Milk & Dairy Beef Drug Residue Prevention

Reference Manual 2017

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, 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.

NMPF
NATIONAL MILK
PRODUCERS FEDERATION

DMI DAIRY MANAGEMENT INC.™

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.

Consumers count on the care you provide to make sure that your animals are healthy and comfortable. And when an animal does get sick, **Resflor Gold®** (*florfenicol* and *flunixin meglumine*) helps you do both of those things. Resflor Gold effectively targets the most common causes of BRD – and it provides relief from the fever that comes along with it.

MERCK Animal Health

High-quality food starts with the right care. Visit ResflorGold.com to learn more.

IMPORTANT SAFETY INFORMATION

NOT FOR HUMAN USE. KEEP OUT OF REACH OF CHILDREN. This product contains material that can be irritating to skin and eyes. Animals intended for human consumption must not be slaughtered within 38 days of treatment. This product is not approved for use in female dairy cattle 20 months of age or older, including dry dairy cows. Use in these cattle may cause drug residues in milk and/or in calves born to these cows. A withdrawal period has not been established in pre-ruminating calves. Do not use in calves to be processed for veal. Do not use in animals that have shown hypersensitivity to florfenicol or flunixin. Not for use in animals intended for breeding purposes. The effects of florfenicol and flunixin on bovine reproductive performance, pregnancy, and lactation have not been determined. When administered according to the label directions, RESFLOR GOLD may induce a transient local reaction in the subcutaneous and underlying muscle tissue. Brief summary available on adjacent page.

2 Giralda Farms • Madison, NJ 07940 • merck-animal-health-usa.com • 800-521-5767

7/15 BV-RG-53719

PRODUCT INFORMATION
NADA 141-299, Approved by FDA.

Resflor GOLD® Florfenicol and Flunixin Meglumine

(Florfenicol and Flunixin Meglumine)
Antimicrobial/Non-Steroidal Anti-Inflammatory Drug

For subcutaneous use in beef and non-lactating dairy cattle only. Not for use in female dairy cattle 20 months of age or older or in calves to be processed for veal.

BRIEF SUMMARY: For full prescribing information, see package insert.

INDICATION: RESFLOR GOLD® is indicated for treatment of bovine respiratory disease (BRD) associated with *Mannheimia haemolytica, Pasteurella multocida, Histophilus somni,* and *Mycoplasma bovis,* and control of BRD-associated pyrexia in beef and non-lactating dairy cattle.

CONTRAINDICATIONS: Do not use in animals that have shown hypersensitivity to florfenicol or flunixin.

WARNINGS: NOT FOR HUMAN USE. KEEP OUT OF REACH OF CHILDREN. This product contains material that can be irritating to skin and eyes. Avoid direct contact with skin, eyes, and clothing. In case of accidental eye exposure, flush with water for 15 minutes. In case of accidental skin exposure, wash with soap and water. Remove contaminated clothing. Consult a physician if irritation persists. Accidental injection of this product may cause local irritation. Consult a physician immediately. The Material Safety Data Sheet (MSDS) contains more detailed occupational safety information.

For customer service or to obtain a copy of the MSDS, call 1-800-211-3573. For technical assistance or to report suspected adverse reactions, call 1-800-219-9286.

Not for use in animals intended for breeding purposes. The effects of florfenicol on bovine reproductive performance, pregnancy, and lactation have not been determined. Toxicity studies in dogs, rats, and mice have associated the use of florfenicol with testicular degeneration and atrophy. NSAIDs are known to have potential effects on both parturition and the estrous cycle. There may be a delay in the onset of estrus if flunixin is administered during the prostaglandin phase of the estrous cycle. The effects of flunixin on imminent parturition have not been evaluated in a controlled study. NSAIDs are known to have the potential to delay parturition through a tocolytic effect.

RESFLOR GOLD®, when administered as directed, may induce a transient reaction at the site of injection and underlying tissues that may result in trim loss of edible tissue at slaughter.

RESIDUE WARNINGS: Animals intended for human consumption must not be slaughtered within 38 days of treatment. Do not use in female dairy cattle 20 months of age or older. Use of florfenicol in this class of cattle may cause milk residues. A withdrawal period has not been established in pre-ruminating calves. Do not use in calves to be processed for veal.

ADVERSE REACTIONS: Transient inappetence, diarrhea, decreased water consumption, and injection site swelling have been associated with the use of florfenicol in cattle. In addition, anaphylaxis and collapse have been reported post-approval with the use of another formulation of florfenicol in cattle.

In cattle, rare instances of anaphylactic-like reactions, some of which have been fatal, have been reported, primarily following intravenous use of flunixin meglumine.

Made in Germany
Intervet Inc. Roseland, NJ 07068

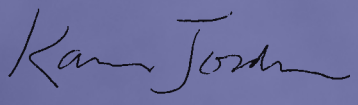
May 2009 US 3448_JV

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 we meet their needs and exceed their expectations every day. Day in and day out, our dairy farmers provide the best in animal husbandry and in care for their animals. Continually, we evaluate our best management practices and disease prevention protocols to keep our animals healthy and comfortable. There are occasions where animals may get sick and need antimicrobial therapy to overcome a specific disease challenge. As dairy producers, we strategically and judiciously use our antimicrobial therapy to help an individual animal that has been threatened with a disease.

We take this responsibility of judicious antimicrobial use seriously and take many precautions with our antibiotic-treated animals so that their milk or meat does not enter the food supply. The avoidance of milk and meat residues in the dairy industry takes an on-farm team effort that begins with the VCPR – the Veterinarian-Client-Patient Relationship. Dairy farm owners/managers/herdsman must work with their veterinarians to develop treatment protocols that ensure that antimicrobials are used correctly. Once a decision is made to use antimicrobials, then protocols must be in place to guide employees on the safe way to handle the animal to prevent an inadvertent milk or meat residue from occurring. Identification of treated animals and recording drug use are essential to prevent residues. For nearly 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 judicious 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,



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

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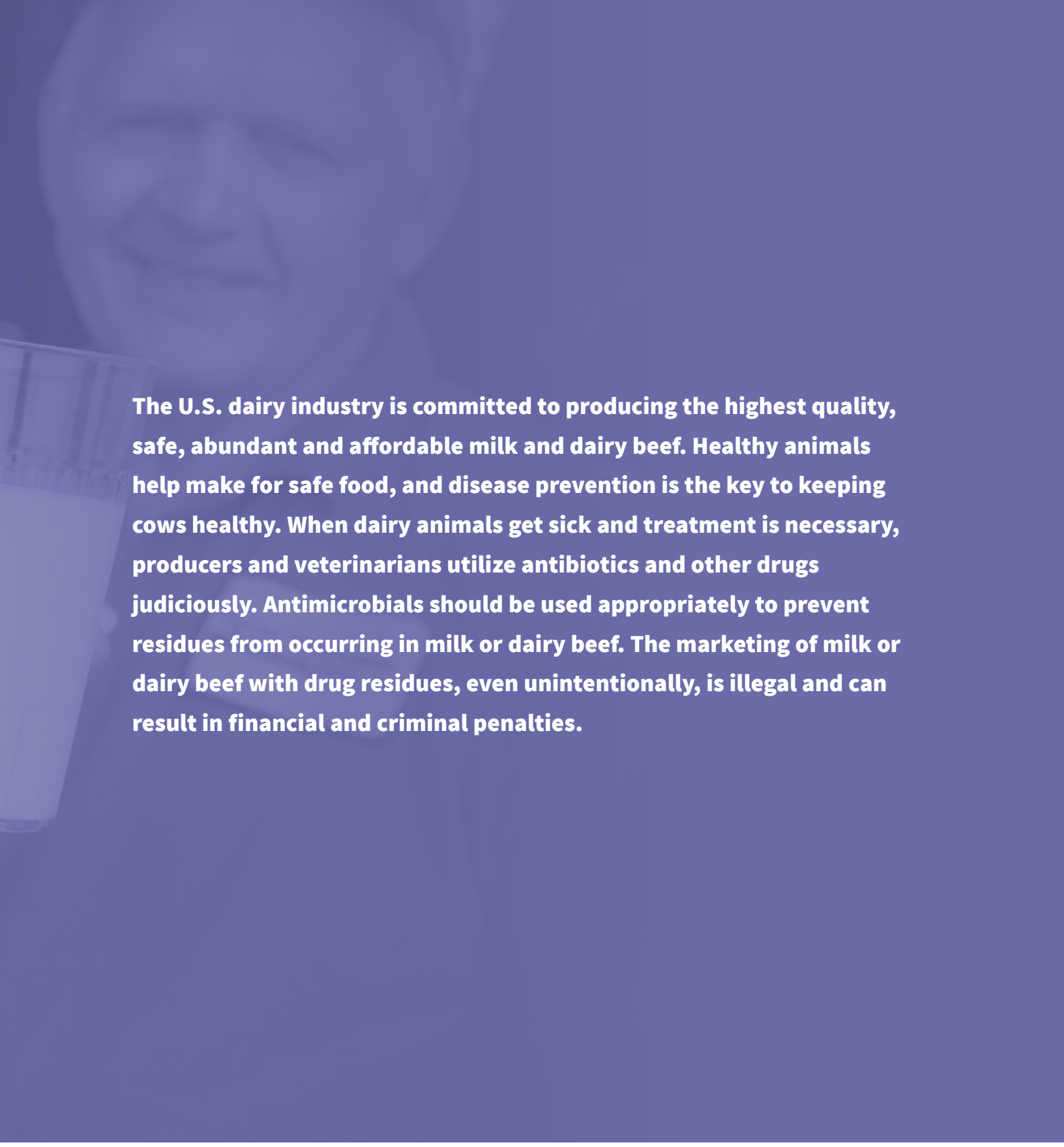


The U.S. dairy industry is committed to producing the highest quality, safe, abundant and affordable milk and dairy beef. Healthy animals help make for safe food, and disease prevention is the key to keeping cows healthy. When dairy animals get sick and treatment is necessary, producers and veterinarians utilize antibiotics and other drugs judiciously. Antimicrobials should be used appropriately to prevent residues from occurring in milk or 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 use of antimicrobials in companion animals and humans. 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. In September 2014, President Obama released Executive Order 13676: Combating Antibiotic-Resistant Bacteria. The executive order established a task force co-chaired by the Secretaries of Defense, Agriculture and Health and Human Services with the goal of:

> *"... working domestically and internationally to detect, prevent and control illness and death related to antibiotic-resistant infections by implementing measures that reduce the emergence and spread of antibiotic resistant bacteria and help ensure the continued availability of effective therapeutics for the treatment of bacterial infections."*

In combination, the National Dairy FARM Program's Animal Care Reference Manual and the Milk & Dairy Beef Drug Residue Prevention Reference Manual serve as the roadmap for the U.S. dairy industry's commitment to antimicrobial stewardship. That commitment begins on the farm with coordinated animal health and care programs, including a Herd Health Plan developed in consultation with the Veterinarian of Record. An effective written Herd Health Plan emphasizes prevention, rapid diagnosis and quick decision-making on necessary treatment of all sick or injured dairy cattle on the farm. Even with the best prevention programs, animals can become sick or injured, and judicious and responsible use of antimicrobials (including antibiotics) under veterinary supervision may be necessary to improve the health outcome of the animal.

Animal Drugs

There are three classes of animal drugs: Over-the-Counter (OTC), Prescription (Rx) and Veterinary Feed Directive (VFD). OTC drugs can be sold by any person or establishment without a veterinary prescription. Rx drugs can only be sold to the producer by a veterinarian or pharmacist, and only with a veterinary prescription. VFD is 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. Pulmotil® (tilmicosin) is the first VFD product approved for use in cattle. The Food and Drug Administration (FDA) approved the drug as a treatment for groups of cattle in the early stages of a bovine respiratory disease outbreak to provide 14 days of sustained in-feed therapy. Pulmotil® is approved for use in beef and non-lactating dairy cattle.

In December 2013, the FDA finalized Guidance for Industry #213 establishing the procedures for voluntarily phasing out growth promotion indications for medically important antibiotics in alignment with Guidance for Industry #209. In June 2015, the FDA finalized the Veterinary Feed Directive (VFD) to improve efficiency of the program. The VFD regulation mandates the rules and responsibilities of licensed veterinarians in prescribing and administering medically important antibiotics in feed or water. 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. **There are no legal extra-label uses of VFD drugs.**

With these guidances and VFD changes, animal pharmaceutical companies agreed to voluntarily revise the FDA-approved use conditions for these

products to remove production indications through feed by December 31, 2016. The over-the-counter status for the remaining approved therapeutic uses through feed now require a VFD under veterinary oversight as of the same date. Additionally, water-soluble drugs, such as those administered through milk replacer, were scheduled to transition from OTC to prescription on that date. **There are no VFD drugs approved for use in lactating dairy cattle.**

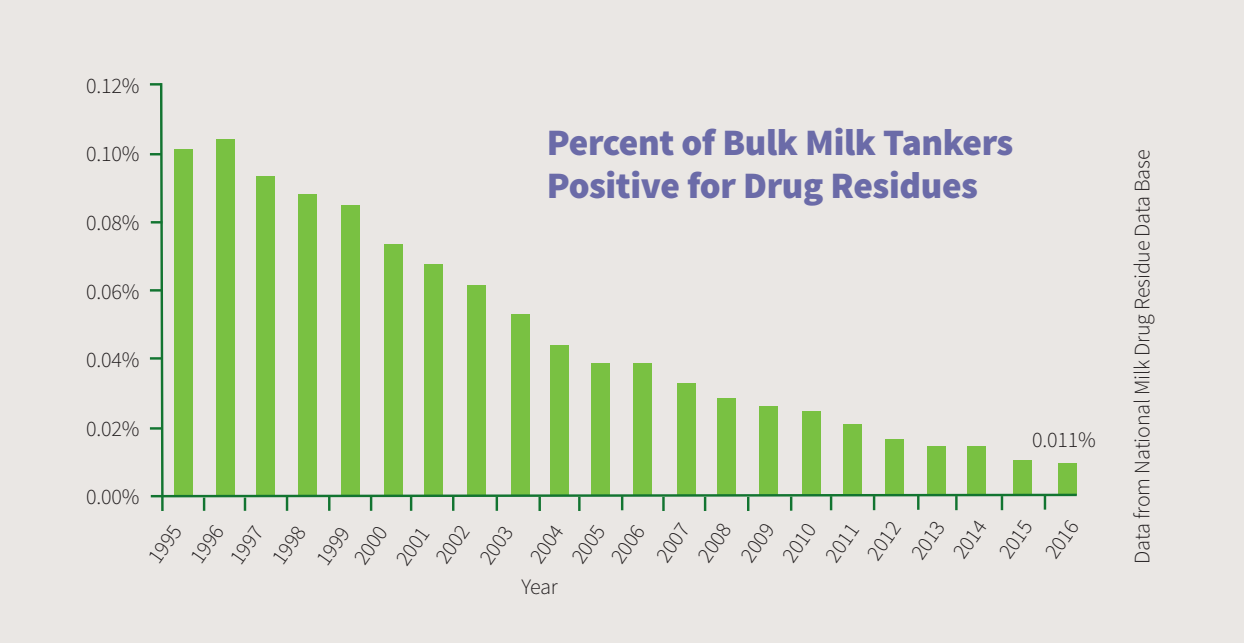
FDA Guidance for Industry #152 defines medically important antibiotics that will be subject to the VFD when administered in feed or water to include aminoglycosides, lincosamides, macrolides, penicillins, streptogramins, sulfonamides and tetracyclines. Ionophores, like monensin, are not affected by the 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.

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 recommended under the guidance of a veterinarian working in the context of a Veterinarian-Client-Patient Relationship (VCPR).

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

Figure 1. Percent of Bulk Milk Tankers Positive For Drug Residues, 1995-2016



Milk Drug Residue Testing

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. Customers (e.g. , processors) may also require additional testing for quality assurance purposes.

Any tanker found positive for beta-lactam residue is rejected for human consumption. In 1996, of the 3,384,779 bulk milk pick-up tankers tested, 0.104 percent tested positive.[1] Through increased education and industry advancements, of the 3,085,627 bulk milk pick-up tankers tested by industry and state regulatory agencies from October 2015 to September 2016, 0.011 percent tested positive for drug residues. This signifies a dramatic decrease from an already low-level of occurrence.[2] See Figure 1.

Multidrug 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. According to the bulletin's authors, the intended 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.

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 or ciprofloxacin, flunixin, bacitracin, thiabendazole, virginiamycin and tripelennamine. Some testing laboratories have modified this method to include additional drugs.

Meat Drug Residue Testing

The United States Department of Agriculture (USDA) Food Safety Inspection Service (FSIS) conducts tests for chemicals – including antibiotics and other drugs, pesticides and environmental chemicals – in meat, poultry and egg products destined for human consumption. The Scheduled Sampling Plan tests for these chemicals through a random sampling of tissue from healthy-appearing food animals. The development of the plan by USDA includes: 1) determining the compounds are of food safety concern; 2) using algorithms to rank the selected compounds; 3) pairing these compounds with appropriate production classes; and 4) establishing the number of samples to be collected.[3]

The Food Safety and Inspection Service Hazard Analysis and Critical Control Point (FSIS 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. Factors that can contribute to higher risk of residues are found in Figure 2 and can be useful in assessing animals destined for slaughter. If there is any doubt about the potential for drug residues in an animal, they should be withheld from market.

Each year, nearly 3 million adult dairy cows are slaughtered for beef. Of that amount, a very small percentage test positive for a residue. Over the past several years, USDA has made several changes to its residue screening program including: 1) implementation of the KIS test, which is more sensitive than earlier tests, and 2) increasing of the number of tests conducted on market dairy cows. In spite of these changes, USDA FSIS has continued to report a decline in the number of tissue residues in market dairy cows during the past three years.
See Figure 3 on Page 12.

- 2015 PMO - Drug Residue Testing and Farm Surveillance http://www.fda.gov/downloads/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/Milk/UCM513508.pdf

Dairy farmers transition their cows from a supplier of milk to a source of beef when the decision is made to ship a cow to market. Shipping sound animals reduces the chance that an animal will be targeted for drug residue testing. The risk of tissue residue violations should be minimized if treatment protocols and appropriate withdrawal times are

Figure 2. Tissue Residue Risk Assessment of a Dairy Cow for Market

Animal history is documented, recorded and available.

LOW RISK

- ☐ Animal never treated with drugs
- ☐ Single drug administration of lactating/ non-lactating animal approved drug – AND followed drug label information for dose, route of administration, duration of therapy and withholding time
- ☐ Veterinary oversight of the use of drugs in an extra-label manner

Animal is displaying lameness, injection sites, surgical evidence or looks sick AND any of the below apply:

HIGH RISK

- ☐ History of animal treatment not documented or not communicated to person sending cow to market
- ☐ Multiple drug administrations without veterinary oversight
- ☐ Doses or withholding times not followed or unknown
- ☐ Route of administration that was used is not as prescribed on the label
- ☐ Drug not approved for animal status, e.g. lactating
- ☐ Duration of therapy not followed

If any of the above high-risk attributes exist, consult pharmaceutical, veterinary or screening test experts to determine status of animal before offered for sale – **When in doubt hold it out!**

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.

1 National Milk Drug Residue Data Base: Fiscal Year 1996 Annual Report. GLH, Incorporated. Lighthouse, FL. February 10, 1997. https://www.kandc-sbcc.com/nmdrd/fy-96.pdf

2 National Milk Drug Residue Data Base: Fiscal Year 2016 Annual Report. GLH, Incorporated. Lighthouse, FL. February 14, 2017. https://www.kandc-sbcc.com/nmdrd/fy-16.pdf

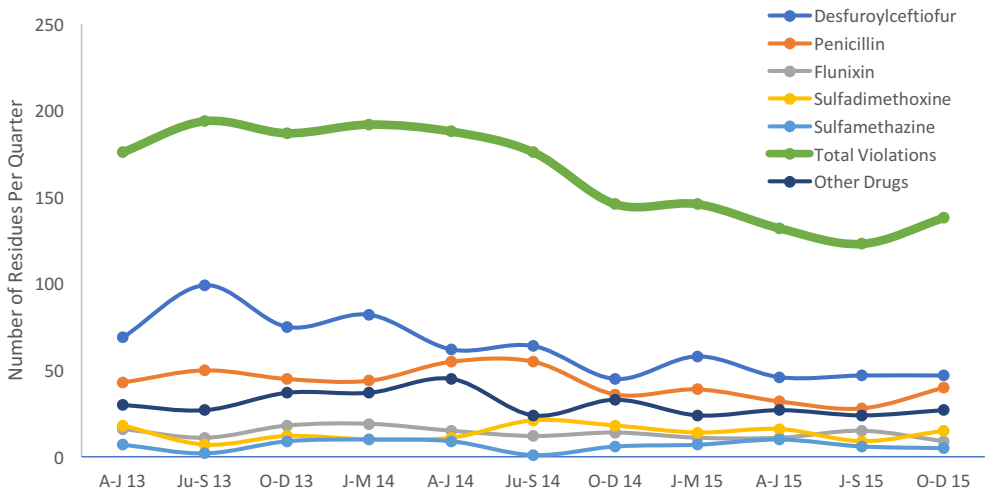
3 2016 FSIS National Residue Program Scheduled Sampling Plans. USDA Food Safety Inspection Service Office of Public Health Science. June 2016. https://www.fsis.usda.gov/wps/wcm/connect/04d78d46-c519-428c-a856-fe6416ae9e18/2016-Blue-Book.pdf?MOD=AJPERES

4 U.S. National Residue Program: Residue Quarterly Reports. USDA Food Safety Inspection Service. https://tinyurl.com/juzwflg

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. FSIS provides a user guide that explains the information contained in the list.

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 second 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.

Figure 3. Prevalence of Drug Residues in Cull Cows from April 2013 – December 2015



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

The regulatory tolerances for milk and meat antibiotic residues vary depending on the type of drug used and route of administration. The withdrawal times and tolerances 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. All of these products have a tolerance limit if it is used in the labeled class of animal. Extra-label drug use in unapproved classes of animals is discouraged. A complete listing of the tolerances can be found in the **FDA Green Book**, which lists all approved animal drugs. The Green Book is available in searchable format online.

When there is doubt about an animal's drug residue status it is advised to consult experts that can help determine the status of the drug in the animal before it is sent to slaughter. Your herd health veterinarian is a good first resource. The veterinarian can help determine if pharmaceutical companies should be consulted or live animal screening tests employed to determine an animal drug residue status. If you have questions or concerns about potential residues or withdrawal times, please contact your herd veterinarian. For additional help or information, the following phone numbers and websites of pharmaceutical and screening test manufacturers may also help with advice and determine residue status.

Charm Sciences, Inc. • 1-800-343-2170
www.charm.com

Merck's Dairy Cares 365 • 1-800-521-5767
https://www.dairycare365.com/solution/residue-prevention-education

Zoetis • 1-800-366-5288
www.avoidresidues.com

Resources

- FDA Green Book, for tissue residue thresholds http://www.fda.gov/AnimalVeterinary/Products/ApprovedAnimalDrugProducts/
- FSIS Residue Repeat Violator Lists https://www.fsis.usda.gov/wps/portal/fsis/topics/data-collection-and-reports/chemistry/residue-chemistry
- Food Animal Residue Avoidance & Depletion Program(FARAD) http://www.farad.org
- 2015 PMO - Drug Residue Testing and Farm Surveillance http://www.fda.gov/downloads/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/Milk/UCM513508.pdf
- Animal Drugs @ FDA, FDA Approved Animal Drug Products http://www.fda.gov/AnimalVeterinary/Products/ApprovedAnimalDrugProducts/

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 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 post-mortem indication. Be mindful of sending animals to slaughter that show signs of metritis such as high fever, major drops in milk production, 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** Signs of treatment, as 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.

Food Animal Residue Avoidance Databank (FARAD)

FARAD is a congressionally-mandated risk-management program that is supported by the USDA. The primary mission of FARAD is to provide science-based expert advice to help mitigate unsafe chemical residues (drugs, pesticides, biotoxins, etc.) in products derived from food animals.

FARAD provides the following services:

- Advice on residue avoidance or mitigation
- VetGram search for required withdrawal times for approved food animal drugs
- FARAD-recommended withdrawal intervals for extra-label use of approved food animal drugs

Producers should work with the veterinarian with whom they have a valid VCPR for drug residue information first. The veterinarian is the ideal resource to discuss FARAD-specific information regarding withdrawal times, especially for extra-label drug use.

Visit
WWW.FARAD.ORG
for more information

Records Management

FDA requires veterinarians to maintain records for two years of all animals treated using extra-label drugs (21 CFR 530.5)[4]. Though not a regulatory requirement, a good management practice for producers is to keep records on all animals treated with drugs for two years. The record system should be easily accessible to everyone who works with the animals. Records should be permanent so the veterinarian has a history to which he/she can refer to prescribe effective therapy and to serve as protection 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:

- Treatment date
- Animal identification
- Dosage
- Route of administration and expected duration
- Withdrawal time for milk and meat
- Individual who administered the drug
- Drug used
- Duration of therapy

Code of Federal Regulations 21 CFR 530.5. Food and Drug Administration. April 1, 2016. http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/CFRSearch.cfm?fr=530.5

02 Residue Overview

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

The Code of Federal Regulations (CFR) provides an updated list of animal drugs prohibited from extra-label use and drugs not approved for use in food animals. The lists below are subject to change. Consult the current version of 21 CFR Sec. 530.41 for the most up-to-date list.

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.

1. Chloramphenicol
2. Clenbuterol
3. Diethylstilbestrol (DES)
4. Dimetridazole
5. Ipronidazole
6. Other nitroimidazoles
7. Furazolidone
8. Nitrofurazone
9. Sulfonamide drugs in lactating dairy cattle (except approved use of sulfadimethoxine, sulfabromomethazine and sulfaethoxypyridazine)
10. Fluoroquinolones (examples ciprofloxin, enrofloxacin)
11. Glycopeptides
12. Phenylbutazone in female dairy cattle 20 months of age or older
13. Cephalosporins (not including cephapirin) in cattle, swine, chickens or turkeys:
    i. For disease prevention purposes;
    ii. At unapproved doses, frequencies, durations or routes of administration; or
    iii. If the drug is not approved for that species and production class.

[62 FR 27947, May 22, 1997, as amended at 67 FR 5471, Feb. 6, 2002; 68 FR 9530, Feb. 28, 2003; 68 FR 14134, Mar. 24, 2003; 71 FR 14377, Mar. 22, 2006, 77FR745, Jan. 6, 2012]

5. Code of Federal Regulations. 21CFR 530.41. Food and Drug Administration. April 1, 2016. http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/cfrsearch.cfm?fr=530.41

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.

Cephalosporin Extra-Label Use Prohibitions

On April 6, 2012, the U.S. Food and Drug Administration Order of Prohibition of Cephalosporins became effective. 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.

Specifically, the *prohibited uses* include:

- Using cephalosporin drugs at unapproved dose levels, frequencies, durations or routes of administration;

- Using cephalosporin drugs in cattle, swine, chickens or turkeys 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.

The following exceptions to the prohibition apply:

- 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; and
- Extra-label use in food-producing minor species, such as sheep, goats, ducks or rabbits.

Cephapirin

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.

Underlying Causes of Antibiotic Residues in Milk and Meat

Drug residues can be avoided by 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
- Not following veterinarian's recommendation when using any drug
- Not following the manufacturer- or veterinarian prescribed label directions for correct treatment for the appropriate withdrawal time
- 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

When multiple treatments are combined or overlapped, the time to clear those drugs from an animal's system can increase. Producers should consult with their veterinarian for appropriate withdrawal times. Animal liver and kidney function, particularly with poor animal metabolism, may not be able to keep up with multiple circulating drugs and therefore withholding times can be prolonged.

In sustainable farm management, you can maximize the value of your market animals and the good reputation of your farm, while reducing increased regulatory oversight risk, with good record keeping and intelligent risk assessment of animals prior to sending animals to market.

Malicious Contamination

Dairymen should recognize and remember that drug residues in milk may occur because of intentional, malicious contamination. Ensure your antibiotics are stored securely and monitor your farm for any suspicious activity.

Potential Residue Violations from Extra-Label Drug Use in an Unapproved Class of Cattle

Extra-Label Use (ELDU) in dairy cattle:

- All ELDU must come from the direction of the Veterinarian of Record responsible for the VCPR with the dairy.
- FDA defines a lactating dairy cow as a dairy breed animal over 20 months of age. Springing heifers and dry cows are classified as "lactating dairy cattle."
- 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.
    - This means that the level that will result in a violative residue in meat or milk from a drug not approved for use in lactating dairy cattle is ANY detectable level above zero (0).
    - Current tests that may be performed on-farm or on bulk tank milk at a processing facility 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.
    - Current scientific literature does not provide clear guidance on the length of withdrawal times that must be applied to allow meat and milk residues to drop to zero (0). The labeled meat withdrawal time does not apply to lactating dairy cows if the drug is not approved for lactating dairy cows.
- Always use drugs approved in the class of animal to which the drug is being administered as a first line of therapy.
- Case selection is important. It is not prudent to give a drug with a high risk of residue to an animal that has a poor chance of recovery. Animals that are suffering and have a poor chance of recovery should be euthanized. Animals that are healthy enough for slaughter and are a poor candidate for treatment should be culled/marketed instead of being treated with an unapproved drug that has a higher risk of creating a milk/meat residue.
- Always record all treatments in your treatment records and keep them for a minimum of two years.
- Regularly review treatment protocols and your treatment records with the Veterinarian of Record.

The FDA establishes tolerances for drug residues in food animals. These tolerances are based on approved labeled use of the drug. This is because the FDA only has data for drug residue depletion on the approved production class. The main production classes are beef, dairy and veal. Many products have been approved for beef and non-lactating dairy (less than 20 months of age), so the FDA does not have established tolerance levels for these products if used in lactating dairy or veal. If a drug is approved in one production class, usage in another class is considered ELDU. Therefore, such use would mean there is not an established tolerance and any detectable level would be a violative drug residue.

What does this mean for dairy producers and their veterinarians? The labeled withdrawal times would not apply to an unapproved production class. While FARAD can provide withdrawal 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 therefore exercise extreme caution using drugs not approved for that production class of animal and consider avoiding such use due to unknown withdrawal times. Remember that the FDA definition of a lactating dairy cow is a dairy breed animal over 20 months of age. Springing heifers and dry cows are classified as "lactating dairy cattle."

What are some examples of ELDU in an unapproved class?

Example Using Nuflor® (florfenicol), Micotil® (tilmicosin) or Draxxin® (tulathromycin) in a dairy animal over 20 months of age. The labeled meat withdrawal time for beef cattle would not apply to use in this production class. The meat withdrawal time would be the amount of time for the detection level to be "zero," which is unknown, may be hard to predict, and is subject to the sensitivity of the residue testing methodology. Using the beef labeled withdrawal time for these drugs in lactating dairy cows could result in a violative residue.

Example Using most products in bob veal calves. There are few medications that are approved for male dairy calves intended for veal. Most medication detected in this production class of animal will likely result in a violation.

What else should a producer do to prevent residue violations and minimize liability?

- Keep accurate treatment records and follow all withdrawal times.
- Only use drugs extra-label if you have a valid VCPR, directions from your veterinarian, and can ensure that no residue will occur from such use.
- Refrain from using antibiotics and other drugs that are not approved for that production class (i.e., beef cattle antibiotics in lactating dairy cows).
- 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." Consult FARAD's VetGRAM search for products that are approved in veal.

- For extra-label indications in cattle, use a product approved in that production class as your first treatment option.
- Do not market recently treated cattle. Dairy farmers need to stop marketing recently treated cows that have not responded to treatment. Alternatives for these cows are to hold the animal until she is healthy and free of drug residues or to humanely euthanize. Marketing a cow should not replace euthanasia on dairy farms.
- Do not use prohibited drugs or aminoglycosides (e.g. , gentamicin) in cattle. The USDA and FDA are still detecting a significant number of gentamicin residues in cattle.
- Do not use sulfonamide products extra-label in lactating dairy cows.
- Do not use compounded medications in cattle.
- Monitor the residue violators list that is posted on the FSIS web page.
- Veterinarians and producers should consider that any withdrawal times from projections provided by FARAD are current FARAD recommendations and are subject to change as new research and testing methodologies become available.
- The practice of spraying hairy heel warts with antibiotic sprays in the parlor during milk harvest is a potential source for antibiotic contamination of milk. This practice should be avoided.

Resources

- Food Armor HACCP for Proper Drug Use **http://www.foodarmor.org**
- Food Safety Concerns of Pesticides, Veterinary Drug Residues, and Mycotoxins in Meat and Meat Products Asian Journal of Animal Sciences **http://scialert.net/qredirect.php?doi=ajas.2010.46.55&linkid=pdf**
- Preventing Drug Residues in Milk and Dairy Cull Cows, Virginia Tech University Extension **http://pubs.ext.vt.edu/404/404-403/404-403.html**
- Dairy Care 365 Residue Prevention, Merck Animal Health **https://www.dairycare365.com/solution/residue-prevention-education**
- Residue Free, Zoetis, Inc. **https://www.zoetisus.com/dairy/avoidresidues/index.html**

Examples of Products and Risk Factors for Residues

Ceftiofur (also known as Ceftiflex®, Excede®, Excenel®, Naxcel®, Spectramast®)	• Using the withholding time for one product when using another. • The withholding times for each product are different. • Not keeping accurate records to record the exact product given (Excede versus Excenel). • Using the drug in an unapproved route of administration. Excede is labeled to be given at the base or pinna 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 prescribing veterinarian or manufacturer for withdrawal times.
Enrofloxacin (Baytril 100®)	• Extra-label use in food animals is prohibited. • Only labeled for non-lactating dairy animals twenty months of age or less and beef animals for pneumonia.*
Florfenicol (Nuflor®)	• Sustained release has a longer withdrawal time. • Not approved for dairy cattle over 20 months of age. • No tolerance level for dairy cattle.
Flunixin (also known as Banamine®, Flu-Nix™, Flunixin meglumine**, Prevail™)	• Using the drug in an unapproved route of administration such as intramuscular or subcutaneous. These drugs are only approved for intravenous administration. • Using another administration route results in extended withdrawal times, well beyond the labeled withholding time.
Gentamicin	• Use of gentamicin results in extended withdrawal times and therefore its use is discouraged by AVMA, AABP and AVC. • Use of gentamicin in lactating dairy cows for intramammary use is not recommended. • FARAD recommends not less than a TWO-YEAR withdrawal and, therefore, the use of this drug should not be considered.
Neomycin	• Not following withdrawal time on the bag. • Feeding medicated milk replacer to calves to be processed for slaughter. • Extra-label use of oral neomycin products.
Penicillin	• 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	• 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. • Inadvertently administering a sustained release product when intending to use a daily use product.
Tetracycline	• 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.

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.
2. Keep records of antibiotic use and identify all treated animals, including treatment protocols.
3. Implement a preventive animal health program to reduce the incidence of disease.
4. Maintain milk quality and implement an effective mastitis management program to reduce the use of 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 recommendations and withdrawal periods. If ELDU is indicated by a veterinarian's prescription, that veterinarian must establish and document appropriate withdrawal periods.
7. Do not use drugs that are specifically prohibited for use in 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.
10. If in doubt about residue status, do not market milk and/or dairy beef from treated animals.

Prescription and Extra-label Use

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

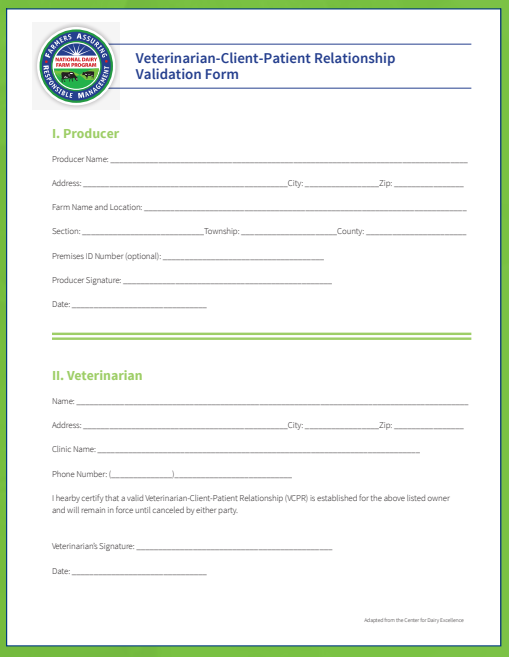
This statement is on every prescription drug sold. Any extra-label use of antibiotics must be used as prescribed by a veterinarian, following the written instructions for the specific lifecycle of animals to be treated, including dose, route of administration, frequency of use, and withdrawal times for milk and/or meat.

Remember, extra-label use will generally require an extended withdrawal time.

Best Management Checklist to Avoid Drug Residues

Establish a Valid Veterinarian-Client-Patient Relationship (VCPR)

- ☐ A veterinarian has assumed the responsibility for making medical judgments regarding the health of the animals.
- ☐ A veterinarian has made routine and timely visits to the dairy to gain sufficient knowledge of the animals to initiate general or preliminary diagnosis of the medical condition of the animals.
- ☐ A veterinarian is readily available for follow-up in case of adverse reactions or failure of treatment.
- ☐ Employees are aware that it is policy to follow the instructions of a veterinarian.
- ☐ The veterinarian and producer have established an approved drug list.
- ☐ All drugs on the dairy have proper labeling.
- ☐ The veterinarian establishes and reviews antibiotic use protocols in conjunction with the producer/farm management team.



Veterinarian-Client-Patient Relationship Validation Form

I. Producer

Producer Name: _____

Address: _____ City: _____ Zip: _____

Farm Name and Location: _____

Section: _____ Township: _____ County: _____

Premises ID Number (optional): _____

Producer Signature: _____

Date: _____

II. Veterinarian

Name: _____

Address: _____ City: _____ Zip: _____

Clinic Name: _____

Phone Number: (_____) _____

I hearby certify that a valid Veterinarian-Client-Patient Relationship (VCPR) is established for the above listed owner and will remain in force until canceled by either party.

Veterinarian's Signature: _____

Date: _____

Adapted from the Center for Dairy Excellence

Use Only Prescription (Rx) Drugs or FDA-Approved Over-the-Counter (OTC) Drugs with Veterinarian's Guidance

- ☐ Only FDA-approved drugs are used to treat animals.
- ☐ Copies of drug inserts and/or product labeling are available for all drugs used on the dairy.
- ☐ Only a veterinarian can prescribe drugs in an "extra-label" manner.
- ☐ A list of current over-the-counter and prescription drugs has been developed that can be used with the dairy cows.
- ☐ Any Veterinary Feed Directive (VFD) feeds on the dairy are stored in such a way that an accidental use cannot occur.
- ☐ Administer all drugs properly and identify all treated animals.
- ☐ Two or more methods are used to identify treated animals.
- ☐ The label and the package insert information is read and followed.
- ☐ Package inserts for drugs that the veterinarian and the producer have put on the approved drug list are reviewed.
- ☐ A proper facility to segregate treated animals from untreated animals is available.

Maintain and Use Proper Treatment Records on All Treated Animals

- [ ] A record system is maintained for all treated animals.
- [ ] Treatment records are reviewed with the consulting veterinarian.
- [ ] Records are used to improve management of potential hazards and to reduce risk to milk quality.
- [ ] Record use is reviewed with employees and/or family members.

Implement Employee/Family Training of Proper Drug Use to Avoid Marketing Adulterated Milk and Meat Products

- [ ] Recommendations from the veterinarian are reviewed with employees and/or family members.
- [ ] Employees and/or family members receive regular training on the prevention of milk and meat residues.
- [ ] Properly document when all training sessions take place and who is in attendance.
- [ ] Awareness exists that milk contamination often occurs when the normal pattern of milking changes (vacation, children home from college, sickness, etc.).
- [ ] Treatment records are checked before marketing animals.
- [ ] Employees and/or family members understand the cost and consequences of marketing adulterated meat or milk.
- [ ] Employees and/or family members understand the instructions found on the drug label.
- [ ] Employees and/or family members understand that all treated animals are milked last and/or their milk is diverted from saleable milk to prevent violative residues.

Use Drug Residue Screening Tests

- [ ] Withholding times are never decreased for meat or milk from treated animals.
- [ ] Milk from treated dry cows that freshen early is always tested for residues prior to marketing.
- [ ] Milk from newly purchased animals is always tested before adding their milk to the bulk tank.
- [ ] When a cow is treated in an extra-label manner, the milk gets tested.
- [ ] When using bulk tank tests on individual cows, consult the manufacturer's directions to ensure applicability.

Market Only Healthy Cattle

- [ ] Cattle have a body condition score of 2 or more.
- [ ] Cattle are well-hydrated and alert.
- [ ] Proper withhold times are followed and confirmed prior to sale.
- [ ] Severely lame cattle are NOT marketed (score of 3 on the FARM Locomotion scale).

Precautions While Administering Drugs

When treating animals with any product that is given intramuscular (IM), subcutaneous (SQ), intravascular (IV) or intramammary (IMM), take the following precautions:

- Read both the product label and insert, and consult your veterinarian before administering drugs.
- Use a clean injection site 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 are not sent to slaughter until withdrawal times are met.
- Train employees on proper injection site selection.

Intermediate Owners

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.

03

Approved Drugs & Screening Tests

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, and 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 2017. 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 sodium	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	Norbrook Laboratories, Ltd.
Erythromycin	Rx	21 days	Gallimycin-100	Bimeda, Inc.
Florfenicol	Rx	28 or 33 days ## (See label)	Norfenicol®	Norbrook Laboratories, Ltd.
	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	FluNix™ Injection	Agri Laboratories, Ltd.
	Rx	4 days	Prevail	MWI Veterinary Supply
	Rx	4 days	VetaMeg	Aspen Veterinary Resources
Gamithromycin	Rx	35 days	Zactran	Merial, Inc.
Gonadorelin diacetate tetrahydrate	Rx	None	Cystorelin	Merial, 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	Agri-Mectin® Injection	Agri Laboratories, Ltd.
	OTC	35 days	IVOMEC 1% Injection for Cattle	Merial, Inc.
	OTC	35 days	Noromectin® 1% Injection	Norbrook Laboratories, Ltd.
Ivermectin/Clorsulon*	OTC	49 days	IVOMEC Plus Injection for Cattle	Merial, Inc.
	OTC	21 days	Noromectin® Plus Injection	Norbrook Laboratories, Ltd.
Oxytetracycline	Rx	28 days	300 PRO LA	Norbrook Laboratories, Ltd.
	Rx	28 days	Agrimycin® 200 Injection	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® LA-200®	Zoetis, Inc.
	OTC	28 days	Noromycin 300 LA	Norbrook Laboratories, Ltd.
	Rx	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	OTC	22 days	Agrimycin® 100 ♦	Agri Laboratories, Ltd.
	Rx	18 days	Bio-Mycin® C	Boehringer Ingelheim Vetmedica,Inc.
	OTC	22 days	Duramycin 100	Durvet, 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.

Withholding times depend upon labeled dosage used.

♦ Not intended for use in veal calves.

* 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
	OTC	18 days	Oxy-Tet™ 100	Boehringer Ingelheim Vetmedica,Inc.
	OTC	22 days	Oxytet 100	Norbrook Laboratories, Ltd.
	OTC	22 days	Terra-Vet 100 Injection	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	10 days	Agri-Cillin Injection	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.
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	Zoetis, Inc.
Tulathromycin	Rx	22 days	DRAXXIN 25™	Zoetis, Inc.
	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
	Rx	None	Vital E	Merck Animal Health
	OTC	None	Vitamin E 300	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.

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

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 Postcalving	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 Postcalving	30 days	AlbaDry® Plus Suspension	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.

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

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	Chlortetracyline 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.
Decoquinate	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	Crystalyx® 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. a (Sustained Release Bolus)	Zoetis, Inc.
	Rx	7 days	Di-Methox 12.5% Oral Solution	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.

FDA-Approved Drugs for Oral Use

Non-Lactating Cattle** (continued)

Active Ingredient	Drug Type	Meat Withholding Time	Product Name	Manufacturer/Marketer
	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.
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.
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	Vetrimec Pour-On	MWI Veterinary Supply
Moxidectin	OTC	None	Cydectin® (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 methylene disalicylate	OTC	None	BMD 30	Zoetis, Inc.
	OTC	None	BMD 50	Zoetis, Inc.
	OTC	None	BMD 60	Zoetis, 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
Decoquinate	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
Oxytetracycline dihydrate	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™ 50	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 Injection	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	Rx	96 hours	28 days	300 PRO LA	Norbrook Laboratories, Ltd.
	Rx	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	Noromycin 300 LA	Norbrook Laboratories, Ltd.
	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	10 days	Agri-Cillin Injection	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	Zoetis, Inc.

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) / dihydrostreptomycin	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 withold following infusion twice at a 24-hour interval 21-day meat withhold following any extended duration of therapy (infusion longer that 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

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.
Moxidectin	OTC	None	None	Cydectin® (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 Avilable as of January 2017

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™ ß-Lactam One-Step Test	Silver Lake Research Corporation	Urine	ǂ
	Premi®test	DSM Food Specialties USA, Inc	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™ ß-Lactam One-Step Test	Silver Lake Research Corporation	Urine	ǂ
	Premi®test	DSM Food Specialties USA, Inc	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	DSM Food Specialties USA, Inc	Urine	100
Cephalexin (unapproved in dairy cattle)	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	DSM Food Specialties USA, Inc	Urine	100
Chloramphenicol ¢ (prohibited)	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 (prohibited as feed additive for lactating dairy cows)	Charm II Tetracycline Test	Charm Sciences	Serum	200
	Charm II Tetracycline Test	Charm Sciences	Urine	3000

§ 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.

ǂ 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 Avilable as of January 2017

Residues Detected	Test Name	Sponsor	Specimen	Sensitivity (ppb)
	Charm KIS Test	Charm Sciences	Serum	10,000
	Charm KIS Test	Charm Sciences	Urine	10,000
	Premi®test	DSM Food Specialties USA, Inc	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™ ß-Lactam One-Step Test	Silver Lake Research Corporation	Urine	‡
	Premi®test	DSM Food Specialties USA, Inc	Urine	50
Danofloxacin	Premi®test	DSM Food Specialties USA, Inc	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	DSM Food Specialties USA, Inc	Urine	3000
Enrofloxacin *	Charm Enroflox Test (ROSA Test)	Charm Sciences	Urine	100
	Premi®test	DSM Food Specialties USA, Inc	Urine	600
	Veratox for Enrofloxacin	Neogen Corporation	Serum	1
	Veratox for Enrofloxacin	Neogen Corporation	Urine	1
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	DSM Food Specialties USA, Inc	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	2
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	DSM Food Specialties USA, Inc	Urine	100
	Veratox for Gentamicin	Neogen Corporation	Serum	5

‡ 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 Avilable as of January 2017

Residues Detected	Test Name	Sponsor	Specimen	Sensitivity (ppb)
	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™ ß-Lactam One-Step Test	Silver Lake Research Corporation	Urine	‡
Kanamycin (unapproved in dairy cattle) (AVMA, AABP and Academy of Veterinary Consultants [AVC] advocate their members voluntarily refrain from use)	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 (unapproved in dairy cattle)	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	DSM Food Specialties USA, Inc	Urine	100
Neomycin	Charm II Gentamicin and Neomycin Test	Charm Sciences	Serum	50
	Charm II Gentamicin and Neomycin Test	Charm Sciences	Urine	10,000
	Charm KIS Test	Charm Sciences	Serum	1000
	Charm KIS Test	Charm Sciences	Urine	1000
	Premi®test	DSM Food Specialties USA, Inc	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 (prohibited as feed additive for lactating dairy cows)	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	DSM Food Specialties USA, Inc	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

‡ Predicts pass or fail on USDA tissue residue tests.

Serum and Urine Screening Tests

Screening Tests Avilable as of January 2017

Residues Detected	Test Name	Sponsor	Specimen	Sensitivity (ppb)
Sulfamethoxazole* (unapproved in dairy cattle)	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
Sulfanilamide* (unapproved in dairy cattle)	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
Sulfapyridine* (unapproved in dairy cattle)	Charm II Sulfonamide Test	Charm Sciences	Serum	400
	Charm II Sulfonamide Test	Charm Sciences	Urine	1000
	Charm KIS Test	Charm Sciences	Serum	10,000
Sulfaquinoxaline* (unapproved in dairy cattle)	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
Sulfathiazole* (unapproved in dairy cattle)	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
Sulfonamides	Veratox for Sulfonamides	Neogen Corporation	Serum	2.5
Tetracycline (prohibited as feed additive for lactating dairy cows)	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	DSM Food Specialties USA, Inc	Urine	50
Tulathromycin* (unapproved in dairy cattle)	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	DSM Food Specialties USA, Inc	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	DSM Food Specialties USA, Inc	Urine	50
	Veratox for Tylosin	Neogen Corporation	Serum	20

* Prohibited from use in any kind of lactating cattle.

ZACTRAN® (gamithromycin)

24-hour response.[1]
10-day treatment.[2]
1 economical dose.

Weaning isn't just stressful on the outside.

An investment in ZACTRAN today will protect your investment tomorrow.

The first 12 months is a crucial time in a heifer's life. Pneumonia or Bovine Respiratory Disease (BRD) can occur from multiple factors, including *Mycoplasma bovis*.[3] BRD-induced complications during this time can have a long-term effect, including reduced milk production later in life.[3] With a rapid, powerful response, ZACTRAN can help the genetic potential of your heifers.

IMPORTANT SAFETY INFORMATION: *For use in cattle only. Do not treat cattle within 35 days of slaughter. Because a discard time in milk has not been established, do not use in female dairy cattle 20 months of age or older, or in calves to be processed for veal. The effects of ZACTRAN on bovine reproductive performance, pregnancy and lactation have not been determined.*

[1]Sifferman RL, Wolff WA, Holste JE, et al. Field efficacy evaluation of gamithromycin for treatment of bovine respiratory disease in cattle at feedlots. *Intern J Appl Res Vet Med.* 2011;9(2):171-180.

[2]ZACTRAN product label.

[3]Van Der Fels-Klerx HJ, Martin SW, Nielen M, et al. Effects on productivity and risk factors of Bovine Respiratory Disease in dairy heifers; a review for the Netherlands. *Neth J Ag Sci.* 2002;50:27-45.

MERIAL

ZACTRAN.com

ZACTRAN® (gamithromycin)

150 mg/mL ANTIMICROBIAL
NADA 141-328, Approved by FDA
For subcutaneous injection in beef and non-lactating dairy cattle only. Not for use in female dairy cattle 20 months of age or older or in calves to be processed for veal.

Caution: Federal (USA) law restricts this drug to use by or on the order of a licensed veterinarian.
READ ENTIRE BROCHURE CAREFULLY BEFORE USING THIS PRODUCT.

INDICATIONS

ZACTRAN is indicated for the treatment of bovine respiratory disease (BRD) associated with *Mannheimia haemolytica*, *Pasteurella multocida*, *Histophilus somni* and *Mycoplasma bovis* in beef and non-lactating dairy cattle. ZACTRAN is also indicated for the control of respiratory disease in beef and non-lactating dairy cattle at high risk of developing BRD associated with *Mannheimia haemolytica* and *Pasteurella multocida*.

CONTRAINDICATIONS

As with all drugs, the use of ZACTRAN is contraindicated in animals previously found to be hypersensitive to this drug.

WARNING: FOR USE IN CATTLE ONLY. NOT FOR USE IN HUMANS. KEEP THIS AND ALL DRUGS OUT OF REACH OF CHILDREN. NOT FOR USE IN CHICKENS OR TURKEYS.

The material safety data sheet (MSDS) contains more detailed occupational safety information. To report adverse effects, obtain an MSDS or for assistance, contact Merial at 1-888-637-4251.

RESIDUE WARNINGS: Do not treat cattle within 35 days of slaughter. Because a discard time in milk has not been established, do not use in female dairy cattle 20 months of age or older. A withdrawal period has not been established for this product in pre-ruminating calves. Do not use in calves to be processed for veal.

PRECAUTIONS

The effects of ZACTRAN on bovine reproductive performance, pregnancy, and lactation have not been determined. Subcutaneous injection of ZACTRAN may cause a transient local tissue reaction in some cattle that may result in trim loss of edible tissues at slaughter.

ADVERSE REACTIONS

Transient animal discomfort and mild to moderate injection site swelling may be seen in cattle treated with ZACTRAN.

EFFECTIVENESS

The effectiveness of ZACTRAN for the treatment of BRD associated with *Mannheimia haemolytica*, *Pasteurella multocida* and *Histophilus somni* was demonstrated in a field study conducted at four geographic locations in the United States. A total of 497 cattle exhibiting clinical signs of BRD were enrolled in the study. Cattle were administered ZACTRAN (6 mg/kg BW) or an equivalent volume of sterile saline as a subcutaneous injection once on Day 0. Cattle were observed daily for clinical signs of BRD and were evaluated for clinical success on Day 10. The percentage of successes in cattle treated with ZACTRAN (58%) was statistically significantly higher ($p<0.05$) than the percentage of successes in the cattle treated with saline (19%).

The effectiveness of ZACTRAN for the treatment of BRD associated with *M. bovis* was demonstrated independently at two U.S. study sites. A total of 502 cattle exhibiting clinical signs of BRD were enrolled in the studies. Cattle were administered ZACTRAN (6 mg/kg BW) or an equivalent volume of sterile saline as a subcutaneous injection once on Day 0. At each site, the percentage of successes in cattle treated with ZACTRAN on Day 10 was statistically significantly higher than the percentage of successes in the cattle treated with saline (74.4% vs. 24% [$p<0.001$], and 67.4% vs. 46.2% [$p=0.002$]). In addition, in the group of calves treated with gamithromycin that were confirmed positive for *M. bovis* (pre-treatment nasopharyngeal swabs), there were more calves at each site (45 of 57 calves, and 5 of 6 calves) classified as successes than as failures.

The effectiveness of ZACTRAN for the control of respiratory disease in cattle at high risk of developing BRD associated with Mannheim*ia haemolytica* and *Pasteurella multocida* was demonstrated in two independent studies conducted in the United States. A total of 467 crossbred beef cattle at high risk of developing BRD were enrolled in the study. ZACTRAN (6 mg/kg BW) or an equivalent volume of sterile saline was administered as a single subcutaneous injection within one day after arrival. Cattle were observed daily for clinical signs of BRD and were evaluated for clinical success on Day 10 post-treatment. In each of the two studies, the percentage of successes in the cattle treated with ZACTRAN (86% and 78%) was statistically significantly higher ($p=0.0019$ and $p=0.0016$) than the percentage of successes in the cattle treated with saline (36% and 58%).

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Made in Austria

Milk Screening Tests

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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
		Charm II Aflatoxin Test (Quantitative)	Charm Sciences	0.02
		Charm II Aflatoxin Test (Sequential)	Charm Sciences	0.5
		Charm ROSA MRL Aflatoxin Quantitative Test	Charm Sciences	0.05
		Charm ROSA SL Aflatoxin Test (Quantitative)	Charm Sciences	0.5
		Reveal for Aflatoxin M1	Neogen Corporation	0.5
		SNAP Aflatoxin M1	IDEXX Labs, Inc.	0.5
Amoxicillin	10 #	BetaStar Plus Beta-lactam Test ♠	Neogen Corporation	5.5
		Charm 3 SL3 Beta-lactam Test ♠	Charm Sciences	8.4 •
		Charm *B. stearothermophilus* Tablet Disc Assay ♠	Charm Sciences	7.5 •
		Charm Blue Yellow II Test	Charm Sciences	3
		Charm Cowside II Test	Charm Sciences	4
		Charm Flunixin and Beta-lactam Test ♠	Charm Sciences	5.9 •
		Charm HPLC-Receptogram	Charm Sciences	10
		Charm II Beta-lactam Test ♠ (Competitive)	Charm Sciences	7.5 •
		Charm II Beta-lactam Test ♠ (Quantitative)	Charm Sciences	8.1 •
		Charm II Beta-lactam Test ♠ (Sequential)	Charm Sciences	8.1 •
		Charm MRL Beta-lactam 1 Minute Test	Charm Sciences	4
		Charm MRL Beta-lactam 3 Minute Test	Charm Sciences	5
		Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Charm Sciences	5
		Charm MRL Beta-lactam and Tetracycline Test	Charm Sciences	4
		Charm MRL Beta-lactam RF Tetracycline 2 Minute Test	Charm Sciences	4
		Charm MRL Beta-lactam Test	Charm Sciences	4
		Charm Quad 1 Test	Charm Sciences	4
		Charm Quad Test	Charm Sciences	4
		Charm SL Beta-lactam Test ♠	Charm Sciences	5.6 •
		Charm TRIO Test	Charm Sciences	3.5
		Delvotest BLF	DSM Food Specialties USA, Inc	3
		Delvotest P 5 Pack♠	DSM Food Specialties USA, Inc	4.6 •
		Delvotest P/Delvotest P Mini♠	DSM Food Specialties USA, Inc	7.7 •
		Delvotest SP-NT	DSM Food Specialties USA, Inc	2-3.0
		Delvotest T	DSM Food Specialties USA, Inc	4
		Eclipse® 3G	ZEU-Inmunotec	3
		New SNAP Beta-lactam (Visual)	IDEXX Labs, Inc.	6.9
		New SNAP Beta-lactam ♠	IDEXX Labs, Inc.	7.3
		Penzyme ® Milk Test	Neogen Corporation	6
Ampicillin	10 #	BetaStar Plus Beta-lactam Test♠	Neogen Corporation	5.2
		Charm 3 SL3 Beta-lactam Test♠	Charm Sciences	8.0 •
		Charm *B. stearothermophilus* Tablet Disc Assay ♠	Charm Sciences	6.7 •
		Charm Blue Yellow II Test	Charm Sciences	3
		Charm Cowside II Test	Charm Sciences	4
		Charm Flunixin and Beta-lactam Test♠	Charm Sciences	6.8 •
		Charm HPLC-Receptogram	Charm Sciences	2
		Charm II Beta-lactam Test ♠ (Competitive)	Charm Sciences	5.7 •

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

• Sensitivities based on evaluations of raw commingled bovine milk samples by test sponsors, independent laboratories, and FDA and reported FDA memo M-a-85 Revision #15 and FDA memorandum (8/29/16).

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Residues Detected	Tolerance (ppb)	Test Name	Sponsor	Sensitivity (ppb)
		Charm II Beta-lactam Test ♠ (Quantitative)	Charm Sciences	6.6 •
		Charm II Beta-lactam Test ♠ (Sequential)	Charm Sciences	6.6 •
		Charm MRL Beta-lactam 1 Minute Test	Charm Sciences	4
		Charm MRL Beta-lactam 3 Minute Test	Charm Sciences	4
		Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Charm Sciences	4
		Charm MRL Beta-lactam and Tetracycline Test	Charm Sciences	4
		Charm MRL Beta-lactam RF Tetracycline 2 Minute Test	Charm Sciences	4
		Charm MRL Beta-lactam Test	Charm Sciences	4
		Charm Quad 1 Test	Charm Sciences	4
		Charm Quad Test	Charm Sciences	4
		Charm SL Beta-lactam Test ♠	Charm Sciences	8.5 •
		Charm TRIO Test	Charm Sciences	8.8
		Delvotest BLF	DSM Food Specialties USA, Inc	5
		Delvotest P 5 Pack ♠	DSM Food Specialties USA, Inc	4.0 •
		Delvotest P/Delvotest P Mini ♠	DSM Food Specialties USA, Inc	5.1 •
		Delvotest SP-NT	DSM Food Specialties USA, Inc	2
		Delvotest T	DSM Food Specialties USA, Inc	3
		Eclipse ® 3G	ZEU-Inmunotec	3
		New SNAP Beta-lactam (Visual)	IDEXX Labs, Inc.	6.2
		New SNAP Beta-lactam ♠	IDEXX Labs, Inc.	5.8 •
		Penzyme ® Milk Test	Neogen Corporation	7
Atrazine	20 #	Atrazine RaPID Assay ®	Strategic Diagnostics, Inc.	5
Bacitracin (unapproved in lactating dairy cows)	500 #	Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	>1000
		Delvotest SP-NT	DSM Food Specialties USA, Inc	580
		Eclipse ® 3G	ZEU-Inmunotec	600
Carbendazim	20 #	Benomyl RaPID Assay ®	Strategic Diagnostics, Inc.	5
Cefoperazone	None ¥	BetaStar Plus Beta-lactam Test	Neogen Corporation	8
		Charm 3 SL3 Beta-lactam Test	Charm Sciences	1
		Charm *B. stearothermophilus* Tablet Disc Assay	Charm Sciences	5
		Charm Blue Yellow II Test	Charm Sciences	30
		Charm Cowside II Test	Charm Sciences	30
		Charm Flunixin and Beta-lactam Test	Charm Sciences	9
		Charm II Beta-lactam Test (Competitive)	Charm Sciences	20
		Charm II Beta-lactam Test (Quantitative)	Charm Sciences	20
		Charm II Beta-lactam Test (Sequential)	Charm Sciences	5
		Charm MRL Beta-lactam 1 Minute Test	Charm Sciences	3
		Charm MRL Beta-lactam 3 Minute Test	Charm Sciences	2
		Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Charm Sciences	3
		Charm MRL Beta-lactam and Tetracycline Test	Charm Sciences	8
		Charm MRL Beta-lactam RF Tetracycline 2 Minute Test	Charm Sciences	2
		Charm MRL Beta-lactam Test	Charm Sciences	9
		Charm Quad 1 Test	Charm Sciences	3
		Charm Quad Test	Charm Sciences	3
		Charm SL Beta-lactam Test	Charm Sciences	15
		Charm TRIO Test	Charm Sciences	2
		Delvotest SP-NT	DSM Food Specialties USA, Inc	580
		Delvotest T	DSM Food Specialties USA, Inc	40

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

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Residues Detected	Tolerance (ppb)	Test Name	Sponsor	Sensitivity (ppb)
Cefquinome	None ¥	BetaStar Plus Beta-lactam Test	Neogen Corporation	8
		Charm 3 SL3 Beta-lactam Test	Charm Sciences	50
		Charm *B. stearothermophilus* Tablet Disc Assay	Charm Sciences	100
		Charm Blue Yellow II Test	Charm Sciences	60
		Charm Cowside II Test	Charm Sciences	60
		Charm Flunixin and Beta-lactamTest	Charm Sciences	75
		Charm II Beta-lactam Test (Competitive)	Charm Sciences	40
		Charm II Beta-lactam Test (Quantitative)	Charm Sciences	40
		Charm II Beta-lactam Test (Sequential)	Charm Sciences	10
		Charm MRL Beta-lactam 1 Minute Test	Charm Sciences	40
		Charm MRL Beta-lactam 3 Minute Test	Charm Sciences	25
		Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Charm Sciences	25
		Charm MRL Beta-lactam and Tetracycline Test	Charm Sciences	20
		Charm MRL Beta-lactam RF Tetracycline 2 Minute Test	Charm Sciences	25
		Charm MRL Beta-lactam Test	Charm Sciences	20
		Charm Quad Test	CharmSciences	20
		Charm Quad1 Test	Charm Sciences	15
		Charm SL Beta-lactam Test	Charm Sciences	30
		Delvotest T	DSM Food Specialties USA, Inc	40
Ceftiofur	100 £	BetaStar Plus Beta-lactam Test ♠	Neogen Corporation	80
		Charm 3 SL3 Beta-lactam Test ♠	Charm Sciences	79 •
		Charm *B. stearothermophilus* Tablet Disc Assay ♠	Charm Sciences	>100 •
		Charm Blue Yellow II Test	Charm Sciences	100
		Charm Cowside II Test	Charm Sciences	>100
		Charm Flunixin and Beta-lactam Test ♠	Charm Sciences	63 •
		Charm HPLC-Receptogram	Charm Sciences	30-40
		Charm II Beta-lactam Test ♠ (Competitive)	Charm Sciences	47 •
		Charm II Beta-lactam Test ♠ (Quantitative)	Charm Sciences	8.0 •
		Charm II Beta-lactam Test ♠ (Sequential)	Charm Sciences	58 •
		Charm MRL Beta-lactam RF Tetracycline 2 Minute Test	Charm Sciences	70
		Charm MRL Beta-lactam 1 Minute Test	Charm Sciences	100
		Charm MRL Beta-lactam 3 Minute Test	Charm Sciences	40
		Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Charm Sciences	70
		Charm MRL Beta-lactam and Tetracycline Test	Charm Sciences	20
		Charm MRL Beta-lactam Test	Charm Sciences	20
		Charm Quad Test	Charm Sciences	40
		Charm Quad1 Test	Charm Sciences	70
		Charm SL Beta-lactam Test♠	Charm Sciences	77 •
		Charm TRIO Test	Charm Sciences	50
		Delvotest BLF	DSM Food Specialties USA, Inc	>20
		Delvotest P 5 Pack♠	DSM Food Specialties USA, Inc	>100
		Delvotest P/Delvotest P Mini♠	DSM Food Specialties USA, Inc	>100
		Delvotest SP-NT	DSM Food Specialties USA, Inc	130
		Delvotest T	DSM Food Specialties USA, Inc	80
		Eclipse® 3G	ZEU-Inmunotec	60

¥ 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 evaluations of raw commingled bovine milk samples by test sponsors, independent laboratories, and FDA and reported FDA memo M-a-85 Revision #15 and FDA memorandum (8/29/16).

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Residues Detected	Tolerance (ppb)	Test Name	Sponsor	Sensitivity (ppb)
		New SNAP Beta-Lactam ♠	IDEXX Labs, Inc.	12 •
Cephalexin (unapproved in dairy cattle)	None ¥	BetaStar Plus Beta-lactam Test	Neogen Corporation	500
		Charm 3 SL3 Beta-lactam Test	Charm Sciences	3000
		Charm *B. stearothermophilus* Tablet Disc Assay	Charm Sciences	85
		Charm Blue Yellow II Test	Charm Sciences	100
		Charm Cowside II Test	Charm Sciences	50
		Charm Flunixin and Beta-lactam Test	Charm Sciences	50 •
		Charm II Beta-lactam Test (Competitive)	Charm Sciences	45
		Charm II Beta-lactam Test (Quantitative)	Charm Sciences	40
		Charm II Beta-lactam Test (Sequential)	Charm Sciences	40
		Charm MRL Beta-lactam	Charm Sciences	30
		Charm MRL Beta-lactam 1 Minute Test	Charm Sciences	1000
		Charm MRL Beta-lactam 3 Minute Test	Charm Sciences	1000
		Charm MRL Beta-lactam and RF Tetracycline 2 Minute Test	Charm Sciences	2000
		Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Charm Sciences	2000
		Charm MRL Beta-lactam Test	Charm Sciences	60
		Charm Quad 1 Test	Charm Sciences	80
		Charm Quad Test	Charm Sciences	1000
		Charm SL Beta-lactam Test	Charm Sciences	50
		Charm TRIO Test	Charm Sciences	750
		Delvotest P 5 Pack ♠	DSM Food Specialties USA, Inc	60-100
		Delvotest P/Delvotest P Mini ♠	DSM Food Specialties USA, Inc	60-100
		Delvotest SP-NT	DSM Food Specialties USA, Inc	5-6.0
		Delvotest T	DSM Food Specialties USA, Inc	30
		Eclipse® 3G	ZEU-Inmunotec	60
Cephapirin	20 #	BetaStar Plus Bet-lactam Test ♠	Neogen Corporation	19
		Charm 3 SL3 Beta-lactam Test ♠	Charm Sciences	20.0 •
		Charm *B. stearothermophilus* Tablet Disc Assay ♠	Charm Sciences	11.7 •
		Charm Blue Yellow II Test	Charm Sciences	6
		Charm Cowside II Test	Charm Sciences	10
		Charm Flunixin and Beta-lactam Test ♠	Charm Sciences	13.4 •
		Charm HPLC-Receptogram	Charm Sciences	2
		Charm II Beta-lactam Test ♠ (Competitive)	Charm Sciences	4.2 •
		Charm II Beta-lactam Test ♠ (Quantitative)	Charm Sciences	4.1 •
		Charm II Beta-lactam Test ♠ (Sequential)	Charm Sciences	4.1
		Charm MRL Beta-lactam 1 Minute Test	Charm Sciences	20
		Charm MRL Beta-lactam 3 Minute Test	Charm Sciences	30
		Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Charm Sciences	25
		Charm MRL Beta-lactam and Tetracycline Test	Charm Sciences	8
		Charm MRL Beta-lactam RF Tetracycline 2 Minute Test	Charm Sciences	20
		Charm MRL Beta-lactam Test	Charm Sciences	10
		Charm Quad 1 Test	Charm Sciences	10
		Charm Quad Test	Charm Sciences	30

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Residues Detected	Tolerance (ppb)	Test Name	Sponsor	Sensitivity (ppb)
		Charm SL Beta-lactam Test ♠	Charm Sciences	13.7 •
		Charm TRIO Test	Charm Sciences	14.5
		Delvotest BLF	DSM Food Specialties USA, Inc	4
		Delvotest P 5 Pack ♠	DSM Food Specialties USA, Inc	8.2 •
		Delvotest P/Delvotest P Mini ♠	DSM Food Specialties USA, Inc	7
		Delvotest SP-NT	DSM Food Specialties USA, Inc	4-6.0
		Delvotest T	DSM Food Specialties USA, Inc	5
		Eclipse® 3G	ZEU-Inmunotec	8
		New SNAP Beta-lactam (Visual)	IDEXX Labs, Inc.	11.9
		New SNAP Beta-lactam ♠	IDEXX Labs, Inc.	11.7 •
		Penzyme® Milk Test	Neogen Corporation	11.6
Chloramphenicol ¢ (prohibited in food producing animals)	None ¥	BetaStar 4D Beta-lactam, Tetracycline, Streptomycin, Chloramphenicol Test	Neogen Corporation	0.3
		Charm *B. stearothermophilus* Tablet Disc Assay	Charm Sciences	20,000
		Charm HPLC-Receptogram	Charm Sciences	1
		Charm II Amphenicol Test ♠	Charm Sciences	1
		Charm II Chloramphenicol Test ♠	Charm Sciences	0.1
		Charm Quad Test	Charm Sciences	0.3
		Charm ROSA Amphenicol Test	Charm Sciences	0.1
		Charm ROSA Chloramphenicol Test	Charm Sciences	0.15
		Delvotest SP-NT	DSM Food Specialties USA, Inc	2500
		Delvotest T	DSM Food Specialties USA, Inc	3080
		Eclipse® 3G	ZEU-Inmunotec	5000
Chlortetracycline (prohibited as feed additive in lactating dairy cattle)	300 #	BetaStar 4D	Neogen Corporation	5
		Charm *B. stearothermophilus* Tablet Disc Assay	Charm Sciences	1000 †
		Charm Blue Yellow II Test	Charm Sciences	200
		Charm Cowside II Test	Charm Sciences	100
		Charm HPLC-Receptogram	Charm Sciences	15
		Charm II Tetracycline Drug Test ♠ (Competitive Assay)	Charm Sciences	257 •
		Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Charm Sciences	100
		Charm MRL Beta-lactam and Tetracycline Test	Charm Sciences	100
		Charm MRL Beta-lactam RF Tetracycline 2 Minute Test	Charm Sciences	10
		Charm Quad 1 Test	Charm Sciences	70
		Charm Quad Test	Charm Sciences	6
		Charm ROSA Tetracycline - SL Test	Charm Sciences	289
		Charm ROSA Tetracycline Test	Charm Sciences	96
		Charm TRIO Test	Charm Sciences	34
		Delvotest P 5 Pack	DSM Food Specialties USA, Inc	250-300
		Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	200
		Delvotest SP-NT	DSM Food Specialties USA, Inc	250-300
		Delvotest T	DSM Food Specialties USA, Inc	150
		SNAP Tetracycline	IDEXX Labs, Inc.	100
Clindamycin (unapproved in dairy cattle)	None ¥	Charm II Macrolide Test	Charm Sciences	50
		Charm ROSA Macrolide Test	Charm Sciences	80

¥ 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 evaluations of raw commingled bovine milk samples by test sponsors, independent laboratories, and FDA and reported FDA memo M-a-85 Revision #15 and FDA memorandum (8/29/16).

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)
Cloxacillin	10 #	BetaStar Plus Beta-lactam Test ♠	Neogen Corporation	8.2
		Charm 3 SL3 Beta-lactam Test ♠	Charm Sciences	8.6 •
		Charm *B. stearothermophilus* Tablet Disc Assay ♠	Charm Sciences	48❖•
		Charm Blue Yellow II Test	Charm Sciences	20
		Charm Cowside II Test	Charm Sciences	25
		Charm Flunixin and Beta-lactam Test ♠	Charm Sciences	75 •
		Charm HPLC-Receptogram	Charm Sciences	10
		Charm II Beta-lactam Test ♠ (Competitive)	Charm Sciences	70❖•
		Charm II Beta-lactam Test ♠ (Sequential)	CharmSciences	50❖•
		Charm II Beta-lactam Test ♠(Quantitative)	Charm Sciences	8.5 •
		Charm II for Cloxacillin in Milk ♠ (Competitive)	Charm Sciences	8.5 •
		Charm MRL Beta-lactam 1 Minute Test	Charm Sciences	20
		Charm MRL Beta-lactam 3 Minute Test	Charm Sciences	30
		Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Charm Sciences	20
		Charm MRL Beta-lactam and Tetracycline Test	Charm Sciences	35
		Charm MRL Beta-lactam RF Tetracycline 2 Minute Test	Charm Sciences	20
		Charm MRL Beta-lactam Test	Charm Sciences	35
		Charm Quad 1 Test	Charm Sciences	25
		Charm Quad Test	Charm Sciences	30
		Charm SL Beta-lactam Test ♠	Charm Sciences	50❖
		Charm TRIO Test	Charm Sciences	8.6
		Delvo P/Delvotest P Mini ♠	DSM Food Specialties USA, Inc	25❖•
		Delvotest BLF	DSM Food Specialties USA, Inc	17
		Delvotest P 5 Pack ♠	DSM Food Specialties USA, Inc	30❖
		Delvotest SP-NT	DSM Food Specialties USA, Inc	11
		Delvotest T	DSM Food Specialties USA, Inc	5
		Eclipse® 3G	ZEU-Inmunotec	30
		New SNAP Beta-Lactam ♠	IDEXX Labs, Inc.	50❖•
Danofloxacin (Extra-label use in food animals is prohibited)	None ¥	BetaStar for Quinolone	Neogen Corporation	5
		Charm Quad 1 Test	Charm Sciences	20
		Charm Quinolone Test	Charm Sciences	10
Dapson	None ¥	Charm Cowside II Test	Charm Sciences	2
		Charm II Sulfa Drug Test (Competitive)	Charm Sciences	2
		Charm II Sulfa Drug Test (Sequential)	Charm Sciences	2
		Delvotest T	DSM Food Specialties USA, Inc	40
Dicloxacillin (unapproved in dairy cattle)	None ¥	BetaStar Plus Beta-lactam Test	Neogen Corporation	7
		Charm 3 SL3 Beta-lactam Test	Charm Sciences	7
		Charm *B. stearothermophilus* Tablet Disc Assay	Charm Sciences	40
		Charm Blue Yellow II Test	Charm Sciences	30
		Charm Cowside II Test	Charm Sciences	10
		Charm Flunixin and Beta-lactam Test	Charm Sciences	60
		Charm HPLC Receptogram	Charm Sciences	10
		Charm II Beta-lactam Test (Competitive)	Charm Sciences	45

¥ 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 evaluations of raw commingled bovine milk samples by test sponsors, independent laboratories, and FDA and reported FDA memo M-a-85 Revision #15 and FDA memorandum (8/29/16).

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)
		Charm II Beta-lactam Test (Quantitative)	Charm Sciences	5
		Charm II Beta-lactam Test (Sequential)	Charm Sciences	45
		Charm II for Cloxacillin in Milk	Charm Sciences	9
		Charm MRL Beta-lactam 1 Minute Test	Charm Sciences	15
		Charm MRL Beta-lactam 3 Minute Test	Charm Sciences	25
		Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Charm Sciences	20
		Charm MRL Beta-lactam and Tetracycline Test	Charm Sciences	30
		Charm MRL Beta-lactam RF Tetracycline 2 Minute Test	Charm Sciences	20
		Charm MRL Beta-lactam Test	Charm Sciences	30
		Charm Quad 1 Test	Charm Sciences	20
		Charm Quad Test	Charm Sciences	30
		Charm SL Beta-lactam Test	Charm Sciences	50
		Charm TRIO Test	Charm Sciences	10
		Delvotest BLF	DSM Specialties	24
		Delvotest P 5 Pack	DSM Food Specialties USA, Inc	15
		Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	20
		Delvotest SP-NT	DSM Food Specialties USA, Inc	6
		New SNAP Beta-lactam	IDEXX Labs, Inc.	50
Dihydrostreptomycin	125 #	BetaStar 4D Beta-lactam, Tetracycline, Chloramphenicol, Streptomycin Test	Neogen Corporation	200
		Charm II Streptomycin Test	Charm Sciences	75
		Charm Quad 3 Test	Charm Sciences	100
		Charm ROSA Neomycin and Streptomycin Test	Charm Sciences	125
		Charm Streptomycin Test	Charm Sciences	75
		Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	5000
		Delvotest SP-NT	Charm Sciences	680
		Delvotest T	DSM Food Specialties USA, Inc	800
Enrofloxacin (not approved in lactating dairy cattle 20 months of age or older)	None	BetaStar for Quinolone	Neogen Corporation	1.5
		Charm Enroflox Test (ROSA Test)	Charm Sciences	7
		Charm Quad 1 Test	Charm Sciences	15
		Charm Quinolone Test	Charm Sciences	10
		Delvotest SP-NT	DSM Food Specialties USA, Inc	1000-1500
Erythromycin	50 ^	Charm *B. stearothermophilus* Tablet Disc Assay	Charm Sciences	400 †
		Charm Blue Yellow II Test	Charm Sciences	150
		Charm Cowside II Test	Charm Sciences	100
		Charm II Macrolide Test	Charm Sciences	25 †
		Charm Quad 2 Test	Charm Sciences	30
		Charm ROSA Macrolide Test	Charm Sciences	10
		Delvotest P 5 Pack	DSM Food Specialties USA, Inc	250
		Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	500
		Delvotest SP-NT	DSM Food Specialties USA, Inc	90
		Delvotest T	DSM Food Specialties USA, Inc	150
		Eclipse® 3G	ZEU-Inmunotec	200
Florfenicol (unapproved in lactating cows, consult with your veterinarian)	None	Charm II Amphenicol Test	Charm Sciences	40
		Charm ROSA Amphenicol Test	Charm Sciences	50
Flunixin	2	Alert Flunixin Test	Neogen Corporation	2
		Charm Flunixin and Beta-lactam Test ♠	Charm Sciences	1.9 ⧺ •

^ Values indicate the FDA-established target testing levels and do not represent official tolerance levels. Target testing levels are used by the FDA as guides for deciding whether or not to prosecute. They are not and cannot be transformed into tolerances that are established for animal drugs under section 512 (b) of the Federal Food, Drug & Cosmetic Act. They are not binding, do not dictate any result, do not limit the FDA's discretion in any way, and do not protect milk producers (or milk) from court enforcement action.

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⧺ 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 evaluations of raw commingled bovine milk samples by test sponsors, independent laboratories, and FDA and reported FDA memo M-a-85 Revision #15 and FDA memorandum (8/29/16).

Milk Screening Tests

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Residues Detected	Tolerance (ppb)	Test Name	Sponsor	Sensitivity (ppb)
Gentamicin (AVMA, AABP and Academy of Veterinary Consultants [AVC] advocate their members voluntarily refrain from use)	30 ^	Charm *B. stearothermophilus* Tablet Disc Assay	Charm Sciences	100
		Charm Blue Yellow II Test	Charm Sciences	100
		Charm Cowside II Test	Charm Sciences	100
		Charm II Gentamicin and Neomycin Test	Charm Sciences	24
		Charm II Gentamicin and Streptomycin Test	Charm Sciences	30 †
		Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	1000
		Delvotest SP-NT	DSM Food Specialties USA, Inc	100
		Delvotest T	DSM Food Specialties USA, Inc	80
		Eclipse® 3G	ZEU-Inmunotec	>1000
		SNAP Gentamicin	IDEXX Labs, Inc.	30 †
Hetacillin	None ¥	Charm *B. stearothermophilus* Tablet Disc Assay	Charm Sciences	7.5
		Charm 3 SL3 Beta-lactam Test	Charm Sciences	8
		Charm Blue Yellow II Test	Charm Sciences	3
		Charm Cowside II Test	Charm Sciences	4
		Charm Flunixin and Beta-lactam Test	Charm Sciences	5.9
		Charm II Beta-lactam Test (Competitive)	Charm Sciences	7.5
		Charm II Beta-lactam Test (Quantitative)	Charm Sciences	7.5
		Charm II Beta-lactam Test (Sequential)	Charm Sciences	7.5
		Charm MRL Beta-lactam	Charm Sciences	4
		Charm MRL Beta-lactam 1 Minute Test and Tetracycline Test	Charm Sciences	4
		Charm MRL Beta-lactam 3 Minute Test	Charm Sciences	4
		Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Charm Sciences	4
		Charm MRL Beta-lactam RF Tetracycline 2 Minute Test	Charm Sciences	4
		Charm MRL Beta-lactam Test	Charm Sciences	4
		Charm Quad 1 Test	Charm Sciences	4
		Charm Quad Test	Charm Sciences	4
		Charm SL Beta-lactam Test	Charm Sciences	7.5
		Charm TRIO Test	Charm Sciences	4
		Delvotest P 5 Pack	DSM Food Specialties USA, Inc	5
		Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	5
Kanamycin (AVMA, AABP and Academy of Veterinary Consultants [AVC] advocate their members voluntarily refrain from use)	None ¥	Charm *B. stearothermophilus* Tablet Disc Assay	Charm Sciences	1000
		Charm II Gentamicin and Streptomycin Test	Charm Sciences	1000
		Charm Quad 3 Test	Charm Sciences	100
		Delvotest SP-NT	DSM Food Specialties USA, Inc	5000
		Delvotest T	DSM Food Specialties USA, Inc	1310
		Eclipse® 3G	ZEU-Inmunotec	>2000
Lincomycin (unapproved in dairy cattle)	None ¥	Charm Blue Yellow II Test	Charm Sciences	150
		Charm Cowside II Test	Charm Sciences	150
		Charm II Macrolide Test	Charm Sciences	100
		Charm Quad 2 Test	Charm Sciences	150
		Delvotest P 5 Pack	DSM Food Specialties USA, Inc	400-1000
		Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	400-1000
		Delvotest SP-NT	DSM Food Specialties USA, Inc	156
		Delvotest T	DSM Food Specialties USA, Inc	180
		Eclipse® 3G	ZEU-Inmunotec	150

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† 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)
Neomycin (AVMA, AABP and Academy of Veterinary Consultants [AVC] advocate their members voluntarily refrain from use)	150 #	Charm Blue Yellow II Test	Charm Sciences	150
		Charm Cowside II Test	Charm Sciences	150
		Charm II Gentamicin and Neomycin Test	Charm Sciences	20 †
		Charm Quad 3 Test	Charm Sciences	250
		Charm ROSA Neomycin and Streptomycin Test	Charm Sciences	150
		Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	1000-5000 †
		Delvotest SP-NT	DSM Food Specialties USA, Inc	810
		Delvotest T	DSM Food Specialties USA, Inc	60
		Eclipse® 3G	ZEU-Inmunotec	1500
Novobiocin	100 #	Charm *B. stearothermophilus* Tablet Disc Assay	Charm Sciences	1000 †
		Charm II Novobiocin Test	Charm Sciences	100 †
		Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	600
		Delvotest SP-NT	DSM Food Specialties USA, Inc	750-800
Oxytetracycline (prohibited as feed additive for lactating dairy cattle)	300 #	BetaStar 4D	Neogen Corporation	5
		Charm *B. stearothermophilus* Tablet Disc Assay	Charm Sciences	1000 †
		Charm Blue Yellow II Test	Charm Sciences	100
		Charm Cowside II Test	Charm Sciences	100
		Charm HPLC-Receptogram	Charm Sciences	15
		Charm II Tetracycline Drug Test ♠ (Competitive Assay)	Charm Sciences	119 •
		Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Charm Sciences	100
		Charm MRL Beta-lactam and Tetracycline Test	Charm Sciences	100
		Charm MRL Beta-lactam RF Tetracycline 2 Minute Test	Charm Sciences	10
		Charm Quad 1 Test	Charm Sciences	70
		Charm Quad Test	Charm Sciences	6
		Charm ROSA Tetracycline - SL Test	Charm Sciences	291
		Charm ROSA Tetracycline Test	Charm Sciences	94
		Charm TRIO Test	Charm Sciences	53
		Delvotest P 5 Pack	DSM Food Specialties USA, Inc	400
		Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	300
		Delvotest SP-NT	DSM Food Specialties USA, Inc	235
		Delvotest T	DSM Food Specialties USA, Inc	80
		Eclipse® 3G	ZEU-Inmunotec	100
		SNAP Tetracycline	IDEXX Labs, Inc.	50
Penicillin	5 ^	BetaStar Plus Beta-lactam Test ♠	Neogen Corporation	4.7
		Charm 3 SL3 Beta-lactam Test ♠	Charm Sciences	3.8 •
		Charm *B. stearothermophilus* Tablet Disc Assay♠	Charm Sciences	3.8 •
		Charm Blue Yellow II Test	Charm Sciences	2
		Charm Cowside II Test	Charm Sciences	3
		Charm Flunixin and Beta-lactam Test ♠	Charm Sciences	2.0 •
		Charm HPLC-Receptogram	Charm Sciences	5
		Charm II Beta-lactam Test ♠ (Competitive)	Charm Sciences	3.0 •
		Charm II Beta-lactam Test ♠ (Quantitative)	Charm Sciences	3.4 •
		Charm II Beta-lactam Test ♠ (Sequential)	Charm Sciences	3.4 •
		Charm MRL Beta-lactam 1 Minute Test	Charm Sciences	3
		Charm MRL Beta-lactam 3 Minute Test	Charm Sciences	3

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

• Sensitivities based on evaluations of raw commingled bovine milk samples by test sponsors, independent laboratories, and FDA and reported FDA memo M-a-85 Revision #15 and FDA memorandum (8/29/16).

Milk Screening Tests

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Residues Detected	Tolerance (ppb)	Test Name	Sponsor	Sensitivity (ppb)
		Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Charm Sciences	3
		Charm MRL Beta-lactam and Tetracycline Test	Charm Sciences	3
		Charm MRL Beta-lactam RF Tetracycline 2 Minute Test	Charm Sciences	2.5
		Charm MRL Beta-lactam Test	Charm Sciences	3
		Charm Quad 1 Test	Charm Sciences	4
		Charm Quad Test	Charm Sciences	3.0
		Charm SL Beta-lactam Test ♠	Charm Sciences	3.6 •
		Charm TRIO Test	Charm Sciences	2
		Delvotest BLF	DSM Food Specialties USA, Inc	3
		Delvotest P 5 Pack ♠	DSM Food Specialties USA, Inc	2.1 •
		Delvotest P/Delvotest P Mini ♠	DSM Food Specialties USA, Inc	3.1 •
		Delvotest SP-NT	DSM Food Specialties USA, Inc	1.5
		Delvotest T	DSM Food Specialties USA, Inc	2
		Eclipse® 3G	ZEU-Inmunotec	2-3.0
		New SNAP Beta-lactam (Visual)	IDEXX Labs, Inc.	3.1
		New SNAP Beta-lactam ♠	IDEXX Labs, Inc.	3
		Penzyme® Milk Test	Neogen Corporation	5
Pirlimycin	400 #	Charm *B. stearothermophilus* Tablet Disc Assay	Charm Sciences	100
		Charm Blue Yellow II Test	Charm Sciences	100
		Charm Cowside II Test	Charm Sciences	50
		Charm II Macrolide Test	Charm Sciences	80
		Charm Quad 2 Test	Charm Sciences	100
		Charm ROSA Macrolide Test	Charm Sciences	80
		Charm ROSA Pirlimycin Test	Charm Sciences	250
		Delvotest P 5 Pack	DSM Food Specialties USA, Inc	80
		Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	80
		Delvotest SP-NT	DSM Food Specialties USA, Inc	20-80
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 *B. stearothermophilus* Tablet Disc Assay	Charm Sciences	1000 †
		Charm Cowside II Test	Charm Sciences	1000
		Charm Quad 3 Test	Charm Sciences	200
		Delvotest T	DSM Food Specialties USA, Inc	1850
		Eclipse® 3G	ZEU-Inmunotec	>2500
Streptomycin (AVMA, AABP and Academy of Veterinary Consultants [AVC] advocate their members voluntarily refrain from use)	None ¥	BetaStar 4D Beta-lactam, Tetracycline, Chloramphenicol, Streptomycin Test	Neogen Corporation	200
		Charm *B. stearothermophilus* Tablet Disc Assay ♠	Charm Sciences	1000 †
		Charm Cowside II Test	Charm Sciences	1000
		Charm II Gentamicin and Streptomycin Test	Charm Sciences	20 †
		Charm Quad 3 Test	Charm Sciences	175
		Charm ROSA Neomycin and Streptomycin Test	Charm Sciences	150
		Charm ROSA Streptomycin Test	Charm Sciences	75
		Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	4000
		Delvotest SP-NT	DSM Food Specialties USA, Inc	1200
		Delvotest T	DSM Food Specialties USA, Inc	400
		Eclipse® 3G	ZEU-Inmunotec	1500

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• Sensitivities based on evaluations of raw commingled bovine milk samples by test sponsors, independent laboratories, and FDA and reported FDA memo M-a-85 Revision #15 and FDA memorandum (8/29/16).

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Residues Detected	Tolerance (ppb)	Test Name	Sponsor	Sensitivity (ppb)
Sulfachlorpyridazine * (unapproved in lactating dairy cattle)	10 ^	Charm HPLC Receptogram	Charm Sciences	10
		Charm II Sulfa Drug Test ♠	Charm Sciences	5
		Charm Quad 1 Test	Charm Sciences	20
		Charm ROSA Sulfa Test	Charm Sciences	1
		Charm TRIO Test	Charm Sciences	1
		Charm Blue Yellow II Test	Charm Sciences	50
		Charm Cowside II Test	Charm Sciences	50
Sulfadiazine * (unapproved in lactating dairy cattle)	10 ^	Charm Blue Yellow II Test	Charm Sciences	50
		Charm Cowside II Test	Charm Sciences	50
		Charm HPLC-Receptogram	Charm Sciences	5
		Charm II Sulfa Drug Test (Competitive Assay)	Charm Sciences	4.9 •
		Charm Quad 1 Test	Charm Sciences	20
		Charm ROSA Sulfa Test	Charm Sciences	2
		Charm TRIO Test	Charm Sciences	3
		Delvotest SP-NT	DSM Food Specialties USA, Inc	50
		Delvotest T	DSM Food Specialties USA, Inc	50
		Eclipse® 3G	ZEU-Inmunotec	100
Sulfadimethoxine	10 #	Charm *B. stearothermophilus* Tablet Disc Assay	Charm Sciences	10,000
		Charm Cowside II Test	Charm Sciences	25
		Charm HPLC-Receptogram	Charm Sciences	5
		Charm II Sulfa Drug Test ♠ (Competitive Assay)	Charm Sciences	4.0 •
		Charm ROSA Sulfa Test	Charm Sciences	4
		Charm TRIO Test	Charm Sciences	7.6
		Delvotest SP-NT	DSM Food Specialties USA, Inc	100
		Delvotest T	DSM Food Specialties USA, Inc	40
Sulfadoxine * (unapproved in lactating dairy cattle)	None ¥	Charm Blue Yellow II Test	Charm Sciences	100
		Charm Cowside II Test	Charm Sciences	100
		Charm II Sulfa Drug Test	Charm Sciences	7
		Charm Quad 1 Test	Charm Sciences	100
		Charm ROSA Sulfa Test	Charm Sciences	8
		Charm TRIO Test	Charm Sciences	20
		Delvotest SP-NT	DSM Food Specialties USA, Inc	110
Sulfamerazine * (unapproved in lactating dairy cattle)	10 ^	Charm Blue Yellow II Test	Charm Sciences	100
		Charm Cowside II Test	Charm Sciences	100
		Charm HPLC-Receptogram	Charm Sciences	5
		Charm II Sulfa Drug Test	Charm Sciences	4.0 †
		Charm Quad 1 Test	Charm Sciences	40
		Charm ROSA Sulfa Test	Charm Sciences	3
		Charm TRIO Test	Charm Sciences	4
		Delvotest SP-NT	DSM Food Specialties USA, Inc	50-100

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Residues Detected	Tolerance (ppb)	Test Name	Sponsor	Sensitivity (ppb)
Sulfamethazine × (unapproved in lactating dairy cattle)	10 ^	Charm Blue Yellow II Test	Charm Sciences	100
		Charm Cowside II Test	Charm Sciences	100
		Charm HPLC-Receptogram	Charm Sciences	5
		Charm II Sulfa Drug Test (Competitive Assay)	Charm Sciences	9.4 •
		Charm Quad 1 Test	Charm Sciences	20
		Charm ROSA Sulfa Test	Charm Sciences	8
		Charm TRIO Test	Charm Sciences	9.2
		Delvotest SP-NT	DSM Food Specialties USA, Inc	150
		Delvotest T	DSM Food Specialties USA, Inc	150
		Eclipse® 3G	ZEU-Inmunotec	150
		SNAP Sulfamethazine Test	IDEXX Labs, Inc.	10
Sulfamethizole * (unapproved in lactating dairy cattle)	10 ^	Charm Blue Yellow II Test	Charm Sciences	50
		Charm Cowside II Test	Charm Sciences	20
		Charm HPLC-Receptogram	Charm Sciences	5
		Charm II Sulfa Drug Test	Charm Sciences	6.0 †
		Charm Quad 1 Test	Charm Sciences	50
		Charm ROSA Sulfa Test	Charm Sciences	1
		Charm TRIO Test	Charm Sciences	1
Sulfamethizole * (unapproved in lactating dairy cattle)	None ¥	Charm Blue Yellow II Test	Charm Sciences	50
		Charm Cowside II Test	Charm Sciences	50
		Charm HPLC-Receptogram	Charm Sciences	5
		Charm II Sulfa Drug Test	Charm Sciences	20 †
		Charm Quad 1 Test	Charm Sciences	50
		Charm ROSA Sulfa Test	Charm Sciences	1
		Charm TRIO Test	Charm Sciences	2
		Delvotest SP-NT	DSM Food Specialties USA, Inc	50 †
Sulfanilamide * (unapproved in lactating dairy cattle)	10 ^	Charm Blue Yellow II Test	Charm Sciences	200
		Charm Cowside II Test	Charm Sciences	200
		Charm HPLC-Receptogram	Charm Sciences	10
		Charm II Sulfa Drug Test	Charm Sciences	20
		Charm ROSA Sulfa Test	Charm Sciences	50
		Charm TRIO Test	Charm Sciences	1000
		Delvotest SP-NT	DSM Food Specialties USA, Inc	100
Sulfapyridine * (unapproved in lactating dairy cattle)	10 ^	Charm Blue Yellow II Test	Charm Sciences	100
		Charm Cowside II Test	Charm Sciences	100
		Charm HPLC-Receptogram	Charm Sciences	5
		Charm II Sulfa Drug Test	Charm Sciences	10
		Charm Quad 1 Test	Charm Sciences	20
		Charm ROSA Sulfa Test	Charm Sciences	10
		Charm TRIO Test	Charm Sciences	5

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

^ Values indicate the FDA-established target testing levels and do not represent official tolerance levels. Target testing levels are used by the FDA as guides for deciding whether or not to prosecute. They are not and cannot be transformed into tolerances that are established for animal drugs under section 512 (b) of the Federal Food, Drug & Cosmetic Act. They are not binding, do not dictate any result, do not limit the FDA's discretion in any way, and do not protect milk producers (or milk) from court enforcement action.

* Prohibited from use in any kind of lactating cattle.

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

• Sensitivities based on evaluations of raw commingled bovine milk samples by test sponsors, independent laboratories, and FDA and reported FDA memo M-a-85 Revision #15 and FDA memorandum (8/29/16).

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)
Sulfaquinoxaline * (unapproved in lactating dairy cattle)	10 ^	Charm Blue Yellow II Test	Charm Sciences	100
		Charm Cowside II Test	Charm Sciences	100
		Charm HPLC Receptorgram	Charm Sciences	2
		Charm II Sulfa Drug Test ♠	Charm Sciences	3
		Charm Quad 1 Test	Charm Sciences	20
		Charm ROSA Sulfa Test	Charm Sciences	3
		Charm TRIO Test	Charm Sciences	3
Sulfathiazole * (unapproved in lactating dairy cattle)	10 ^	Charm Blue Yellow II Test	Charm Sciences	50
		Charm Cowside II Test	Charm Sciences	50
		Charm HPLC-Receptogram	Charm Sciences	5
		Charm II Sulfa Drug Test ♠ (Competitive Assay)	Charm Sciences	7.3 •
		Charm Quad 1 Test	Charm Sciences	20
		Charm ROSA Sulfa Test	Charm Sciences	1
		Charm TRIO Test	Charm Sciences	1
		Delvotest SP-NT	DSM Food Specialties USA, Inc	50
		Delvotest T	DSM Food Specialties USA, Inc	50
		Eclipse® 3G	ZEU-Inmunotec	100
Sulfisoxazole * (unapproved in lactating dairy cattle)	None ¥	Charm Blue Yellow II Test	Charm Sciences	50
		Charm Cowside II Test	Charm Sciences	50
		Charm II Sulfa Drug Test	Charm Sciences	6
		Charm Quad 1 Test	Charm Sciences	20
		Charm ROSA Sulfa Test	Charm Sciences	8
		Charm TRIO Test	Charm Sciences	15
Tetracycline (prohibited as feed additive for lactating dairy cows)	300 #	BetaStar 4D	Neogen Corporation	10
		Charm *B. stearothermophilus* Tablet Disc Assay	Charm Sciences	1000
		Charm Blue Yellow II Test	Charm Sciences	100
		Charm Cowside II Test	Charm Sciences	100
		Charm HPLC-Receptogram	Charm Sciences	5.0
		Charm II Tetracycline Drug Test ♠ (Competitive Assay)	Charm Sciences	67 •
		Charm MRL Beta-lactam and Tetracycline 2 Minute Test	Charm Sciences	30
		Charm MRL Beta-lactam and Tetracycline Test	Charm Sciences	30
		Charm MRL Beta-lactam RF Tetracycline 2 Minute Test	Charm Sciences	10
		Charm Quad 1 Test	Charm Sciences	20
		Charm Quad Test	Charm Sciences	6
		Charm ROSA Tetracycline - SL Test	Charm Sciences	126
		Charm ROSA Tetracycline Test	Charm Sciences	90
		Charm TRIO Test	Charm Sciences	42
		Delvotest P 5 Pack	DSM Food Specialties USA, Inc	300
		Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	300
		Delvotest SP-NT	DSM Food Specialties USA, Inc	270
		Delvotest T	DSM Food Specialties USA, Inc	75

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

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

* Prohibited from use in any kind of lactating cattle.

• Sensitivities based on evaluations of raw commingled bovine milk samples by test sponsors, independent laboratories, and FDA and reported FDA memo M-a-85 Revision #15 and FDA memorandum (8/29/16).

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)
		Eclipse® 3G	ZEU-Inmunotec	100
		SNAP Tetracycline	IDEXX Labs, Inc.	50
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
		Charm II Macrolide Test	Charm Sciences	20
		Charm Quad 2 Test	Charm Sciences	40
		Charm ROSA Macrolide Test	Charm Sciences	40
		Delvotest SP-NT	DSM Food Specialties USA, Inc	50
		Delvotest T	DSM Food Specialties USA, Inc	60
Trimethoprim ¥	None	Charm Cowside II Test	Charm Sciences	300
		Delvotest T	DSM Food Specialties USA, Inc	110
Tulathromycin ¥ (unapproved in lactating dairy cattle)	None	Charm II Macrolide Test	Charm Sciences	20
Tylosin (unapproved in lactating dairy cattle)	50 #	Charm Cowside II Test	Charm Sciences	30
		Charm II Macrolide Test	Charm Sciences	50 †
		Charm Quad 2 Test	Charm Sciences	30
		Charm ROSA Macrolide Test	Charm Sciences	40
		Delvotest P 5 Pack	DSM Food Specialties USA, Inc	100
		Delvotest P/Delvotest P Mini	DSM Food Specialties USA, Inc	100
		Delvotest SP-NT	DSM Food Specialties USA, Inc	50
		Delvotest T	DSM Food Specialties USA, Inc	50
		Eclipse® 3G	ZEU-Inmunotec	40

¥ 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

Only Use Drugs Approved for Lactating Dairy Cows

Screening Tests Available as of January 2017 for Detecting Residues in Bulk Tank Milk.

Tests listed below have been neither evaluated by FDA nor 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.

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 Blue Yellow II Test	Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Chlortetracycline, Hetacillin,Lincomycin, Neomycin, Oxytetracycline, Penicillin, Pirlimycin, Tetracycline, Tilmycosin, Tylosin
Charm Cowside II Test	Amoxicillin, Ampicillin, Cephapirin, Chlortetracycline, Hetacillin, Neomycin, Oxytetracycline, Penicillin, Pirlimycin, Tetracycline, Tilmicosin, 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, Tilmicosin, Tylosin
Charm Quad 3 Test	Dihydrostreptomycin, Neomycin
Charm Quad Test	Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Chlortetracycline, Dihydrostreptomycin, Hetacillin, Oxytetracycline, Penicillin, Streptomcyin, Tetracycline
Charm TRIO Test	Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Chlortetracycline, Hetacillin, Oxytetracycline, Penicillin, Sulfachlorpyridazine, Sulfadiazine, Sulfadimethoxine, Sulfamerazine, Sulfamethazine, Sulfamethizole, Sulfaquinoxaline, Sulfathiazole, Tetracycline

Milk Screening Tests

Only Use Drugs Approved for Lactating Dairy Cows

Screening Tests Available as of January 2017 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 Plus Beta-lactam Test	Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Cloxacillin, Penicillin
Charm 3 SL3 Beta-lactam Test	Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Cloxacillin, Penicillin
Charm *B. stearothermophilus* Tablet Disc Assay	Amoxicillin, Ampicillin, Cephapirin, Penicillin
Charm Flunixin and Beta-lactam Test	Amoxicillin, Ampicillin, Ceftiofur, Cephapirin, Cloxacillin, Flunixin, Penicillin
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
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

Milk Screening Tests

Only Use Drugs Approved for Lactating Dairy Cows

Screening Tests Available as of January 2017 for Detecting Residues in Bulk Tank Milk.

Tests listed below have NEITHER been evaluated by FDA nor 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.

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, Sulfamerizine, 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, Tilmicosin, 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, Tilmicosin, Tulathromcyin
Charm ROSA Streptomycin Test	Dihydrostreptomycin
Charm ROSA Sulfa Test	Sulfadiazine, Sulfadimethoxine, Sulfamethazine, Sulfathiazole, Sulfachlorpyridazine, Sulfamerazine, Sulfamethizole, Sulfamethoxazole, Sulfapyridine, Sulfaquinoxaline
Charm ROSA Tetracycline Test	Chlortetracycline, Oxytetracycline, Tetracycline
Charm SL Aflatoxin Test (Quantitative)	Aflatoxin M1

Contact Information for
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: 800-321-0207

Neogen Corporation
620 Lesher 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

CHOOSE A HEALTHIER, MORE PROFITABLE HERD

YOUR HEIFER CALVES ARE YOUR LEGACY. PREDICT HOW HEALTHY THEY WILL BE AS COWS BY PROACTIVELY TESTING THEM WITH CLARIFIDE® PLUS.

CLARIFIDE® Plus provides unique genomic predictions for mastitis, lameness, metritis, retained placenta, displaced abomasum and ketosis. And with a powerful new economic index—the Dairy Wellness Profit Index™ (DWP$™)—producers have the unprecedented ability to choose and plan for a healthier and more profitable herd.

To learn how CLARIFIDE Plus can help make your life easier by selecting heifers to help build a healthier herd, contact your Zoetis representative or visit clarifideplus.com.

CLARIFIDE® plus

clarifideplus.com

DAIRY WELLNESS MAKES A DIFFERENCE™

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CLARIFIDE® PLUS OFFERS INNOVATIVE GENETIC PREDICTIONS FOR DAIRY WELLNESS TRAITS

KEY TAKEAWAYS:

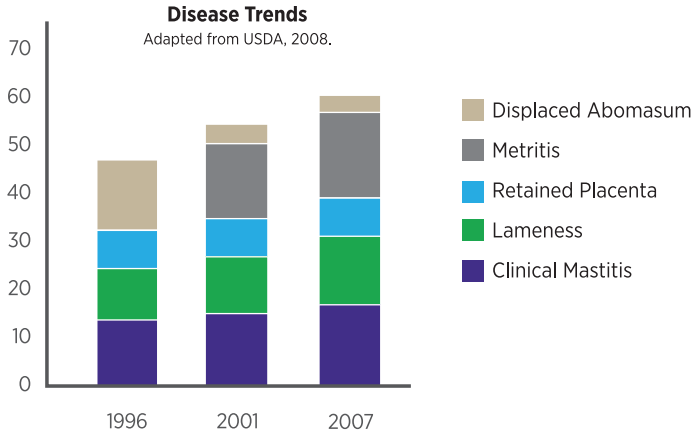
- Prevention and treatment of events that adversely impact animal health require dairy producers to invest significant time, energy and finances, not to mention the cost of lost production and the risk of mortality
- CLARIFIDE® Plus from Zoetis offers dairy producers the opportunity to more accurately identify and genetically select heifers based on wellness traits including mastitis, lameness, metritis, retained placenta, displaced abomasum and ketosis
- In addition to individual trait results, CLARIFIDE Plus provides two indexes—Dairy Wellness Profit Index™ (DWP$™) and Wellness Trait Index™ (WT$™)—that describe differences in lifetime productability attributed to genetic risk for wellness traits

Adverse health events continue to have a significant impact on herd health, longevity and producer profitability. Table 1 shows estimates of the financial impact of adverse health events on dairy production.

TABLE 1: IMPACT OF HEALTH EVENTS

	Incidence/Lactation Range	Cost ($) per Case	Culling Risk[1]
Mastitis	12 – 40%[1,2,3,4,8,13]	$155 – 224[4,8,9]	32.7
Lameness	10 – 48%[2,4,6,13]	$177 – 469[4,7]	16[2]
Metritis	2 – 37%[1,3,10,11,13]	$300 – 358[10,11]	17.1
Retained Placenta	5 – 15%[1,2,3,4,11,12]	$206 – 315[4,12]	31.7
Displaced Abomasum	3 – 5%[1,2,3,4,13]	$494[4]	26.9
Ketosis	5 – 14%[1,3,4,13]	$117 – 289[4,5]	32.5

Figure 1. Producers can help reduce incidence of these events in their herd by using genetic selection strategies to reduce risk of disease.



Improving wellness traits through genetic selection presents a compelling opportunity for dairy producers to help manage disease risk and improve profitability when coupled with sound management practices.

DEVELOPMENT OF FIRST U.S.-BASED DAIRY WELLNESS GENOMIC PREDICTIONS HELPS IDENTIFY MORE TROUBLE-FREE COWS

Genetic evaluation and selection in dairy cattle has traditionally focused on production traits such as milk and protein rather than direct predictors of wellness. But producers have been asking for more ways to make their lives easier and more profitable by having more healthy, longer lasting cows. CLARIFIDE® Plus now delivers on that request.

CLARIFIDE Plus offers U.S. Holstein producers a simple, comprehensive way to combine wellness and other genetic trait predictions into economic-based indexes that measure profitability based on direct genetic predictions for adverse health events.

These indexes include:

- Dairy Wellness Profit Index™ (DWP$™): A multi-trait selection index which includes production, fertility, type, longevity and the wellness traits, including Polled test results.
- Wellness Trait Index™ (WT$™): This selection index focuses exclusively on the wellness traits (mastitis, lameness, metritis, retained placenta, displaced abomasum, ketosis and polled) and estimates expected differences in lifetime profitability related to them.

BASED ON A LARGE, INDEPENDENT U.S. COMMERCIAL HERD DATABASE

Wellness trait predictions from CLARIFIDE Plus provide unique genomic information that enables dairy producers to include differences in risk of disease as criteria for selecting replacement animals.

Zoetis developed the genomic predictions for wellness traits based on an independent database of pedigrees, genotypes, and production and health records assembled from records of nearly 20 million health events from U.S. commercial dairies and internal assets.

These millions of records were the basis for establishing average Wellness Trait reliabilities of 49 – 51 with ranges from 18 to 65 (Table 2). Wellness traits are expressed as Standard Transmitting Ability (STA), where 100 represents average expected disease risk. Higher values are desirable for all traits. Ranges can be found in Table 2.

TABLE 2: AVERAGE RELIABILITY AND AVERAGE, MINIMUM AND MAXIMUM GENETIC VALUES FOR WELLNESS TRAITS*

Dairy Wellness Traits	Average Reliability	Average Score	Minimum	Maximum
Mastitis	51	100	76	115
Lameness	50	100	73	115
Metritis	49	100	75	115
Retained Placenta	50	100	71	116
Displaced Abomasum	49	100	69	111
Ketosis	50	100	72	113

*Numbers reflect data from reference population of animals under two years of age

1. Gröhn YT, et al. Effect of Diseases on the Culling of Holstein Dairy Cows in New York State *Journal Dairy Sci* 1998;81(4):966–978.
2. Bar D, Gröhn YT, Bennett G, González R, Hertl J, Schulte H, Tauer L, Welcome F, Schukken Y. Effect of repeated episodes of generic clinical mastitis on milk yield in dairy cows. *Journal Dairy Sci* 2007;90(10):4643–4653.
3. Guard C. The costs of common diseases of dairy cattle, in *Proceedings*. CVC in San Diego 2008a.
4. McArt JAA, et al. Hyperketonemia in early lactation dairy cattle: a deterministic estimate of component and total cost per case. *J of Dairy Sci* 2015;98(3):2043–2054.
5. Bicalho RC. Lameness in Dairy Cattle: A debilitating disease or a Disease of Debilitated Cattle? in *Proceedings*. Western Dairy Management Conference, 2011;73–83.
6. Clarkson MJ, Downham DY, Faull WB, Hughes JW, Manson FJ, Merritt JB, Murray RD, Russell WB, Sutherst JE, Ward WR. Incidence and prevalence of lameness in dairy cattle. *Vet Rec* 1996;138:563–567.
7. Cha E, Hertl J, Bar D, Gröhn YT. The cost of different types of lameness in dairy cows calculated by dynamic programming. *Preventive Veterinary Medicine* 2010;97(1):1–8.
8. Cha E, Bar D, Hertl J, Tauer L, Bennett G, González R, Schukken Y, Welcome F, Gröhn YT. The cost and management of different types of clinical mastitis in dairy cows estimated by dynamic programming. *Journal Dairy Sci* 2011;94(9):4476–4487.
9. The Value of Uterine Health: the Diseases, the Causes, and the Financial Implications. Article. Dairy Cattle Reproduction Council.
10. Overton M, Fetrow J. Economics of postpartum uterine health, in *Proceedings*. Dairy Cattle Reproduction Council Convention 2008;39–44.
11. Guard C. Retained Placenta: Causes and Treatments. *Advances in Dairy Technology* 1999;11:81.
12. Jones WP, Hansen LB, Chester-Jones H. Response of health care to selection for milk yield of dairy cattle. *Journal of Dairy Science* 1994;77:3137–3152.
13. Zwald NR, Weigel KA, Chang YM, Welper RD, Clay JS. Genetic Selection of Heath Traits using Producer-Recorded Data. I. Incidence Rates, Heritability Estimates, and Sire Breeding Values. *J of Dairy Sci* 2004;87:4287–4294.

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Appendix

CONSIDERATIONS FOR CULLING & TRANSPORTING DAIRY ANIMALS TO MARKET

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 rehydrated.

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 (see FARM Willful Mistreatment Protocol, chapter 8).

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.

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

FARMERS ASSURING RESPONSIBLE MANAGEMENT
NATIONAL DAIRY FARM PROGRAM
Beef Quality Assurance
BEEF
Funded in part by The Beef Checkoff

Injections — Site and Techniques

Moving the injection site area to the neck stops costly damage to economically important cuts of beef. 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 compared with the larger area introduced as the preferred site in the 1990s (Fig. 2).

This is particularly important when administering intramuscular (IM) products. The reason for this is even the shoulder chuck primal contains value-added cuts in today's beef trade. The food industry has introduced a number of new, "value added" beef cuts utilizing this area of the carcass. Furthermore, the food industry has moved to a modified atmosphere packaging process for case-ready meats. This process contains 80% oxygen and 20% carbon dioxide mixture, which can cause green discoloration of the meat close to an injection site, even when no blemish or lesion has occurred.

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 on the internet at: https://www.zoetisus.com/products/pages/excede_beef/RouteOfAdmin.aspx

Whenever possible, choose products formulated and labeled for injection under the skin (subcutaneous/SQ) rather than intramuscular (IM). Figures 1 and 2 illustrate proper injection site and techniques.

Fig 1. "Tent" Technique for SQ injection

Calf necropsy demonstrations prove that when SQ products are given with one hand sliding the needle under the skin, some of the product and needle penetrate the muscle. The "tent" technique ensures that the product is truly being administered in the subcutaneous region.

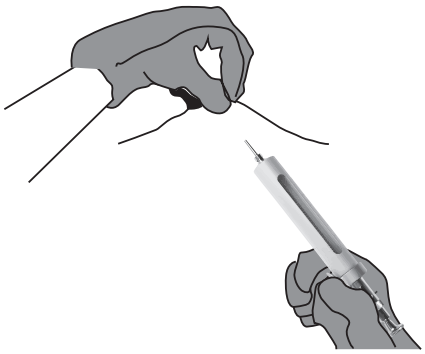
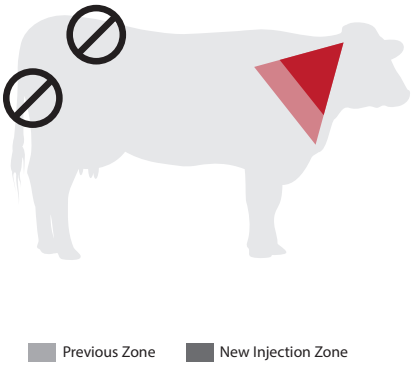


Fig. 2. New Injection Zone

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.



	Route of Administration								
	SQ (1/2 - 3/4 inch needle)			IV (1 1/2 inch needle)			IM (1 - 1 1/2 inch needle)		
	Cattle Weight lbs.			Cattle Weight lbs.			Cattle Weight lbs.		
Injectable Viscosity	<300	300-700	>700	<300	300-700	>700	<300	300-700	>700
Thin Example: Saline	18 gauge	18-16 gauge	16 gauge	18-16 gauge	16 gauge	16-14 gauge	20-18 gauge	18-16 gauge	18-16 gauge
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)									

Needle Selection

Primary considerations in needle selection are: route of administration, size of the animal, and location or site ofthe injection. Secondary considerations include: viscosity of the fluid (how thick and tenacious the fluid is) and volume injected.

Proper Sanitation is Essential

- Keep the contents of the bottle sterile.
- 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.

Cleaning Syringes and Needles

The use of disposable equipment is recommended and preferred. However, if used, reusable syringes, needles, and other injection equipment 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. If disinfectant is used, syringes should be thoroughly rinsed with sterile water before use. Sterile water can be purchased.

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; they also help prevent the spread of blood-borne diseases like Leukosis. This virus is a leading cause of carcass condemnation in slaughter facilities. At the very least, be sure to change needles at a maximum of every 10 head to prevent using a dull needle, which can develop a burr on the end.

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. Your veterinarian must determine how animals will be handled should a needle break in the neck muscle. 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.

Needle Storage/Disposal

Store unused needles in protected area using these disposal guidelines:

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

Drug Storage

Maintain complete physical control over the drug inventory on your dairy, limit access to authorized persons who are trained in proper drug use, and keep complete records of treatment. Animal health products usually have specific storage requirements. Some require refrigeration. All 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 ingredient 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.

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. Drugs indicated for use in dry dairy animals shall be stored with the "Non-Lactating Drugs". Therefore, drugs intended for use in dairy calves, dairy heifers, dairy bulls and dry dairy cows must be segregated from drugs for cows that are currently being milked. The only drugs that should be stored with the "Lactating Drugs" are drugs that are specifically indicated on the manufacturer's drug label or on a veterinarian's prescription label for extra-label drug use to be used in lactating dairy animals. Therefore the Grade "A" Pasteurized Milk Ordinance requires separate shelves in cabinets, refrigerators or other storage facilities for ***"Non-Lactating Drugs" and "Lactating Drugs".***

Resources

1 2013 Grade "A" Pasteurized Milk Ordinance MO - Drug Residue Testing and Farm Surveillance **http://www.fda.gov/downloads/Food/FoodSafety/ Product-SpecificInformation/MilkSafety/NationalonferenceonInterstateMilkShipmentsNCIMSModelDocuments/UCM291757.pdf**

Resources

Sample Record-Keeping Forms

- Veterinarian-Client-Patient Relationship (VCPR) Form
- 8-Step Plan for Keeping Records
- Recommended or Approved Drug List
- Sample Animal Treatment Plan
- Beginning Drug Inventory
- Record of Drug Purchases
- Daily Treatment Record
- Drug Disposal Record
- Certificate of Review

Is BQA certification on your to-do list?

It's free, convenient and available **online, anytime.**

By becoming Beef Quality Assurance (BQA)-certified, you have a positive story to tell consumers that can increase their understanding of — and confidence in — how you're raising a safe, wholesome and healthy beef supply. It's a consumer-friendly story, and an opportunity to add more value to cattle by implementing the very latest in best management practices. **Get certified! Visit BQA.org today.**

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Employee Training • Cattle Care and Handling

Beef Quality Assurance

Veterinarian-Client-Patient Relationship Validation Form

I. Producer

Producer Name: _____

Address: _____City: _____Zip: _____

Farm Name and Location: _____

Section: _____Township: _____County: _____

Premises ID Number (optional): _____

Producer Signature: _____

Date: _____

II. Veterinarian

Name: _____

Address: _____City: _____Zip: _____

Clinic Name: _____

Phone Number: (_____)_____

I hearby certify that a valid Veterinarian-Client-Patient Relationship (VCPR) is established for the above listed owner and will remain in force until canceled by either party.

Veterinarian's Signature: _____

Date: _____

Adapted from the Center for Dairy Excellence

8-STEP PLAN for Keeping Records

(Please duplicate record pages for additional records as needed.)

Why keep drug records?

- Prevent an accidental violative residue
- Save money
- Ensure effective herd health plan
- Reduce liability (drug records are required by law)
- Improve your veterinarian's effectiveness

STEP 1

Recommended or Approved Drug List (Page 79) 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 toprevent an accidental violation of antibiotic residue laws.

STEP 2

Animal Treatment Plan (Page 80) When practicing preventive medicine or treating early symptoms of a disease or infection, it is important to be consistent. The second step is for you to establish a treatment plan for your herd health practices. Review with your herd health veterinarian.

STEP 3

Beginning Inventory (Page 81) You and your herd health veterinarian should discard all old drugs and all drugs not on your approved drug list (Step 1) then annually inventory the remaining drugs and other appropriate information.

STEP 4

Record Medicated Feed Purchases Accidental 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.

STEP 5

Record of Drug Purchases (Page 82) 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 (Page 83) Milking and the sale of market cows will bring your Daily Treatment Record into use. Dairy producers that have accidently marketed milk or dairy beef with violative residues state that it is important to keep these records. Properly identify treated cows. Develop good habits to properly manage antibiotics. z

STEP 7

Monthly Economic Comparison (Page 74) 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

Drug Disposal (Page 84) Periodic review of drugs in storage will mean you occasionally throw away drugs which 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 antibiotic management system may prevent you from incurring a costly and embarrassing antibiotic accident!

Recommended or Approved Drug List for _____ Dairy

(These are the only drugs to be used on my dairy.)

Veterinarian _____

Drug (Active Ingredient)	Company Name	Product Source	Animal Condition	Notes

Sample Animal Treatment Plan

Protocol Number	Diagnosis or Conditions Treated and Signs	Treatment Plan			Withdrawal Time		Appropriate Antibiotic Screening Test
		Antibiotic or Drug Used	Dose and Route	Length of Treatment	Milk (hrs)	Meat (days)	
1	*Mild Mastitis*	*Oxytocin*	*2cc IM*	*4 Milkings*			
2	*Mastitis w/ hard qtr.*	*Pirsue*	*24 hrs./2 times*	*2 days*	*36*	*9*	*none*
3	*dry treat*	*Tomorrow*	*1 tube/qtr.*	*once*	*72*	*42*	*follow label*

Animal Treatment Plan (review with veterinarian)

Protocol Number	Diagnosis or Conditions Treated and Signs	Treatment Plan			Withdrawal		Appropriate Antibiotic Screening Test
		Antibiotic or Drug Used	Dose and Route	Length of Treatment	Milk (hrs)	Meat (days)	

Beginning Drug Inventory

				Meets Labeling Requirments			Indications for Use			

Record of Drug Purchases

Drug Purchased	Date Purchased	Where Purchased	Amount Purchased	Purpose	Notes

Daily Treatment Record

Developed by the American Association of Bovine Practitioners

Herd _____ Veterinarian _____

Cow ID	Time of Treatment				Pen	Diagnosis	Treatment	Withdrawal Time		Calculated Withdrawal Period Expires Milk/Meat	Actual Date In Tank	Residue Test		Remarks for example: initials of person treating or testing
	Date	AM	PM	3X				Milk (hrs)	Meat (days)			Date Tested	Test Results	
						LF RF LR RR								
						LF RF LR RR								
						LF RF LR RR								
						LF RF LR RR								
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						LF RF LR RR								
						LF RF LR RR								

Drug Disposal Record

Date	Drug	Reason for Disposal	Method of Disposal	Notes

2017 Milk and Dairy Beef Residue Prevention

Producer's Certificate of Participation

presented to

_____ _____

Producer/Dairy Name **Permit Number**

_____ _____

Field Representative of Cooperative or Proprietary Dairy **Date**

I have reviewed the Milk and Dairy Beef Residue Prevention manual with _____, D.V.M., V.M.D. I agree to implement appropriate management procedures to avoid violative drug residues from the milk or dairy beef produced at my dairy. I understand that I am responsible for any drug residues that occur in my milk or meat animals. I am renewing my commitment to meeting the consumers' concern for quality .

I have reviewed the Milk and Dairy Beef Residue Prevention manual with _____. I have explained the manual to the producer named above. The producer acknowledges that he/she understands the best management practices and the actions that need to be implemented. Upon request by the dairy producer, I will provide additional recommendations designed specifically for this dairy including individual consultation as needed.

_____ _____ _____ _____

Producer Signature **Date** **Consulting Veterinarian's Signature** **Date**

National Milk Producers Federation (NMPF) has prepared the Milk and Dairy Beef Residue Manual as part of its Farmers AssuringResponsible Management (FARM) program. This certificate affirms both the commitment of the dairy producer to adhere to the terms of that manual, and the oversight and supervision of the producer's consulting veterinarian. NMPF makes no separate guarantees or representations with respect to producer's adherence.

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For more information visit

WWW.NMPF.ORG

or contact us directly at **info@nmpf.org**

To learn more about the National Dairy FARM Program, log on to

NATIONALDAIRYFARM.COM

or contact the National Milk Producers Federation at

(703) 243-6111

DAIRYFARM@NMPF.ORG

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