ceftiofur marker residue (DCA, desfuroylceftiofur metabolite derivative).

• Sensitivities based on evaluation of raw commingled bovine milk samples by test sponsors, independent laboratories, and FDA and reported in FDA memo M-a-85 Revision #16 and FDA memoranda (1/30/18, 11/27/18, and 12/20/18).

Milk Screening Tests

Not all of the tests listed below have been evaluated by FDA and accepted by the National Conference on Interstate Milk Shipments (NCIMS) for residue testing. Refer to M-a-85 (latest revision) or M-1-92-11. These tests are believed to be reliable indicators of antibiotic contamination in milk and should be viewed as tools to screen bulk tank milk.

Residues Detected	Tolerance (ppb)	Test Name	Sponsor	Sensitivity (ppb)
Cefoperazone	None [¥]	SNAP Beta-Lactam ST	IDEXX Laboratories, Inc.	35
	None [¥]	SNAP Beta-Lactam ST Plus	IDEXX Labs, Inc.	20
	None [¥]	SNAP duo ST Plus	IDEXX Labs, Inc.	35
Cefquinome	None [¥]	Charm 3 SL3 Beta-lactam Test	Charm Sciences	50
	None [¥]	Charm <i>B. stearothersophilus</i> Tablet Disc Assay	Charm Sciences	100
	None [¥]	Charm Beta-lactum 30 Second Test	Charm Sciences	50
	None [¥]	Charm Blue Yellow II Test	Charm Sciences	60
	None [¥]	Charm Cowside II Test	Charm Sciences	60
	None [¥]	Charm Flunixin and Beta-lactam Test	Charm Sciences	75
	None [¥]	Charm II Beta-lactam Test (Competitive)	Charm Sciences	40
	None [¥]	Charm II Beta-lactam Test (Quantitative)	Charm Sciences	40
	None [¥]	Charm II Beta-lactam Test (Sequential)	Charm Sciences	10
	None [¥]	Charm MRL Beta-lactam 1 Minute Test	Charm Sciences	40
	None [¥]	Charm MRL Beta-lactam 3 Minute Test	Charm Sciences	25
	None [¥]	Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Charm Sciences	25
	None [¥]	Charm MRL Beta-lactam and Tetracycline Test	Charm Sciences	20
	None [¥]	Charm MRL Beta-lactam RF Tetracycline 2 Minute Test	Charm Sciences	25
	None [¥]	Charm MRL Beta-lactam Test	Charm Sciences	20
	None [¥]	Charm Quad Test	Charm Sciences	20
	None [¥]	Charm Quad1 Test	Charm Sciences	15
	None [¥]	Charm SL Beta-lactam Test	Charm Sciences	30
	None [¥]	Delvotest T	DSM Food Specialties USA, Inc	40
	None [¥]	SNAP Beta-Lactam ST	IDEXX Laboratories, Inc.	16
	None [¥]	SNAP Beta-Lactam ST Plus	IDEXX Labs, Inc.	12
	None [¥]	SNAP duo ST Plus	IDEXX Labs, Inc.	16
Ceftiofur	100 [€]	BetaStar® Advanced for Beta-lactams	Neogen Corporation	92.7
	100 [€]	Charm 3 SL3 Beta-lactam Test*	Charm Sciences	79 *
	100 [€]	Charm <i>B. stearothersophilus</i> Tablet Disc Assay*	Charm Sciences	>100*
	100 [€]	Charm Beta-lactum 30 Second Test	Charm Sciences	73
	100 [€]	Charm Blue Yellow II Test	Charm Sciences	100
	100 [€]	Charm Cowside II Test	Charm Sciences	>100
	100 [€]	Charm Flunixin and Beta-lactam Test*	Charm Sciences	63 *
	100 [€]	Charm HPLC-Receptogram	Charm Sciences	30-40

¥ No official tolerance or target testing levels have been established by the FDA.

• Evaluated by FDA and Accepted by National Conference on Interstate Milk Shipments (NCIMS).

Tolerance is the maximum legally allowable level or concentration of a drug or chemical in a food product at the time milk is marketed or the animal is slaughtered.

• Sensitivities based on evaluation of raw commingled bovine milk samples by test sponsors, independent laboratories, and FDA and reported in FDA memo M-a-85 Revision #16 and FDA memoranda (1/30/18, 11/27/18, and 12/20/18).

Milk Screening Tests

Not all of the tests listed below have been evaluated by FDA and accepted by the National Conference on Interstate Milk Shipments (NCIMS) for residue testing. Refer to M-a-85 (latest revision) or M-1-92-11. These tests are believed to be reliable indicators of antibiotic contamination in milk and should be viewed as tools to screen bulk tank milk.

Residues Detected	Tolerance (ppb)	Test Name	Sponsor	Sensitivity (ppb)
Ceftiofur	100 [£]	Charm II Beta-lactam Test* (Competitive)	Charm Sciences	47 *
	100 [£]	Charm II Beta-lactam Test* (Quantitative)	Charm Sciences	8.0 *
	100 [£]	Charm II Beta-lactam Test* (Sequential)	Charm Sciences	58 *
	100 [£]	Charm MRL Beta-lactam RF Tetracycline 2 Minute Test	Charm Sciences	70
	100 [£]	Charm MRL Beta-lactam 1 Minute Test	Charm Sciences	100
	100 [£]	Charm MRL Beta-lactam 3 Minute Test	Charm Sciences	40
	100 [£]	Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Charm Sciences	70
	100 [£]	Charm MRL Beta-lactam and Tetracycline Test	Charm Sciences	20
	100 [£]	Charm MRL Beta-lactam Test	Charm Sciences	20
	100 [£]	Charm Quad Test	Charm Sciences	40
	100 [£]	Charm Quad1 Test	Charm Sciences	70
	100 [£]	Charm SL Beta-lactam Test*	Charm Sciences	77 *
	100 [£]	Charm TRIO Test	Charm Sciences	50
	100 [£]	Delvotest P 5 Pack*	DSM Food Specialties USA, Inc	> 100
	100 [£]	Delvotest P/Delvotest P Mini*	DSM Food Specialties USA, Inc	> 100
	100 [£]	Delvotest SP-NT	DSM Food Specialties USA, Inc	130
	100 [£]	Delvotest T	DSM Food Specialties USA, Inc	80
	100 [£]	Eclipse® 3G	ZEU-Inmunotec	60
	100 [£]	New SNAP Beta-Lactam*	IDEXX Labs, Inc.	12 *
	100 [£]	SNAP Beta-Lactam ST	IDEXX Laboratories, Inc.	50-80
	100 [£]	SNAP Beta-Lactam ST Plus	IDEXX Labs, Inc.	9
	100 [£]	SNAP duo ST Plus	IDEXX Labs, Inc.	8
	100 [£]	SNAP TRIO JAPAN	IDEXX Labs, Inc.	20
Cephalexin	None [¥]	Charm 3 SL3 Beta-lactam Test	Charm Sciences	3000
	None [¥]	Charm <i>B. stearothersophilus</i> Tablet Disc Assay	Charm Sciences	85
	None [¥]	Charm Beta-lactum 30 Second Test	Charm Sciences	2000
	None [¥]	Charm Blue Yellow II Test	Charm Sciences	100
	None [¥]	Charm Cowside II Test	Charm Sciences	50
	None [¥]	Charm Flunixin and Beta-lactam Test	Charm Sciences	50 *
	None [¥]	Charm II Beta-lactam Test (Competitive)	Charm Sciences	45
	None [¥]	Charm II Beta-lactam Test (Quantitative)	Charm Sciences	40

¥ No official tolerance or target testing levels have been established by the FDA.

♠ Evaluated by FDA and Accepted by National Conference on Interstate Milk Shipments (NCIMS).

⌘ The use of chloramphenicol in any food-producing animal is strictly forbidden under federal law. Consider testing for chloramphenicol in purchased new additions to the lactating herd or in other instances where the drug-treatment history is unknown.

Tolerance is the maximum legally allowable level or concentration of a drug or chemical in a food product at the time milk is marketed or the animal is slaughtered.

† The sensitivity of the test method was determined by independent research at Virginia Polytechnic Institute and State University.

• Sensitivities based on evaluation of raw commingled bovine milk samples by test sponsors, independent laboratories, and FDA and reported in FDA memo M-a-85 Revision #16 and FDA memoranda (1/30/18, 11/27/18, and 12/20/18).

Milk Screening Tests

Not all of the tests listed below have been evaluated by FDA and accepted by the National Conference on Interstate Milk Shipments (NCIMS) for residue testing. Refer to M-a-85 (latest revision) or M-1-92-11. These tests are believed to be reliable indicators of antibiotic contamination in milk and should be viewed as tools to screen bulk tank milk.

Residues Detected	Tolerance (ppb)	Test Name	Sponsor	Sensitivity (ppb)
Cephalexin	None ^Y	Charm II Beta-lactam Test (Sequential)	Charm Sciences	40
	None ^Y	Charm MRL Beta-lactam	Charm Sciences	30
	None ^Y	Charm MRL Beta-lactam 1 Minute Test	Charm Sciences	1000
	None ^Y	Charm MRL Beta-lactam 3 Minute Test	Charm Sciences	1000
	None ^Y	Charm MRL Beta-lactam	Charm Sciences	2000
	None ^Y	Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Charm Sciences	2000
	None ^Y	Charm MRL Beta-lactam Test	Charm Sciences	60
	None ^Y	Charm Quad 1 Test	Charm Sciences	80
	None ^Y	Charm Quad Test	Charm Sciences	1000
	None ^Y	Charm SL Beta-lactam Test	Charm Sciences	50
	None ^Y	Charm TRIO Test	Charm Sciences	750
	None ^Y	Delvotest P 5 Pack*	DSM Food Specialties USA, Inc	60-100
	None ^Y	Delvotest P/Delvotest P Mini*	DSM Food Specialties USA, Inc	60-100
	None ^Y	Delvotest SP-NT	DSM Food Specialties USA, Inc	5-6.0
	None ^Y	Delvotest T	DSM Food Specialties USA, Inc	30
	None ^Y	Eclipse® 3G	ZEU-Inmunotec	60
	None ^Y	RF Tetracycline 2 Minute Test		
	None ^Y	SNAP Beta-Lactam ST	IDEXX Laboratories, Inc.	>7500
	None ^Y	SNAP Beta-Lactam ST Plus	IDEXX Labs, Inc.	40
	None ^Y	SNAP duo ST Plus	IDEXX Labs, Inc.	30
Cephapirin	20 [#]	BetaStar® Advanced for Beta-lactams	Neogen Corporation	18.1
	20 [#]	Charm Beta-lactum 30 Second Test	Charm Sciences	13
	20 [#]	Charm 3 SL3 Beta-lactam Test*	Charm Sciences	20.0 *
	20 [#]	Charm <i>B. stearothermophilus</i> Tablet Disc Assay*	Charm Sciences	11.7 *
	20 [#]	Charm Blue Yellow II Test	Charm Sciences	6
	20 [#]	Charm Cowside II Test	Charm Sciences	10
	20 [#]	Charm Flunixin and Beta-lactam Test*	Charm Sciences	13.4 *
	20 [#]	Charm HPLC-Receptogram	Charm Sciences	2
	20 [#]	Charm II Beta-lactam Test* (Competitive)	Charm Sciences	4.2 *
	20 [#]	Charm II Beta-lactam Test* (Quantitative)	Charm Sciences	4.1 *
	20 [#]	Charm II Beta-lactam Test* (Sequential)	Charm Sciences	4.1
	20 [#]	Charm MRL Beta-lactam 1 Minute Test	Charm Sciences	20

^Y No official tolerance or target testing levels have been established by the FDA.

[◆] Evaluated by FDA and Accepted by National Conference on Interstate Milk Shipments (NCIMS).

[❖] 90/95% concentrations were not determined for sensitivities significantly above the tolerance/safe level.

[#] Tolerance is the maximum legally allowable level or concentration of a drug or chemical in a food product at the time milk is marketed or the animal is slaughtered.

• Sensitivities based on evaluation of raw commingled bovine milk samples by test sponsors, independent laboratories, and FDA and reported in FDA memo M-a-85 Revision #16 and FDA memoranda (1/30/18, 11/27/18, and 12/20/18).

Milk Screening Tests

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Residues Detected	Tolerance (ppb)	Test Name	Sponsor	Sensitivity (ppb)
Cephapirin	20 #	Charm MRL Beta-lactam 3 Minute Test	Charm Sciences	30
	20 #	Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Charm Sciences	25
	20 #	Charm MRL Beta-lactam and Tetracycline Test	Charm Sciences	8
	20 #	Charm MRL Beta-lactam RF Tetracycline 2 Minute Test	Charm Sciences	20
	20 #	Charm MRL Beta-lactam Test	Charm Sciences	10
	20 #	Charm Quad 1 Test	Charm Sciences	10
	20 #	Charm Quad Test	Charm Sciences	30
	20 #	Charm SL Beta-lactam Test*	Charm Sciences	13.7 †
	20 #	Charm TRIO Test	Charm Sciences	14.5
	20 #	Delvotest P 5 Pack*	DSM Food Specialties USA, Inc	8.2 *
	20 #	Delvotest P/Delvotest P Mini*	DSM Food Specialties USA, Inc	7
	20 #	Delvotest SP-NT	DSM Food Specialties USA, Inc	4-6.0
	20 #	Delvotest T	DSM Food Specialties USA, Inc	5
	20 #	Eclipse® 3G	ZEU-Inmunotec	8
	20 #	New SNAP Beta-lactam (Visual)	IDEXX Labs, Inc.	11.9
	20 #	New SNAP Beta-lactam*	IDEXX Labs, Inc.	11.7 †
	20 #	Penzyme® Milk Test	Neogen Corporation	11.6
	20 #	SNAP Beta-Lactam ST	IDEXX Labs, Inc.	25-35
	20 #	SNAP Beta-Lactam ST Plus	IDEXX Labs, Inc.	25
	20 #	SNAP duo ST Plus	IDEXX Labs, Inc.	30
	20 #	SNAP TRIO JAPAN	IDEXX Labs, Inc.	10
Chloramphenicol ‡	None ✓	BetaStar 4D Beta-lactam, Tetracycline, Streptomycin, Chloramphenicol Test	Neogen Corporation	0.3
	None ✓	Charm <i>B. stearothersophilus</i> Tablet Disc Assay	Charm Sciences	20,000
	None ✓	Charm HPLC-Receptogram	Charm Sciences	1
	None ✓	Charm II Amphenicol Test*	Charm Sciences	1
	None ✓	Charm II Chloramphenicol Test*	Charm Sciences	0.1
	None ✓	Charm Quad Test	Charm Sciences	0.3
	None ✓	Charm ROSA Amphenicol Test	Charm Sciences	0.1
	None ✓	Charm ROSA Chloramphenicol Test	Charm Sciences	0.15
	None ✓	Delvotest SP-NT	DSM Food Specialties USA, Inc	2500
	None ✓	Delvotest T	DSM Food Specialties USA, Inc	3080
	None ✓	Eclipse® 3G	ZEU-Inmunotec	5000

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Tolerance is the maximum legally allowable level or concentration of a drug or chemical in a food product at the time milk is marketed or the animal is slaughtered.

⊕ Predicts pass or fail on USDA tissue residue tests.

† The sensitivity of the test method was determined by independent research at Virginia Polytechnic Institute and State University.

• Sensitivities based on evaluation of raw commingled bovine milk samples by test sponsors, independent laboratories, and FDA and reported in FDA memo M-a-85 Revision #16 and FDA memoranda (1/30/18, 11/27/18, and 12/20/18).

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Residues Detected	Tolerance (ppb)	Test Name	Sponsor	Sensitivity (ppb)
Chlortetracycline	300 #	BetaStar 4D	Neogen Corporation	5
	300 #	BetaStar® Advanced for Tetracyclines	Neogen Corporation	254
	300 #	Charm <i>B. stearothermophilus</i> Tablet Disc Assay	Charm Sciences	1000 †
	300 #	Charm Blue Yellow II Test	Charm Sciences	200
	300 #	Charm Cowside II Test	Charm Sciences	100
	300 #	Charm HPLC-Receptogram	Charm Sciences	15
	300 #	Charm II Tetracycline Drug Test* (Competitive Assay)	Charm Sciences	257 *
	300 #	Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Charm Sciences	100
	300 #	Charm MRL Beta-lactam and Tetracycline Test	Charm Sciences	100
	300 #	Charm MRL Beta-lactam RF Tetracycline 2 Minute Test	Charm Sciences	10
	300 #	Charm Quad 1 Test	Charm Sciences	70
	300 #	Charm Quad Test	Charm Sciences	6
	300 #	Charm ROSA Tetracycline Test (dilution confirmation)	Charm Sciences	292
	300 #	Charm TRIO Test	Charm Sciences	34
	300 #	Delvotest P 5 Pack	DSM Food Specialties USA, Inc	250-300
	300 #	Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	200
	300 #	Delvotest SP-NT	DSM Food Specialties USA, Inc	250-300
	300 #	Delvotest T	DSM Food Specialties USA, Inc	150
	300 #	SNAP Tetracycline	IDEXX Labs, Inc.	60
	300 #	SNAP Tetracycline (Dilution confirmation)	IDEXX Labs, Inc.	600
	300 #	SNAP duo ST Plus	IDEXX Labs, Inc.	40
Clindamycin	None √	Charm II Macrolide Test	Charm Sciences	50
	None √	Charm ROSA Macrolide Test	Charm Sciences	80
Cloxacillin	10 #	BetaStar® Advanced for Beta-lactams	Neogen Corporation	9
	10 #	Charm 3 SL3 Beta-lactam Test ^m	Charm Sciences	8.6 *
	10 #	Charm <i>B. stearothermophilus</i> Tablet Disc Assay ^m	Charm Sciences	48 ♦
	10 #	Charm Beta-lactum 30 Second Test	Charm Sciences	8.1
	10 #	Charm Blue Yellow II Test	Charm Sciences	20
	10 #	Charm Cowside II Test	Charm Sciences	25
	10 #	Charm Flunixin and Beta-lactam Test ^m	Charm Sciences	75 *
	10 #	Charm HPLC-Receptogram	Charm Sciences	10
	10 #	Charm II Beta-lactam Test ^m (Competitive)	Charm Sciences	70 ♦

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† The sensitivity of the test method was determined by independent research at Virginia Polytechnic Institute and State University.

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Residues Detected	Tolerance (ppb)	Test Name	Sponsor	Sensitivity (ppb)
Cloxacillin	10 [#]	Charm II Beta-lactam Test [™] (Sequential)	CharmSciences	50 [♦]
	10 [#]	Charm II Beta-lactam Test [™] (Quantitative)	Charm Sciences	8.5 [*]
	10 [#]	Charm II for Cloxacillin in Milk [™] (Competitive)	Charm Sciences	8.5 [*]
	10 [#]	Charm MRL Beta-lactam 1 Minute Test	Charm Sciences	20
	10 [#]	Charm MRL Beta-lactam 3 Minute Test	Charm Sciences	30
	10 [#]	Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Charm Sciences	20
	10 [#]	Charm MRL Beta-lactam and Tetracycline Test	Charm Sciences	35
	10 [#]	Charm MRL Beta-lactam RF Tetracycline 2 Minute Test	Charm Sciences	20
	10 [#]	Charm MRL Beta-lactam Test	Charm Sciences	35
	10 [#]	Charm Quad 1 Test	Charm Sciences	25
	10 [#]	Charm Quad Test	Charm Sciences	30
	10 [#]	Charm SL Beta-lactam Test [™]	Charm Sciences	50 [♦]
	10 [#]	Charm TRIO Test	Charm Sciences	8.5
	10 [#]	Delvo P/Delvotest P Minim	DSM Food Specialties USA, Inc	25 [♦]
	10 [#]	Delvotest BLF	DSM Food Specialties USA, Inc	17
	10 [#]	Delvotest P 5 Pack [™]	DSM Food Specialties USA, Inc	30 [♦]
	10 [#]	Delvotest SP-NT	DSM Food Specialties USA, Inc	11
	10 [#]	Delvotest T	DSM Food Specialties USA, Inc	5
	10 [#]	Eclipse [®] 3G	ZEU-Inmunotec	30
	10 [#]	New SNAP Beta-Lactam [™]	IDEXX Labs, Inc.	50 [♦]
	10 [#]	SNAP Beta-Lactam ST	IDEXX Labs, Inc.	6
	10 [#]	SNAP Beta-Lactam ST Plus	IDEXX Labs, Inc.	3
	10 [#]	SNAP duo ST Plus	IDEXX Labs, Inc.	4
	10 [#]	SNAP TRIO JAPAN	IDEXX Labs, Inc.	6
Danofloxacin	None [‡]	BetaStar for Quinolone	Neogen Corporation	5
	None [‡]	Charm Quad 1 Test	Charm Sciences	20
	None [‡]	Charm Quinolone Test	Charm Sciences	10
Dapson	None [‡]	Charm Cowside II Test	Charm Sciences	2
	None [‡]	Charm II Sulfa Drug Test (Competitive)	Charm Sciences	2
	None [‡]	Charm II Sulfa Drug Test (Sequential)	Charm Sciences	2
	None [‡]	Delvotest T	DSM Food Specialties USA, Inc	40

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[♦] Evaluated by FDA and Accepted by National Conference on Interstate Milk Shipments (NCIMS).

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Residues Detected	Tolerance (ppb)	Test Name	Sponsor	Sensitivity (ppb)
Dicloxacillin	None †	Charm 3 SL3 Beta-lactam Test	Charm Sciences	7
	None †	Charm <i>B. stearothersophilus</i> Tablet Disc Assay	Charm Sciences	40
	None †	Charm Beta-lactum 30 Second Test	Charm Sciences	7
	None †	Charm Blue Yellow II Test	Charm Sciences	30
	None †	Charm Cowside II Test	Charm Sciences	10
	None †	Charm Flunixin and Beta-lactam Test	Charm Sciences	60
	None †	Charm HPLC Receptogram	Charm Sciences	10
	None †	Charm II Beta-lactam Test (Competitive)	Charm Sciences	45
	None †	Charm II Beta-lactam Test (Quantitative)	Charm Sciences	5
	None †	Charm II Beta-lactam Test (Sequential)	Charm Sciences	45
	None †	Charm II for Cloxacillin in Milk	Charm Sciences	9
	None †	Charm MRL Beta-lactam 1 Minute Test	Charm Sciences	15
	None †	Charm MRL Beta-lactam 3 Minute Test	Charm Sciences	25
	None †	Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Charm Sciences	20
	None †	Charm MRL Beta-lactam and Tetracycline Test	Charm Sciences	30
	None †	Charm MRL Beta-lactam RF Tetracycline 2 Minute Test	Charm Sciences	20
	None †	Charm MRL Beta-lactam Test	Charm Sciences	30
	None †	Charm Quad 1 Test	Charm Sciences	20
	None †	Charm Quad Test	Charm Sciences	30
	None †	Charm SL Beta-lactam Test	Charm Sciences	50
	None †	Charm TRIO Test	Charm Sciences	10
	None †	Delvotest P 5 Pack	DSM Food Specialties USA, Inc	15
	None †	Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	20
	None †	Delvotest SP-NT	DSM Food Specialties USA, Inc	6
	None †	New SNAP Beta-lactam	IDEXX Labs, Inc.	50
	None †	SNAP Beta-Lactam ST	IDEXX Labs, Inc.	6
	None †	SNAP Beta-Lactam ST Plus	IDEXX Labs, Inc.	4
	None †	SNAP duo ST Plus	IDEXX Labs, Inc.	4
	None †	SNAP TRIO JAPAN	IDEXX Labs, Inc.	6
Dihydrostreptomycin	125#	BetaStar 4D Beta-lactam, Tetracycline, Chloramphenicol, Streptomycin Test	Neogen Corporation	200
	125#	Charm II Streptomycin Test	Charm Sciences	75

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Residues Detected	Tolerance (ppb)	Test Name	Sponsor	Sensitivity (ppb)
Dihydrostreptomycin	125 [#]	Charm Quad 3 Test	Charm Sciences	100
	125 [#]	Charm ROSA Neomycin and Streptomycin Test	Charm Sciences	125
	125 [#]	Charm Streptomycin Test	Charm Sciences	75
	125 [#]	Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	5000
	125 [#]	Delvotest SP-NT	Charm Sciences	680
	125 [#]	Delvotest T	DSM Food Specialties USA, Inc	800
Enrofloxacin	None	BetaStar for Quinolone	Neogen Corporation	1.5
	None	Charm Enroflox Test (ROSA Test)	Charm Sciences	7
	None	Charm Quad 1 Test	Charm Sciences	15
	None	Charm Quinolone Test	Charm Sciences	10
	None	Delvotest SP-NT	DSM Food Specialties USA, Inc	1000-1500
Erythromycin	50 [^]	Charm <i>B. stearothermophilus</i> Tablet Disc Assay	Charm Sciences	400 [†]
	50 [^]	Charm Blue Yellow II Test	Charm Sciences	150
	50 [^]	Charm Cowside II Test	Charm Sciences	100
	50 [^]	Charm II Macrolide Test	Charm Sciences	25 [?]
	50 [^]	Charm Quad 2 Test	Charm Sciences	30
	50 [^]	Charm ROSA Macrolide Test	Charm Sciences	10
	50 [^]	Delvotest P 5 Pack	DSM Food Specialties USA, Inc	250
	50 [^]	Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	500
	50 [^]	Delvotest SP-NT	DSM Food Specialties USA, Inc	90
	50 [^]	Delvotest T	DSM Food Specialties USA, Inc	150
	50 [^]	Eclipse [®] 3G	ZEU-Inmunotec	200
Florfenicol	None	Charm II Amphenicol Test	Charm Sciences	40
	None	Charm ROSA Amphenicol Test	Charm Sciences	50
Flunixin	2	Charm Flunixin and Beta-lactam Test m	Charm Sciences	1.9 [‡]
Gentamicin	30 [^]	Charm <i>B. stearothermophilus</i> Tablet Disc Assay	Charm Sciences	100
	30 [^]	Charm Blue Yellow II Test	Charm Sciences	100
	30 [^]	Charm Cowside II Test	Charm Sciences	100
	30 [^]	Charm Gentamicin Test	Charm Sciences	24
	30 [^]	Charm II Gentamicin and Neomycin Test	Charm Sciences	24
	30 [^]	Charm II Gentamicin and Streptomycin Test	Charm Sciences	30 [?]
	30 [^]	Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	1000

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Residues Detected	Tolerance (ppb)	Test Name	Sponsor	Sensitivity (ppb)
Gentamicin	30 [^]	Delvotest SP-NT	DSM Food Specialties USA, Inc	100
	30 [^]	Delvotest T	DSM Food Specialties USA, Inc	80
	30 [^]	Eclipse® 3G	ZEU-Inmunotec	>1000
	30 [^]	SNAP Gentamicin	IDEXX Labs, Inc.	30 [†]
Hetacillin	None [¥]	Charm <i>B. stearothersophilus</i> Tablet Disc Assay	Charm Sciences	7.5
	None [¥]	Charm 3 SL3 Beta-lactam Test	Charm Sciences	8
	None [¥]	Charm Beta-lactum 30 Second Test	Charm Sciences	3
	None [¥]	Charm Blue Yellow II Test	Charm Sciences	3
	None [¥]	Charm Cowside II Test	Charm Sciences	4
	None [¥]	Charm Flunixin and Beta-lactam Test	Charm Sciences	5.9
	None [¥]	Charm II Beta-lactam Test (Competitive)	Charm Sciences	7.5
	None [¥]	Charm II Beta-lactam Test (Quantitative)	Charm Sciences	7.5
	None [¥]	Charm II Beta-lactam Test (Sequential)	Charm Sciences	7.5
	None [¥]	Charm MRL Beta-lactam	Charm Sciences	4
	None [¥]	Charm MRL Beta-lactam 1 Minute Test and Tetracycline Test	Charm Sciences	4
	None [¥]	Charm MRL Beta-lactam 3 Minute Test	Charm Sciences	4
	None [¥]	Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Charm Sciences	4
	None [¥]	Charm MRL Beta-lactam RF Tetracycline 2 Minute Test	Charm Sciences	4
	None [¥]	Charm MRL Beta-lactam Test	Charm Sciences	4
	None [¥]	Charm Quad 1 Test	Charm Sciences	4
	None [¥]	Charm Quad Test	Charm Sciences	4
	None [¥]	Charm SL Beta-lactam Test	Charm Sciences	7.5
	None [¥]	Charm TRIO Test	Charm Sciences	4
	None [¥]	Delvotest P 5 Pack	DSM Food Specialties USA, Inc	5
	None [¥]	Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	5
Kanamycin	None [¥]	Charm <i>B. stearothersophilus</i> Tablet Disc Assay	Charm Sciences	1000
	None [¥]	Charm II Gentamicin and Streptomycin Test	Charm Sciences	1000
	None [¥]	Charm Quad 3 Test	Charm Sciences	100
	None [¥]	Delvotest SP-NT	DSM Food Specialties USA, Inc	5000
	None [¥]	Delvotest T	DSM Food Specialties USA, Inc	1310
	None [¥]	Eclipse® 3G	ZEU-Inmunotec	>2000
Lincomycin	None [¥]	Charm Blue Yellow II Test	Charm Sciences	150
	None [¥]	Charm Cowside II Test	Charm Sciences	150

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Residues Detected	Tolerance (ppb)	Test Name	Sponsor	Sensitivity (ppb)
Lincomycin	None [¥]	Charm II Macrolide Test	Charm Sciences	100
	None [¥]	Charm Quad 2 Test	Charm Sciences	150
	None [¥]	Delvotest P 5 Pack	DSM Food Specialties USA, Inc	400-1000
	None [¥]	Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	400-1000
	None [¥]	Delvotest SP-NT	DSM Food Specialties USA, Inc	156
	None [¥]	Delvotest T	DSM Food Specialties USA, Inc	180
	None [¥]	Eclipse® 3G	ZEU-Inmunotec	150
Neomycin	150 [#]	Charm Blue Yellow II Test	Charm Sciences	150
	150 [#]	Charm Cowside II Test	Charm Sciences	150
	150 [#]	Charm II Gentamicin and Neomycin Test	Charm Sciences	20 [?]
	150 [#]	Charm Quad 3 Test	Charm Sciences	250
	150 [#]	Charm ROSA Neomycin and Streptomycin Test	Charm Sciences	150
	150 [#]	Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	1000-5000 [?]
	150 [#]	Delvotest SP-NT	DSM Food Specialties USA, Inc	810
	150 [#]	Delvotest T	DSM Food Specialties USA, Inc	60
Novobiocin	150 [#]	Eclipse® 3G	ZEU-Inmunotec	1500
	100 [#]	Charm <i>B. stearothersophilus</i> Tablet Disc Assay	Charm Sciences	1000 [?]
	100 [#]	Charm II Novobiocin Test	Charm Sciences	100 [?]
	100 [#]	Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	600
Oxytetracycline	100 [#]	Delvotest SP-NT	DSM Food Specialties USA, Inc	750-800
	300 [#]	BetaStar 4D	Neogen Corporation	5
	300 [#]	BetaStar® Advanced for Tetracyclines	Neogen Corporation	190
	300 [#]	Charm <i>B. stearothersophilus</i> Tablet Disc Assay	Charm Sciences	1000 [†]
	300 [#]	Charm Blue Yellow II Test	Charm Sciences	100
	300 [#]	Charm Cowside II Test	Charm Sciences	100
	300 [#]	Charm HPLC-Receptogram	Charm Sciences	15
	300 [#]	Charm II Tetracycline Drug Test _m (Competitive Assay)	Charm Sciences	119 [*]
	300 [#]	Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Charm Sciences	100
	300 [#]	Charm MRL Beta-lactam and Tetracycline Test	Charm Sciences	100
	300 [#]	Charm MRL Beta-lactam RF Tetracycline 2 Minute Test	Charm Sciences	10
	300 [#]	Charm Quad 1 Test	Charm Sciences	70
	300 [#]	Charm Quad Test	Charm Sciences	6

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Residues Detected	Tolerance (ppb)	Test Name	Sponsor	Sensitivity (ppb)
Oxytetracycline	300 #	Charm ROSA Tetracycline Test (dilution confirmation)	Charm Sciences	243
	300 #	Charm ROSA Tetracycline Test	Charm Sciences	94
	300 #	Charm TRIO Test	Charm Sciences	53
	300 #	Delvotest P 5 Pack	DSM Food Specialties USA, Inc	400
	300 #	Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	300
	300 #	Delvotest SP-NT	DSM Food Specialties USA, Inc	235
	300 #	Delvotest T	DSM Food Specialties USA, Inc	80
	300 #	Eclipse® 3G	ZEU-Inmunotec	100
	300 #	SNAP Tetracycline	IDEXX Labs, Inc.	18
	300 #	SNAP Tetracycline (Dilution confirmation)	IDEXX Labs, Inc.	180
	300 #	SNAP duo ST Plus	IDEXX Labs, Inc.	18
	300 #	SNAP TRIO JAPAN	IDEXX Labs, Inc.	60
Penicillin	5 ^	BetaStar® Advanced for Beta-lactams	Neogen Corporation	4.6
	5 ^	Charm 3 SL3 Beta-lactam Test m	Charm Sciences	3.8 *
	5 ^	Charm <i>B. stearothermophilus</i> Tablet Disc Assay	Charm Sciences	3.8 * m
	5 ^	Charm Beta-lactum 30 Second Test	Charm Sciences	2.9
	5 ^	Charm Blue Yellow II Test	Charm Sciences	2
	5 ^	Charm Cowside II Test	Charm Sciences	3
	5 ^	Charm Flunixin and Beta-lactam Test m	Charm Sciences	2.0 *
	5 ^	Charm HPLC-Receptogram	Charm Sciences	5
	5 ^	Charm II Beta-lactam Test m (Competitive)	Charm Sciences	3.0 *
	5 ^	Charm II Beta-lactam Test m (Quantitative)	Charm Sciences	3.4 *
	5 ^	Charm II Beta-lactam Test m (Sequential)	Charm Sciences	3.4 *
	5 ^	Charm MRL Beta-lactam 1 Minute Test	Charm Sciences	3
	5 ^	Charm MRL Beta-lactam 3 Minute Test	Charm Sciences	3
	5 ^	Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Charm Sciences	3
	5 ^	Charm MRL Beta-lactam and Tetracycline Test	Charm Sciences	3
	5 ^	Charm MRL Beta-lactam RF Tetracycline 2 Minute Test	Charm Sciences	2.5
	5 ^	Charm MRL Beta-lactam Test	Charm Sciences	3
	5 ^	Charm Quad 1 Test	Charm Sciences	4
	5 ^	Charm Quad Test	Charm Sciences	3.0
	5 ^	Charm SL Beta-lactam Test m	Charm Sciences	3.6 *
	5 ^	Charm TRIO Test	Charm Sciences	2
	5 ^	Delvotest P 5 Pack m	DSM Food Specialties USA, Inc	2.1 *

¥ No official tolerance or target testing levels have been established by the FDA.

Tolerance is the maximum legally allowable level or concentration of a drug or chemical in a food product at the time milk is marketed or the animal is slaughtered.

Milk Screening Tests

Not all of the tests listed below have been evaluated by FDA and accepted by the National Conference on Interstate Milk Shipments (NCIMS) for residue testing. Refer to M-a-85 (latest revision) or M-1-92-11. These tests are believed to be reliable indicators of antibiotic contamination in milk and should be viewed as tools to screen bulk tank milk.

Residues Detected	Tolerance (ppb)	Test Name	Sponsor	Sensitivity (ppb)
Penicillin	5 ^	Delvotest P/Delvotest P Mini m	DSM Food Specialties USA, Inc	3.1 *
	5 ^	Delvotest SP-NT	DSM Food Specialties USA, Inc	1.5
	5 ^	Delvotest T	DSM Food Specialties USA, Inc	2
	5 ^	Eclipse® 3G	ZEU-Inmunotec	2-3.0
	5 ^	New SNAP Beta-lactam (Visual)	IDEXX Labs, Inc.	3.1
	5 ^	New SNAP Beta-lactam m	IDEXX Labs, Inc.	3
	5 ^	Penzyme® Milk Test	Neogen Corporation	5
	5 ^	SNAP Beta-Lactam ST	IDEXX Labs, Inc.	3
	5 ^	SNAP Beta-Lactam ST Plus	IDEXX Labs, Inc.	2
	5 ^	SNAP duo ST Plus	IDEXX Labs, Inc.	2
	5 ^	SNAP TRIO JAPAN	IDEXX Labs, Inc.	3
Pirlimycin	400 #	Charm <i>B. stearothermophilus</i> Tablet Disc Assay	Charm Sciences	100
	400 #	Charm Blue Yellow II Test	Charm Sciences	100
	400 #	Charm Cowside II Test	Charm Sciences	50
	400 #	Charm II Macrolide Test	Charm Sciences	80
	400 #	Charm Quad 2 Test	Charm Sciences	100
	400 #	Charm ROSA Macrolide Test	Charm Sciences	80
	400 #	Charm ROSA Pirlimycin Test	Charm Sciences	250
	400 #	Delvotest P 5 Pack	DSM Food Specialties USA, Inc	80
	400 #	Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	80
	400 #	Delvotest SP-NT	DSM Food Specialties USA, Inc	20-80
	400 #	SNAP TRIO JAPAN	IDEXX Labs, Inc.	80
Polymixin B	None [¥]	Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	30
Rifaximin	None [¥]	Delvotest T	DSM Food Specialties USA, Inc	40
Spectinomycin	None [¥]	Charm <i>B. stearothermophilus</i> Tablet Disc Assay	Charm Sciences	1000 [†]
	None [¥]	Charm Cowside II Test	Charm Sciences	1000
	None [¥]	Charm Quad 3 Test	Charm Sciences	200
	None [¥]	Delvotest T	DSM Food Specialties USA, Inc	1850
	None [¥]	Eclipse® 3G	ZEU-Inmunotec	>2500
Streptomycin	None [¥]	BetaStar 4D Beta-lactam, Tetracycline, Chloramphenicol, Streptomycin Test	Neogen Corporation	200
	None [¥]	Charm <i>B. stearothermophilus</i> Tablet Disc Assay m	Charm Sciences	1000 [†]
	None [¥]	Charm Cowside II Test	Charm Sciences	1000
	None [¥]	Charm II Gentamicin and Streptomycin Test	Charm Sciences	20 [†]

[¥] No official tolerance or target testing levels have been established by the FDA.

[#] Tolerance is the maximum legally allowable level or concentration of a drug or chemical in a food product at the time milk is marketed or the animal is slaughtered.

[†] The sensitivity of the test method was determined by independent research at Virginia Polytechnic Institute and State University.

Milk Screening Tests

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Residues Detected	Tolerance (ppb)	Test Name	Sponsor	Sensitivity (ppb)
Streptomycin	None ^Y	Charm Quad 3 Test	Charm Sciences	175
	None ^Y	Charm ROSA Neomycin and Streptomycin Test	Charm Sciences	150
	None ^Y	Charm ROSA Streptomycin Test	Charm Sciences	75
	None ^Y	Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	4000
	None ^Y	Delvotest SP-NT	DSM Food Specialties USA, Inc	1200
	None ^Y	Delvotest T	DSM Food Specialties USA, Inc	400
	None ^Y	Eclipse [®] 3G	ZEU-Inmunotec	1500
Sulfachlorpyridazine*	10 [^]	BetaStar S for Sulfonamides	Neogen Corporation	1
	10 [^]	Charm HPLC Receptogram	Charm Sciences	10
	10 [^]	Charm II Sulfa Drug Test M	Charm Sciences	5
	10 [^]	Charm Quad 1 Test	Charm Sciences	20
	10 [^]	Charm ROSA Sulfa Test	Charm Sciences	2
	10 [^]	Charm TRIO Test	Charm Sciences	1
	10 [^]	Charm Blue Yellow II Test	Charm Sciences	50
	10 [^]	Charm Cowside II Test	Charm Sciences	50
Sulfadiazine*	10 [^]	BetaStar S for Sulfonamides	Neogen Corporation	40
Sulfadiazine*	10 [^]	Charm Blue Yellow II Test	Charm Sciences	50
	10 [^]	Charm Cowside II Test	Charm Sciences	50
	10 [^]	Charm HPLC-Receptogram	Charm Sciences	5
	10 [^]	Charm II Sulfa Drug Test (Competitive Assay)	Charm Sciences	4.9*
	10 [^]	Charm Quad 1 Test	Charm Sciences	20
	10 [^]	Charm ROSA Sulfa Test	Charm Sciences	4
	10 [^]	Charm TRIO Test	Charm Sciences	3
	10 [^]	Delvotest SP-NT	DSM Food Specialties USA, Inc	50
	10 [^]	Delvotest T	DSM Food Specialties USA, Inc	50
	10 [^]	Eclipse [®] 3G	ZEU-Inmunotec	100
	10 [#]	BetaStar S for Sulfonamides	Neogen Corporation	10
Sulfadimethoxine	10 [#]	Charm <i>B. stearothersophilus</i> Tablet Disc Assay	Charm Sciences	10,000
	10 [#]	Charm Cowside II Test	Charm Sciences	25
	10 [#]	Charm HPLC-Receptogram	Charm Sciences	5
	10 [#]	Charm II Sulfa Drug Test M (Competitive Assay)	Charm Sciences	4.0*
	10 [#]	Charm ROSA Sulfa Test	Charm Sciences	7.7
	10 [#]	Charm TRIO Test	Charm Sciences	7.6
	10 [#]	Delvotest SP-NT	DSM Food Specialties USA, Inc	100
	10 [#]	Delvotest T	DSM Food Specialties USA, Inc	40
	10 [#]	BetaStar S for Sulfonamides	Neogen Corporation	10
	10 [#]	Charm <i>B. stearothersophilus</i> Tablet Disc Assay	Charm Sciences	10,000

Milk Screening Tests

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Residues Detected	Tolerance (ppb)	Test Name	Sponsor	Sensitivity (ppb)
Sulfadoxine *	None [✓]	BetaStar S for Sulfonamides	Neogen Corporation	30-40
	None [✓]	Charm Blue Yellow II Test	Charm Sciences	100
	None [✓]	Charm Cowside II Test	Charm Sciences	100
	None [✓]	Charm II Sulfa Drug Test	Charm Sciences	7
	None [✓]	Charm Quad 1 Test	Charm Sciences	100
	None [✓]	Charm ROSA Sulfa Test	Charm Sciences	18
	None [✓]	Charm TRIO Test	Charm Sciences	20
	None [✓]	Delvotest SP-NT	DSM Food Specialties USA, Inc	110
Sulfaethosxypyridazine	10 [^]	BetaStar S for Sulfonamides	Neogen Corporation	1
Sulfamerazine*	10 [^]	BetaStar S for Sulfonamides	Neogen Corporation	10
	10 [^]	Charm Blue Yellow II Test	Charm Sciences	100
	10 [^]	Charm Cowside II Test	Charm Sciences	100
	10 [^]	Charm HPLC-Receptogram	Charm Sciences	5
	10 [^]	Charm II Sulfa Drug Test	Charm Sciences	4.0 [†]
	10 [^]	Charm Quad 1 Test	Charm Sciences	40
	10 [^]	Charm ROSA Sulfa Test	Charm Sciences	4
	10 [^]	Charm TRIO Test	Charm Sciences	4
	10 [^]	Delvotest SP-NT	DSM Food Specialties USA, Inc	100-50
Sulfamethazine x	10 [^]	BetaStar S for Sulfonamides	Neogen Corporation	30
	10 [^]	Charm Blue Yellow II Test	Charm Sciences	100
	10 [^]	Charm Cowside II Test	Charm Sciences	100
	10 [^]	Charm HPLC-Receptogram	Charm Sciences	5
	10 [^]	Charm II Sulfa Drug Test (Competitive Assay)	Charm Sciences	9.4 •
	10 [^]	Charm Quad 1 Test	Charm Sciences	20
	10 [^]	Charm ROSA Sulfa Test	Charm Sciences	7.8
	10 [^]	Charm TRIO Test	Charm Sciences	9.2
	10 [^]	Delvotest SP-NT	DSM Food Specialties USA, Inc	150
	10 [^]	Delvotest T	DSM Food Specialties USA, Inc	150
	10 [^]	Eclipse® 3G	ZEU-Inmunotec	150
	10 [^]	SNAP Sulfamethazine Test	IDEXX Labs, Inc.	10
Sulfamethizole*	10 [^]	Charm Blue Yellow II Test	Charm Sciences	50
	None [✓]	Charm Blue Yellow II Test	Charm Sciences	50
	10 [^]	Charm Cowside II Test	Charm Sciences	20
	None [✓]	Charm Cowside II Test	Charm Sciences	50

Milk Screening Tests

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Residues Detected	Tolerance (ppb)	Test Name	Sponsor	Sensitivity (ppb)
Sulfamethizole*	10 ^	Charm HPLC-Receptogram	Charm Sciences	5
	None ˇ	Charm HPLC-Receptogram	Charm Sciences	5
	None ˇ	Charm II Sulfa Drug Test	Charm Sciences	20 †
	10 ^	Charm II Sulfa Drug Test	Charm Sciences	6.0 †
	10 ^	Charm Quad 1 Test	Charm Sciences	50
	None ˇ	Charm Quad 1 Test	Charm Sciences	50
	10 ^	Charm ROSA Sulfa Test	Charm Sciences	1
	10 ^	Charm TRIO Test	Charm Sciences	1
	None ˇ	Charm TRIO Test	Charm Sciences	2
	None ˇ	Delvotest SP-NT	DSM Food Specialties USA, Inc	50 †
Sulfamethoxazole*	None ˇ	BetaStar S for Sulfonamides	Neogen Corporation	70-90
	None ˇ	Charm ROSA Sulfa Test	Charm Sciences	3
Sulfanilamide*	10 ^	Charm Blue Yellow II Test	Charm Sciences	200
	10 ^	Charm Cowside II Test	Charm Sciences	200
	10 ^	Charm HPLC-Receptogram	Charm Sciences	10
	10 ^	Charm II Sulfa Drug Test	Charm Sciences	20
	10 ^	Charm ROSA Sulfa Test	Charm Sciences	1000
	10 ^	Charm TRIO Test	Charm Sciences	1000
	10 ^	Delvotest SP-NT	DSM Food Specialties USA, Inc	100
Sulfapyridine*	10 ^	Charm Blue Yellow II Test	Charm Sciences	100
	10 ^	Charm Cowside II Test	Charm Sciences	100
	10 ^	Charm HPLC-Receptogram	Charm Sciences	5
	10 ^	Charm II Sulfa Drug Test	Charm Sciences	10
	10 ^	Charm Quad 1 Test	Charm Sciences	20
	10 ^	Charm ROSA Sulfa Test	Charm Sciences	10
	10 ^	Charm TRIO Test	Charm Sciences	5
Sulfaquinoxaline*	10 ^	BetaStar S for Sulfonamides	Neogen Corporation	10
Sulfaquinoxaline*	10 ^	Charm Blue Yellow II Test	Charm Sciences	100
	10 ^	Charm Cowside II Test	Charm Sciences	100
	10 ^	Charm HPLC Receptogram	Charm Sciences	2
	10 ^	Charm II Sulfa Drug Test m	Charm Sciences	3
	10 ^	Charm Quad 1 Test	Charm Sciences	20

Milk Screening Tests

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Residues Detected	Tolerance (ppb)	Test Name	Sponsor	Sensitivity (ppb)
Sulfaquinolaxaline*	10 ^	Charm ROSA Sulfa Test	Charm Sciences	4
	10 ^	Charm TRIO Test	Charm Sciences	3
Sulfathiazole*	10 ^	BetaStar S for Sulfonamides	Neogen Corporation	1
	10 ^	Charm Blue Yellow II Test	Charm Sciences	50
	10 ^	Charm Cowside II Test	Charm Sciences	50
	10 ^	Charm HPLC-Receptogram	Charm Sciences	5
	10 ^	Charm II Sulfa Drug Test m (Competitive Assay)	Charm Sciences	7.3 •
	10 ^	Charm Quad 1 Test	Charm Sciences	20
	10 ^	Charm ROSA Sulfa Test	Charm Sciences	2
	10 ^	Charm TRIO Test	Charm Sciences	1
	10 ^	Delvotest SP-NT	DSM Food Specialties USA, Inc	50
	10 ^	Delvotest T	DSM Food Specialties USA, Inc	50
	10 ^	Eclipse® 3G	ZEU-Inmunotec	100
	None y	Charm Blue Yellow II Test	Charm Sciences	50
	None y	Charm Cowside II Test	Charm Sciences	50
	None y	Charm II Sulfa Drug Test	Charm Sciences	6
	None y	Charm Quad 1 Test	Charm Sciences	20
	None y	Charm ROSA Sulfa Test	Charm Sciences	20
	None y	Charm TRIO Test	Charm Sciences	15
Tetracycline	300 #	BetaStar 4D	Neogen Corporation	10
	300 #	BetaStar® Advanced for Tetracyclines	Neogen Corporation	245
	300 #	Charm <i>B. stearothermophilus</i> Tablet Disc Assay	Charm Sciences	1000
	300 #	Charm Blue Yellow II Test	Charm Sciences	100
	300 #	Charm Cowside II Test	Charm Sciences	100
	300 #	Charm HPLC-Receptogram	Charm Sciences	5.0
	300 #	Charm II Tetracycline Drug Test m (Competitive Assay)	Charm Sciences	67 •
	300 #	Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Charm Sciences	30
	300 #	Charm MRL Beta-lactam and Tetracycline Test	Charm Sciences	30
	300 #	Charm MRL Beta-lactam RF Tetracycline 2 Minute Test	Charm Sciences	10
	300 #	Charm Quad 1 Test	Charm Sciences	20
	300 #	Charm Quad Test	Charm Sciences	6
	300 #	Charm ROSA Tetracycline Test (dilution confirmation)	Charm Sciences	74
	300 #	Charm ROSA Tetracycline Test	Charm Sciences	46
	300 #	Charm TRIO Test	Charm Sciences	42

Milk Screening Tests

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Residues Detected	Tolerance (ppb)	Test Name	Sponsor	Sensitivity (ppb)
Tetracycline	300 #	Delvotest P 5 Pack	DSM Food Specialties USA, Inc	300
	300 #	Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	300
	300 #	Delvotest SP-NT	DSM Food Specialties USA, Inc	270
	300 #	Delvotest T	DSM Food Specialties USA, Inc	75
	300 #	Eclipse® 3G	ZEU-Inmunotec	100
	300 #	SNAP Tetracycline	IDEXX Labs, Inc.	30
	300 #	SNAP Tetracycline (Dilution confirmation)	IDEXX Labs, Inc.	292
	300 #	SNAP duo ST Plus	IDEXX Labs, Inc.	16
	300 #	SNAP TRIO JAPAN	IDEXX Labs, Inc.	80
Thiamphenicol †	None	Charm II Amphenicol Test	Charm Sciences	50
	None	Charm ROSA Amphenicol Test	Charm Sciences	5
Tilmicosin †	None	Charm Cowside II Test	Charm Sciences	50
	None	Charm II Macrolide Test	Charm Sciences	20
	None	Charm Quad 2 Test	Charm Sciences	40
	None	Charm ROSA Macrolide Test	Charm Sciences	40
	None	Delvotest SP-NT	DSM Food Specialties USA, Inc	50
	None	Delvotest T	DSM Food Specialties USA, Inc	60
Trimethoprim †	None	Charm Cowside II Test	Charm Sciences	300
	None	Delvotest T	DSM Food Specialties USA, Inc	110
Tulathromycin †	None	Charm II Macrolide Test	Charm Sciences	20
Tylosin	50 #	Charm Cowside II Test	Charm Sciences	30
	50 #	Charm II Macrolide Test	Charm Sciences	50 †
	50 #	Charm Quad 2 Test	Charm Sciences	30
	50 #	Charm ROSA Macrolide Test	Charm Sciences	40
	50 #	Delvotest P 5 Pack	DSM Food Specialties USA, Inc	100
	50 #	Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	100
	50 #	Delvotest SP-NT	DSM Food Specialties USA, Inc	50
	50 #	Delvotest T	DSM Food Specialties USA, Inc	50
	50 #	Eclipse® 3G	ZEU-Inmunotec	40

Milk Screening Tests

Only Use Drugs Approved for Lactating Dairy Cows

Screening Tests Available as of January 2020 for Detecting Residues in Bulk Tank Milk.

Tests listed below have been evaluated by FDA and accepted by the National Conference on Interstate Milk Shipments (NCIMS) for residue testing. Refer to [M-a-85](#) or M-I-92-11 (latest revisions) for current listing. These tests are believed to be reliable indicators of antibiotic contamination in milk and should be viewed as tools to screen bulk tank milk.

Test Name	Residues Detected At or Below Safe/Tolerance Levels
BetaStar® Advanced for Beta-lactams	Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Cloxacillin, Penicillin
BetaStar® Advanced for Tetracyclines	Chlorotetracycline, Oxytetracycline, Tetracycline
Charm 3 SL3 Beta-lactam Test	Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Cloxacillin, Penicillin
Charm <i>B. stearothersophilus</i> Tablet Disc Assay	Amoxicillin, Ampicillin, Cephapirin, Penicillin
Charm Flunixin and Beta-lactam Test	Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Cloxacillin, Flunixin, Penicillin
Charm ROSA Tetracycline - SL Test (dilution confirmation)	Chlorotetracycline, Oxytetracycline, Tetracycline
Charm II Beta-lactam Test (Competitive)	Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Penicillin
Charm II Beta-lactam Test (Quantitative)	Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Cloxacillin, Penicillin
Charm II Beta-lactam Test (Sequential)	Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Penicillin
Charm II Sulfa Drug Test (Competitive Assay)	Sulfadiazine, Sulfadimethoxine, Sulfamethazine, Sulfathiazole
Charm II Test for Cloxacillin in Milk (Competitive Assay)	Cloxacillin
Charm II Tetracycline Test	Chlortetracycline, Oxytetracycline, Tetracycline
Charm SL Beta-lactam Test	Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Penicillin
Charm ROSA Sulfa Test	Sulfadiazine, Sulfadimethoxine, Sulfamethazine, Sulfathiazole, Sulfachlorpyridazine, Sulfamerazine, Sulfamethizole, Sulfamethoxazole, Sulfapyridine, Sulfaquinoxaline
Charm TRIO Test	Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Chlortetracycline, Hetacillin, Oxytetracycline, Penicillin, Sulfachlorpyridazine, Sulfadiazine, Sulfadimethoxine, Sulfamerazine, Sulfamethazine, Sulfamethizole, Sulfaquinoxaline, Sulfathiazole, Tetracycline
Delvotest P 5 Pack	Amoxicillin, Ampicillin, Cephapirin, Penicillin
Delvotest P/Delvotest P Mini	Amoxicillin, Ampicillin, Cephapirin, Penicillin
New SNAP Beta-Lactam Test Kit	Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Penicillin
IDEXX SNAP Beta-Lactam Test Kit	Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Penicillin
IDEXX SNAP Tetracycline (Dilution Confirmation)	Oxytetracycline, Tetracycline

Milk Screening Tests

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Screening Tests Available as of January 2020 for Detecting Residues in Bulk Tank Milk.

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Test Name	Residues Detected At or Below Safe/Tolerance Levels
2,4 D RaPID Assay	2,4-D
Atrazine RaPID Assay	Atrazine
Benomyl RaPID Assay	Carbendazim
BetaStar 4D	Beta-lactam, Tetracycline, Streptomycin, Chloramphenicol
BetaStar for Quinolone	Quinolones
BetaStar S	Beta-lactam
BetaStar S Combo	Beta-lactam, Tetracycline
Charm Beta -lactam 30 Second Test	Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Cloxacillin, Penicillin
Charm Blue Yellow II Test	Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Chlortetracycline, Hetacillin, Lincomycin, Neomycin, Oxytetracycline, Penicillin, Pirlimycin, Tetracycline, Tilimycin, Tylosin
Charm Cowside II Test	Amoxicillin, Ampicillin, Cephapirin, Chlortetracycline, Hetacillin, Neomycin, Oxytetracycline, Penicillin, Pirlimycin, Tetracycline, Tilimycin, Tylosin
Charm MRL Beta-lactam 1 Minute Test	Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Hetacillin, Penicillin
Charm MRL Beta-lactam 3 Minute Test	Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Hetacillin, Penicillin
Charm MRL Beta-lactam and RF Tetracycline 2 Minute Test	Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Chlortetracycline, Hetacillin, Oxytetracycline, Penicillin, Tetracycline
Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Chlortetracycline, Hetacillin, Oxytetracycline, Penicillin, Tetracycline
Charm MRL Beta-lactam and Tetracycline Test	Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Chlortetracycline, Hetacillin, Oxytetracycline, Penicillin, Tetracycline
Charm MRL Beta-lactam Test	Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Hetacillin, Penicillin
Charm Quad 1 Test	Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Chlortetracycline, Hetacillin, Oxytetracycline, Penicillin, Tetracycline
Charm Quad 2 Test	Erythromycin, Lincomycin, Pirlimycin, Tilimycin, Tylosin
Charm Quad 3 Test	Dihydrostreptomycin, Neomycin
Charm Quad Test	Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Chlortetracycline, Dihydrostreptomycin, Hetacillin, Oxytetracycline, Penicillin, Streptomycin, Tetracycline
Charm ROSA Gentamicin Test	Gentamicin

Milk Screening Tests

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Screening Tests Available as of January 2020 for Detecting Residues in Bulk Tank Milk.

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Test Name	Residues Detected At or Below Safe/Tolerance Levels
Charm 3 SL3 Beta-lactam Test	Hetacillin
Charm B. stearothermophilus Tablet Disc Assay	Hetacillin, Pirlimycin
Charm HPLC-Receptogram	Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Chlortetracycline, Cloxacillin, Penicillin, Sulfadiazine, Sulfadimethoxine, Sulfamethazine, Sulfachlorpyridazine, Sulfamerazine, Sulfamethizole, Sulfanilamide, Sulfapyridine, Sulfaquinoxaline, Sulfathiazole, Oxytetracycline, Tetracycline
Charm II Aflatoxin Test	Aflatoxin M1
Charm II Beta-lactam Test (Competitive)	Hetacillin
Charm II Beta-lactam Test (Quantitative)	Hetacillin
Charm II Gentamicin and Neomycin Test	Gentamicin, Neomycin
Charm II Macrolide Test	Erythromycin, Pirlimycin, Tilimicosin, Tulathromycin, Tylosin
Charm II Novobiocin Test	Novobiocin
Charm II Streptomycin Test	Dihydrostreptomycin, Gentamicin
Charm MRL Aflatoxin Quantitative Test	Aflatoxin M1
Charm Pirlimycin Test	Pirlimycin
Charm ROSA Macrolide Test	Erythromycin, Pirlimycin, Tilimicosin, Tulathromycin
Charm ROSA Streptomycin Test	Dihydrostreptomycin
Charm ROSA Tetracycline Test	Chlortetracycline, Oxytetracycline, Tetracycline
Charm SL Aflatoxin Test (Quantitative)	Aflatoxin M1
Charm SL Beta-lactam Test	Hetacillin
Delvost P 5 Pack	Pirlimycin, Tetracycline
Delvost P/Delvotest P Mini	Pirlimycin, Tetracycline
Reveal® Q+ for Aflatoxin in M1	Aflatoxin M1
Reveal® Q+ HS for Aflatoxin in M1	Aflatoxin M1
IDEXX SNAP Aflatoxin M1 Test	Aflatoxin M1
IDEXX SNAP Beta-Lactam ST	Amoxicillin, Ampicillin, Ceftiofur, Cloxacillin, Penicillin
IDEXX SNAP Beta-Lactam ST Plus	Amoxicillin, Ampicillin, Ceftiofur, Cloxacillin, Penicillin
IDEXX SNAP Gentamicin Test	Gentamicin
IDEXX SNAP Sulfamethazine Test	Sulfamethazine
IDEXX SNAP Tetracycline Test	Chlortetracycline, Oxytetracycline, Tetracycline
IDEXX SNAPduo ST Plus	Amoxicillin, Ampicillin, Ceftiofur, Chlortetracycline, Cloxacillin, Oxytetracycline, Penicillin, Tetracycline

Glossary

Best Practice: An animal care guideline, protocol or practice that achieves the desired outcome described by the corresponding Management Checklist Point. More than one best practice may exist for a corresponding outcome. For example, a best practice for an “effective record keeping system,” which is a FARM Program guideline outlined in Chapter 3, may be individual written animal health logs or a computer record system such as DairyComp 305.

Bred Heifer: A young, pregnant dairy animal that has not yet given birth to her first calf, typically 13-to-24 months of age.

Distress: Occurs when livestock are injured, sick or in pain.

Dry Cows: Non-lactating pregnant cows from the end of lactation until next parturition. A pregnant cow is generally dry or non-lactating for a period of 40-to-60 days before the next calving.

Dystocia: Difficult birth typically requiring assistance from the animal caretaker.

End of Life: On-farm death due to illness, euthanasia or death at a packing house.

Growing Animals: The period of time between weaning and first parturition during which an animal grows through puberty and begins to approach maturity, approximately from 6 weeks to 24 months of age. See also Bred Heifer, Open Heifer and Springing Heifer.

Herd Health Plan: An animal health management system developed with a veterinarian to prevent, diagnose, control and treat disease or injury of all dairy cattle on a farm.

Lactating Dairy Cow: Any bovine female that has had her first calf.

Licensed Veterinarian: Licensed by one or more state boards of veterinary medical examiners to practice veterinary medicine within the respective state(s).

Milk-Fed Dairy Calf: A calf being fed milk or milk replacer (and not suckling from the dam) from newborn through weaning.

Milking Cows: Cows that are lactating.

Newborn: The young of the domestic cow, from birth through colostrum feeding, typically the first 48 hours of life.

Open Heifer: A young bovine female that has not yet become pregnant.

Pain: An unpleasant physical sensation occurring in varying degrees of severity as consequence of injury, disease or from a medical or management procedure.

Protocols: Written processes that may include instructions provided by the Veterinarian of Record for the management of dairy cows in various situations and under various conditions.

Special-Needs Animals: Sick, injured or non-ambulatory dairy cattle.

Springing Heifers: A heifer that is in the last few weeks of pregnancy.

Stockmanship: The knowledgeable and skillful handling of cattle, based on accepted animal behavior principles, in a safe, efficient, effective and low-stress manner.

Transition Cows: Cows or heifers that are “transitioning” from the period of late gestation (pregnancy) through the period of early lactation, that is, about three weeks prior to and about three weeks after calving (periparturient period).

Veterinarian-Client-Patient Relationship (VCPR): The FARM Program uses the AVMA (2013) definition of a VCPR. A VCPR exists when:

- The veterinarian has assumed the responsibility for making medical judgments regarding the health of the patient and the client has agreed to follow the veterinarian’s instructions.
- The veterinarian has sufficient knowledge of the patient to initiate at least a general or preliminary diagnosis of the medical condition of the patient. This means that the veterinarian is personally acquainted with the keeping and care of the patient by virtue of:
 - A timely examination of the patient by the veterinarian, or
 - Medically appropriate and timely visits by the veterinarian to the operation where the

patient is managed.

- The veterinarian is readily available for follow-up evaluation or has arranged for the following:
 - Veterinary emergency coverage, and
 - Continuing care and treatment.
- The veterinarian provides oversight of treatment, compliance and outcome.
- Patient records are maintained.

Veterinarian of Record (VOR): The Veterinarian of Record is the responsible party for providing appropriate oversight of drug use on the farm operation. Such oversight is a critical component of establishing, maintaining and validating a VCPR. This oversight should include but may not be limited to establishment of treatment protocols, training of personnel, review of treatment records, monitoring drug inventories, and assuring appropriate labeling of drugs.

Weaned Animal: A young calf that is no longer being fed milk or milk replacer and has been transitioned to eating only dry feed.

Written Protocol: A document that provides specific instructions to cow-side personnel for performing a single, specific task. As a training tool, written protocols improve communication and work consistency.

Young Stock: Animals from weaning to 20 months of age.

Contact Information

Companies Marketing Drug Residue Tests

Charm Sciences Inc.

659 Andover St.
Lawrence, MA 01843
Phone: 800-343-2170

DSM Food Specialties USA, Inc.

45 Waterview Blvd.
Parsippany, NJ 07054
Phone: 800-662-4478

IDEXX Laboratories, Inc.

One IDEXX Drive
Westbrook, ME 04092
Phone: 800-548-9997

Neogen Corporation

620 Leshner Place
Lansing, MI 48912
Phone: 800-234-5333

Silver Lake

Research Corporation
911 So. Primrose Ave. Ste. N
Monrovia, CA 91016
Phone: 888-438-1942

Strategic Diagnostics, Inc.

111 Pencader Drive
Newark, DE 19702
Phone: 800-544-8881

ZEU-Inmunotec, S.L.

Polígono Plaza
C/Bari, 25 dpdo.
50197 Zaragoza SPAIN
(34) 976.731533

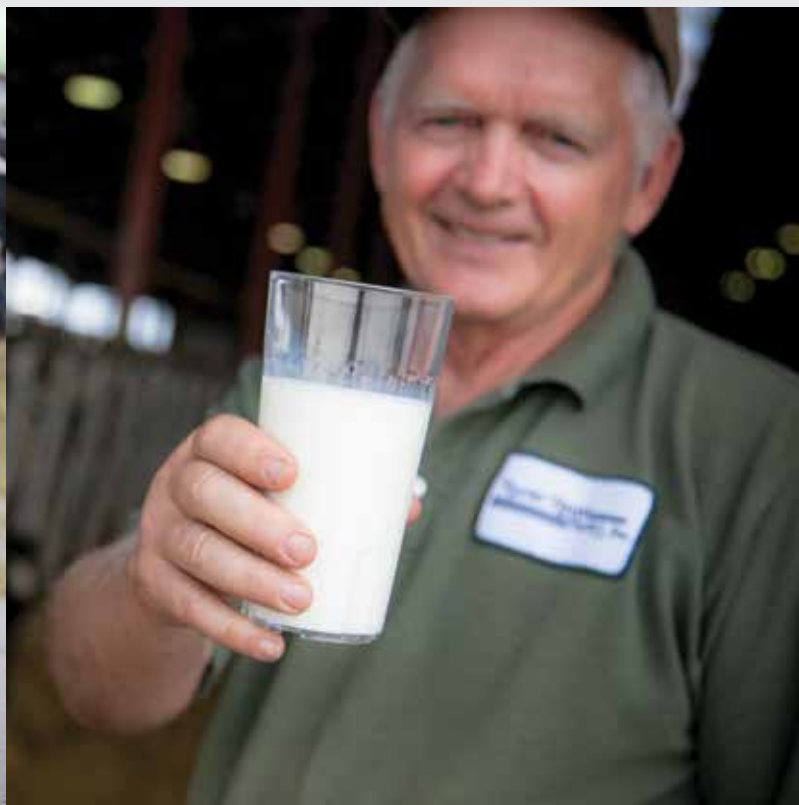
National Dairy FARM Program



2107 Wilson Blvd., Suite 600
Arlington, VA 22201
Phone: 703-243-6111
Email: dairyfarm@nmpf.org
Website: nationaldairyfarm.com



CONNECTING COWS, COOPERATIVES, CAPITOL HILL & CONSUMERS



For more information visit
WWW.NMPF.ORG
or contact us directly at **info@nmpf.org**



Learn more about the National Dairy FARM Program

NATIONALDAIRYFARM.COM

Contact the National Milk Producers Federation

(703) 243-6111

DAIRYFARM@NMPF.ORG



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