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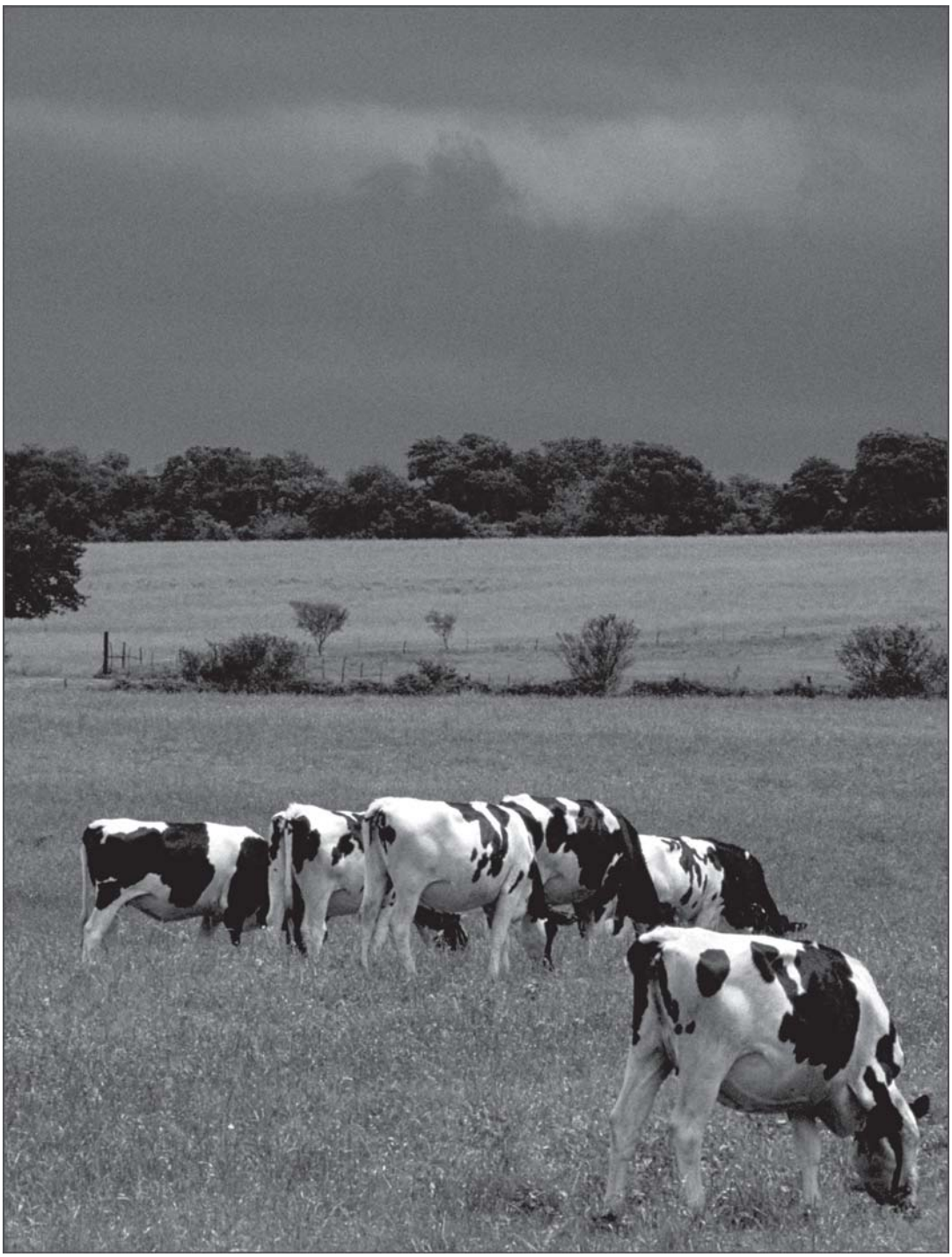
Dairy 2002

Part IV: Antimicrobial Use on U.S. Dairy Operations, 2002



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- BIOCOR Animal Health
- IDEXX Laboratories, Inc.
- The University of California College of Veterinary Medicine, Davis
- TREK Diagnostic Systems
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Introduction

NAHMS is a nonregulatory division of USDA-APHIS-VS designed to help meet animal health information needs. NAHMS has collected data on dairy health and management practices through two previous national studies.

The NAHMS 1991-92 National Dairy Heifer Evaluation Project (NDHEP) provided the dairy industry's first national baseline information on the health and management of dairy cattle in the United States. Just months after the study's first results were released in 1993, cases of acute bovine viral diarrhea surfaced in the United States following an outbreak in Canada. NDHEP information on producer vaccination and biosecurity practices helped officials address the risk of disease spread and target educational efforts on vaccination protocols. An outbreak of human illness related to *Escherichia coli* 0157:H7 was reported in 1993 in the Pacific Northwest. NDHEP data on the bacteria's prevalence in dairy cattle helped officials define public risks as well as research needs. This baseline picture of the industry provided by NDHEP also helped identify additional research and educational efforts in various production areas, such as feed management and weaning age.

Information from the NAHMS Dairy '96 study helped the U.S. dairy industry identify educational needs and prioritize research efforts on such timely topics as antimicrobial usage and Johne's disease, as well as digital dermatitis, bovine leukosis virus, and potential foodborne pathogens, including *E. coli, Salmonella,* and *Campylobacter.*

Data for the NAHMS Dairy 2002 study were collected through personal interviews with producers.

Part I: Reference of Dairy Health and Management in the United States, 2002 is the first in a series of reports containing national information from the NAHMS Dairy 2002 study conducted in 21 major dairy States (see map). Dairy 2002 was designed to provide information to both participants and industry from operations representing 83.0 percent of the U.S. dairy operations and 85.7 percent of the U.S. dairy cows. Data were collected from December 31, 2001, through February 12, 2002.

Part II: Changes in the United States Dairy Industry, 1991-2002 provides national estimates of animal health management practices for comparable populations from the NAHMS 1991 NDHEP, Dairy '96, and Dairy 2002 studies.

Part III: Reference of Dairy Cattle Health and Health Management Practices in the United States, 2002 is the third in a series of reports containing national information resulting from NAHMS Dairy 2002. Data for this report were collected from 1,013 operations with 30 or more dairy cows. State and Federal VMOs and AHTs collected the data between February 25 and April 30, 2002.

Part IV: Antimicrobial Use on U.S. Dairy Operations, 2002 provides national estimates of antimicrobial use on U.S. dairies based on data collected during the NAHMS Dairy 2002 study.

The methods used and number of respondents in the study can be found at the end of this report.

Further information on NAHMS studies and reports are available online at: www.aphis.usda.gov/vs/ceah/ncahs

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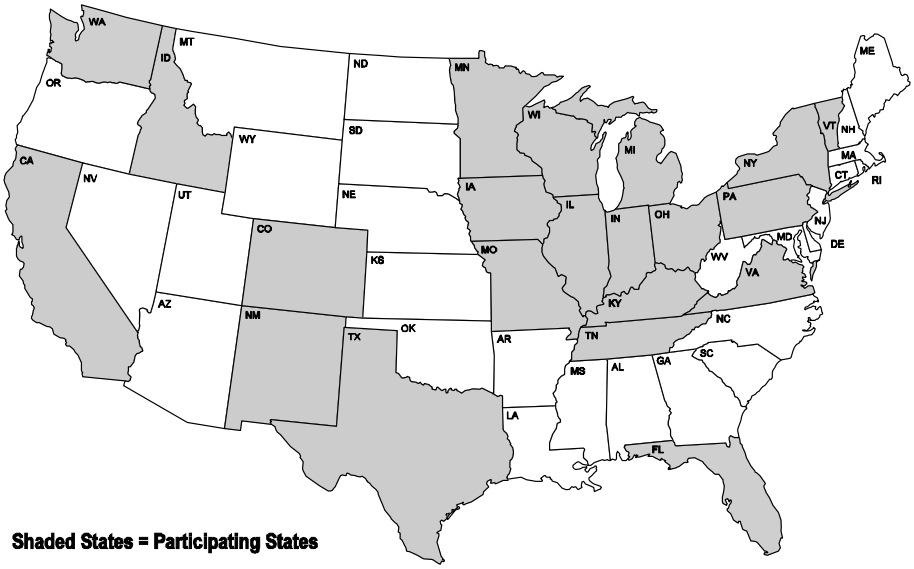
Dairy 2002 Participating States



Terms Used in This Report

Antibiotic: A substance produced by a microorganism and at low concentrations inhibits or kills other microorganisms.

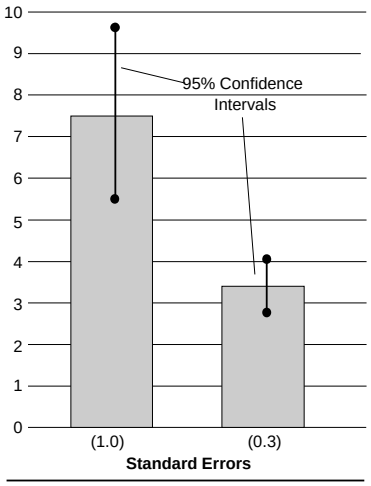
Antimicrobial: Any substance of natural, semisynthetic, or synthetic origin that kills or inhibits the growth of a microorganism.

Cow: Female dairy bovine that has calved at least once.

Heifer: Female dairy bovine that has not yet calved.

Herd size: Herd size is based on January 1, 2002, dairy cow inventory. Small herds are those with fewer than 100 head; medium herds are those with 100 to 499 head; and large herds are those with 500 or more head.

Examples of a 95% Confidence Interval



Population estimates: Estimates in this report are provided with a measure of precision called the standard error. A 95-percent confidence interval can be created with bounds equal to the estimate, plus or minus two standard errors. If the only error is sampling error, the confidence intervals created in this manner will contain the true population mean 95 out of 100 times. In the example to the left, an estimate of 7.5 with a standard error of 1.0 results in limits of 5.5 to 9.5 (two times the standard error above and below the estimate). The second estimate of 3.4 shows a standard error of 0.3 and results in limits of 2.8 and 4.0. Alternatively, the 90-percent confidence interval would be created by multiplying the standard error by 1.65 instead of 2. Most estimates in this report are rounded to the nearest tenth. If rounded to 0, the standard error was reported (0.0). If there were no reports of the event, no standard error was reported (--).

Regions:

West: California, Colorado, Idaho, New Mexico, Texas, Washington
Midwest: Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, Wisconsin
Northeast: New York, Pennsylvania, Vermont
Southeast: Florida, Kentucky, Tennessee, Virginia

Sample profile: Information that describes characteristics of the sites from which Dairy 2002 data were collected.

Section I: Population Estimates

A. Antimicrobial Treatment

NOTE: The following tables represent conditions occurring during the 12 months prior to the Dairy 2002 interview. For each item discussed, data are reported for percentage of operations and for percentage of animals. Also, except where otherwise noted, estimates in this report represent dairy operations with 30 or more cows.

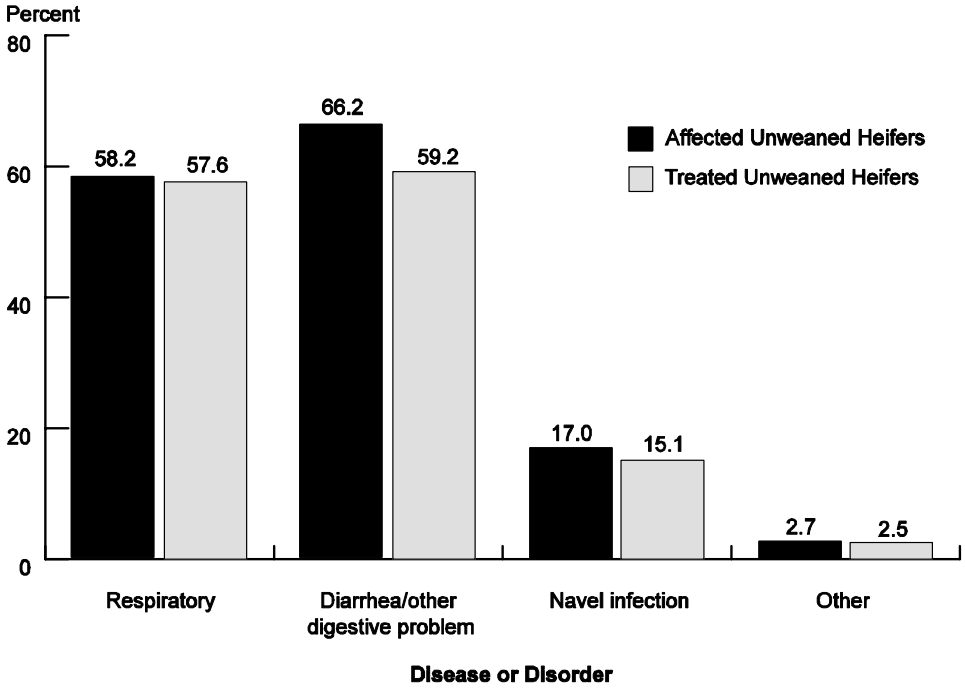
1. Unweaned heifers

A large percentage of operations had one or more unweaned heifers affected with diarrhea (66.2 percent) and respiratory disease (58.2 percent). Overall, 57.6 percent of operations treated for respiratory disease and 59.2 percent treated for digestive problems.

a. Percentage of all operations with any unweaned heifers affected with the following diseases or disorders, and percentage of all operations that treated affected heifers with an antimicrobial for the diseases or disorders:

	Percent Operations With:			
	Affected Unweaned Heifers		Treated Unweaned Heifers	
Disease or Disorder	**Percent**	**Std. Error**	**Percent**	**Std. Error**
Respiratory	58.2	(2.3)	57.6	(2.3)
Diarrhea or other digestive problem	66.2	(2.1)	59.2	(2.2)
Navel infection	17.0	(1.6)	15.1	(1.5)
Other	2.7	(0.6)	2.5	(0.6)

Percentage of All Operations With Any Unweaned Heifers Affected With the Following Diseases or Disorders, and Percentage of All Operations that Treated Affected Heifers With an Antimicrobial for the Diseases or Disorders



Nearly all operations with respiratory disease in unweaned heifers (95.2 percent) treated all affected heifers with an antimicrobial. Slightly more than 8 out of 10 operations (80.6 percent) treated all unweaned heifers affected with diarrhea or other digestive diseases. A small percentage of operations did not treat any unweaned heifers affected with diarrhea/digestive problems or navel infection (10.5 percent and 11.2 percent, respectively).

b. For operations with specified disease in unweaned heifers, percentage of operations by proportion of affected unweaned heifers treated with antimicrobials:

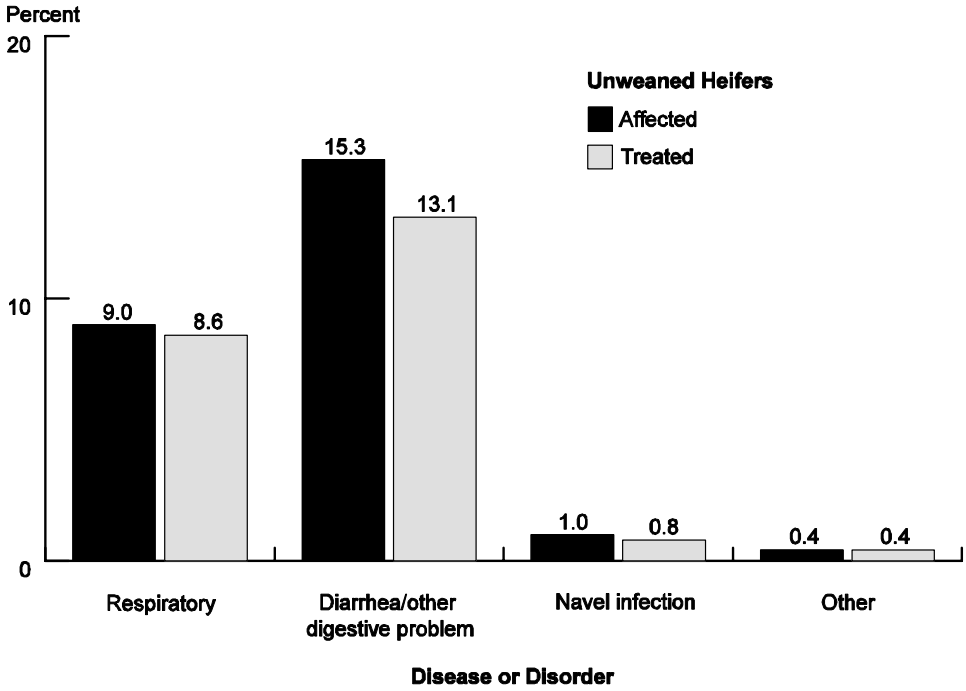
	Percent Operations							
	Disease/Disorder							
	Respiratory		Diarrhea/ Digestive		Navel Infection		Other	
Proportion Treated	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
None	1.1	(0.5)	10.5	(1.7)	11.2	(3.5)	9.5	(5.5)
Some	3.7	(0.9)	8.9	(1.5)	3.6	(2.7)	1.4	(1.3)
All	95.2	(1.0)	80.6	(2.2)	85.2	(4.2)	89.1	(5.7)
Total	100.0		100.0		100.0		100.0	

A higher percentage of unweaned heifers were affected by diarrhea/digestive problems than respiratory disease (15.3 percent and 9.0 percent, respectively). However, a higher percentage of unweaned heifers affected by respiratory disease received antimicrobial treatment than unweaned heifers affected by digestive problems (95.6 percent and 85.7 percent, respectively) (table d).

c. Percentage of all unweaned heifers affected with the following diseases or disorders, and percentage of all unweaned heifers treated with an antimicrobial for the diseases or disorders:

	Percent Unweaned Heifers			
	Affected		Treated	
Disease or Disorder	Percent	Std. Error	Percent	Std. Error
Respiratory	9.0	(0.5)	8.6	(0.5)
Diarrhea or other digestive problem	15.3	(0.9)	13.1	(0.8)
Navel infection	1.0	(0.1)	0.8	(0.1)
Other	0.4	(0.1)	0.4	(0.1)

Percentage of All Unweaned Heifers Affected With the Following Diseases or Disorders, and Percentage of All Unweaned Heifers Treated With an Antimicrobial for the Diseases or Disorders



d. For unweaned heifers affected with the following diseases or disorders, percentage of unweaned heifers treated with an antimicrobial for the diseases or disorders:

Disease or Disorder	Percent Affected Unweaned Heifers Treated	Standard Error
Respiratory	95.6	(1.1)
Diarrhea or other digestive problem	85.7	(2.0)
Navel infection	82.8	(4.9)
Other	96.9	(2.0)

Four out of 10 operations (41.8 percent) reported no respiratory disease in unweaned heifers. When antimicrobials were used to treat respiratory disease, beta-lactams, florfenicol, macrolides, and tetracyclines were the primary antimicrobials given. Florfenicol was the primary antimicrobial used to treat respiratory disease in unweaned heifers on 11.8 percent of operations, and those operations accounted for 29.3 percent of unweaned heifers treated for respiratory disease (table f). About one out of five unweaned heifers treated for respiratory disease (17.9 percent) were on operations where tetracyclines were the primary antimicrobials used to treat the disease. One-third of operations (33.8 percent) reported no diarrhea or digestive disease in unweaned heifers. When antimicrobials were used to treat diarrhea, sulfonamides, tetracyclines, and beta-lactams were the primary antimicrobials given. Diarrhea/digestive disease was present but not treated with antimicrobials on 6.9 percent of operations. Approximately four out of five operations (83.0 percent) reported no navel infection in unweaned heifers. Beta-lactams were the primary antimicrobial used to treat navel infection (11.4 percent of operations).

e. Percentage of operations (including those not reporting diseases or disorders) by primary antimicrobial used to treat unweaned heifers for the following diseases or disorders:

	Percent Operations							
	Disease/Disorder							
	Respiratory		Diarrhea/ Digestive		Navel Infection		Other	
Primary Antimicrobial Used*	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Aminoglycosides	1.1	(0.4)	6.0	(1.0)	0.3	(0.2)	0.3	(0.3)
Beta-lactams	13.9	(1.7)	12.4	(1.6)	11.4	(1.3)	1.1	(0.4)
Cephalosporins	6.9	(1.0)	4.7	(0.8)	1.1	(0.4)	0.1	(0.0)
Florfenicol	11.8	(1.4)	2.3	(0.6)	0.6	(0.4)	0.2	(0.1)
Macrolides	9.6	(1.3)	3.4	(0.9)	0.3	(0.3)	0.1	(0.1)
Sulfonamides	2.8	(0.8)	13.8	(1.6)	0.1	(0.1)	0.0	(--)
Tetracyclines	9.7	(1.2)	12.8	(1.4)	1.4	(0.4)	0.6	(0.3)
Other	1.9	(0.5)	3.8	(0.8)	0.0	(0.0)	0.0	(--)
Any antimicrobial	57.7	(2.3)	59.2	(2.2)	15.2	(1.5)	2.4	(0.6)
No treatment but disease present	0.5	(0.3)	7.0	(1.2)	1.8	(0.6)	0.3	(0.2)
No disease	41.8	(2.3)	33.8	(2.1)	83.0	(1.6)	97.3	(0.6)
Total	100.0		100.0		100.0		100.0	

*See Appendix III for antimicrobial class categories

f. Percentage of treated unweaned heifers by primary antimicrobial used on the operation for treating the following diseases or disorders:

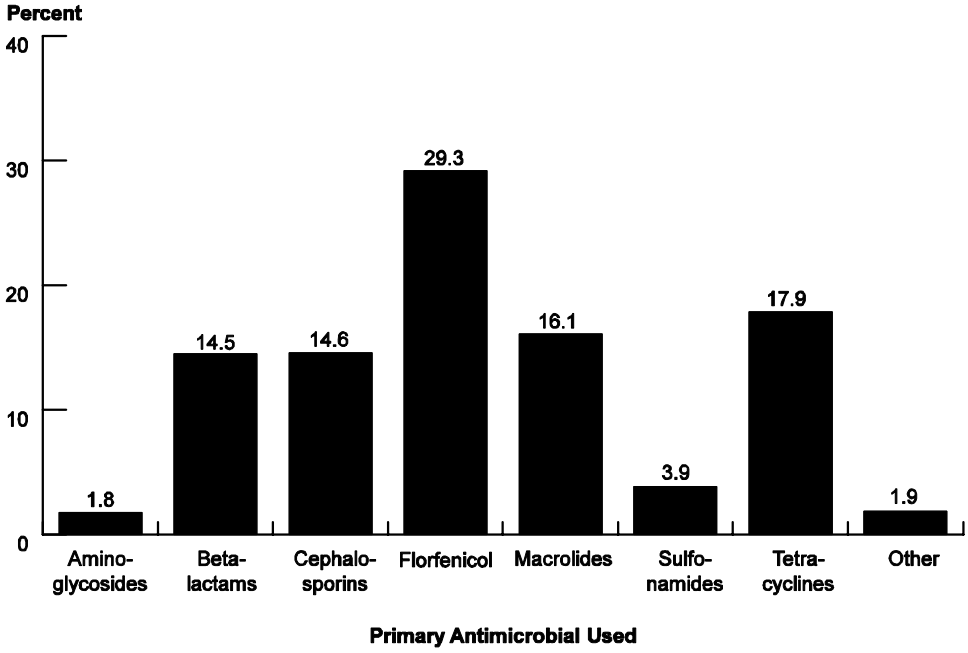
	Percent Treated Unweaned Heifers							
	Disease/Disorder							
	Respiratory		Diarrhea/ Digestive		Navel Infection		Other	
Primary Antimicrobial Used	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Aminoglycosides	1.8	(0.7)	11.5	(2.5)	0.5	(0.5)	12.7	(8.5)
Beta-lactams	14.5	(2.0)	14.4	(2.3)	80.5	(4.2)	28.5	(9.9)
Cephalosporins	14.6	(2.0)	10.6	(2.0)	4.8	(2.1)	0.8	(0.8)
Florfenicol	29.3	(3.3)	3.8	(1.1)	3.9	(2.6)	19.1	(13.1)
Macrolides	16.1	(2.2)	7.1	(1.8)	1.2	(1.1)	0.9	(0.8)
Sulfonamides	3.9	(1.4)	23.8	(2.7)	0.4	(0.3)	0.0	(--)
Tetracyclines	17.9	(2.7)	21.9	(3.2)	8.7	(2.8)	38.0	(13.5)
Other	1.9	(0.6)	6.9	(1.5)	0.0	(--)	0.0	(--)
Total	100.0		100.0		100.0		100.0	

At the animal level, the primary antimicrobial used to treat unweaned heifers with respiratory disease varied by operation size. For small operations, 2 out of 10 unweaned heifers treated for respiratory disease (20.2 percent) were on operations where beta-lactams were the primary choice, compared to 6.6 percent of treated unweaned heifers on large operations.

g. For unweaned heifers treated for ***respiratory*** disease, percentage of treated unweaned heifers by primary antimicrobial used on operation and by herd size:

	Percent Treated Unweaned Heifers							
	Herd Size (Number of Dairy Cows)							
	Small (Less than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Primary Antimicrobial Used	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Aminoglycosides	2.0	(1.2)	2.6	(1.3)	0.6	(0.6)	1.8	(0.7)
Beta-lactams	20.2	(3.9)	14.1	(3.3)	6.6	(2.4)	14.5	(2.0)
Cephalosporins	11.1	(2.7)	13.3	(2.6)	21.7	(5.7)	14.6	(2.0)
Florfenicol	19.3	(5.6)	32.7	(4.5)	38.8	(8.0)	29.3	(3.3)
Macrolides	18.4	(4.3)	20.0	(3.4)	7.2	(2.6)	16.1	(2.2)
Sulfonamides	7.6	(3.4)	2.6	(1.1)	0.3	(0.3)	3.9	(1.4)
Tetracyclines	19.6	(3.8)	11.9	(2.7)	24.0	(7.5)	17.9	(2.7)
Other	1.8	(0.8)	2.8	(1.5)	0.8	(0.4)	1.9	(0.6)
Total	100.0		100.0		100.0		100.0	

For Unweaned Heifers Treated for Respiratory Disease, Percentage of Treated Unweaned Heifers by Primary Antimicrobial Used on the Operation

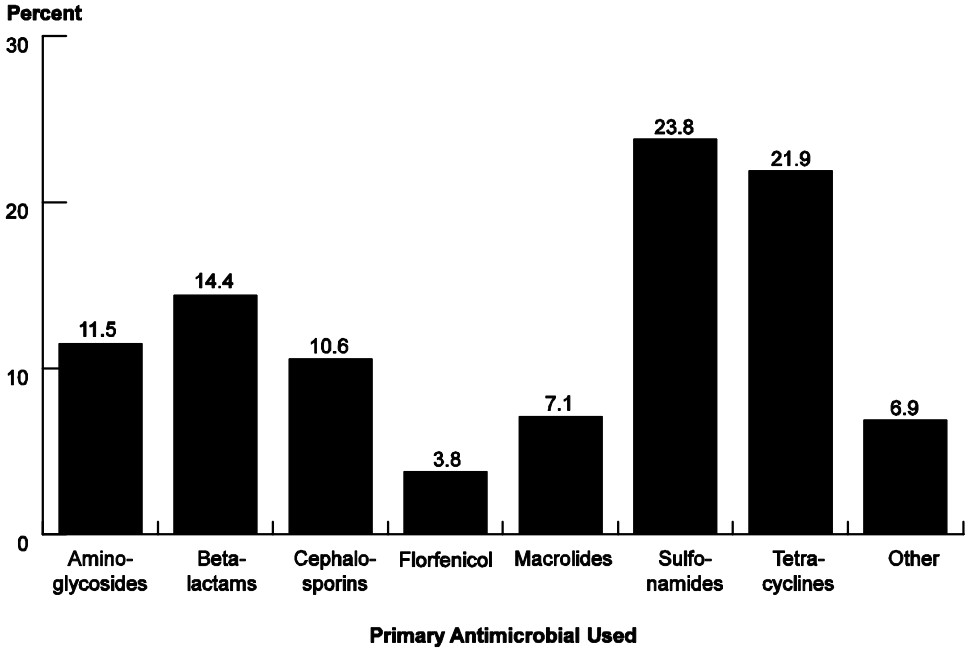


At the animal level, the primary antimicrobials used to treat unweaned heifers with diarrhea or other digestive ailments were sulfonamides and tetracyclines. No significant differences were seen across herd size.

h. For unweaned heifers treated for ***diarrhea or other digestive ailments,*** percentage of treated unweaned heifers by primary antimicrobial used on the operation and by herd size:

	Percent Treated Unweaned Heifers							
	Herd Size (Number of Dairy Cows)							
	Small (Less than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Primary Antimicrobial Used	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Aminoglycosides	10.6	(2.7)	10.2	(3.0)	14.5	(7.1)	11.5	(2.5)
Beta-lactams	19.9	(4.0)	13.4	(3.5)	8.7	(4.6)	14.4	(2.3)
Cephalosporins	7.2	(2.1)	7.9	(1.6)	18.3	(6.5)	10.6	(2.0)
Florfenicol	1.6	(0.8)	7.0	(2.5)	2.3	(1.7)	3.8	(1.1)
Macrolides	7.6	(3.1)	8.8	(3.0)	4.0	(3.2)	7.1	(1.8)
Sulfonamides	23.2	(3.8)	27.0	(4.3)	20.6	(6.3)	23.8	(2.7)
Tetracyclines	22.6	(4.0)	19.3	(4.0)	24.5	(8.7)	21.9	(3.2)
Other	7.3	(2.4)	6.4	(1.9)	7.1	(3.7)	6.9	(1.5)
Total	100.0		100.0		100.0		100.0	

For Unweaned Heifers Treated for Diarrhea or Other Digestive Ailments, Percentage of Treated Unweaned Heifers by Primary Antimicrobial Used on the Operation



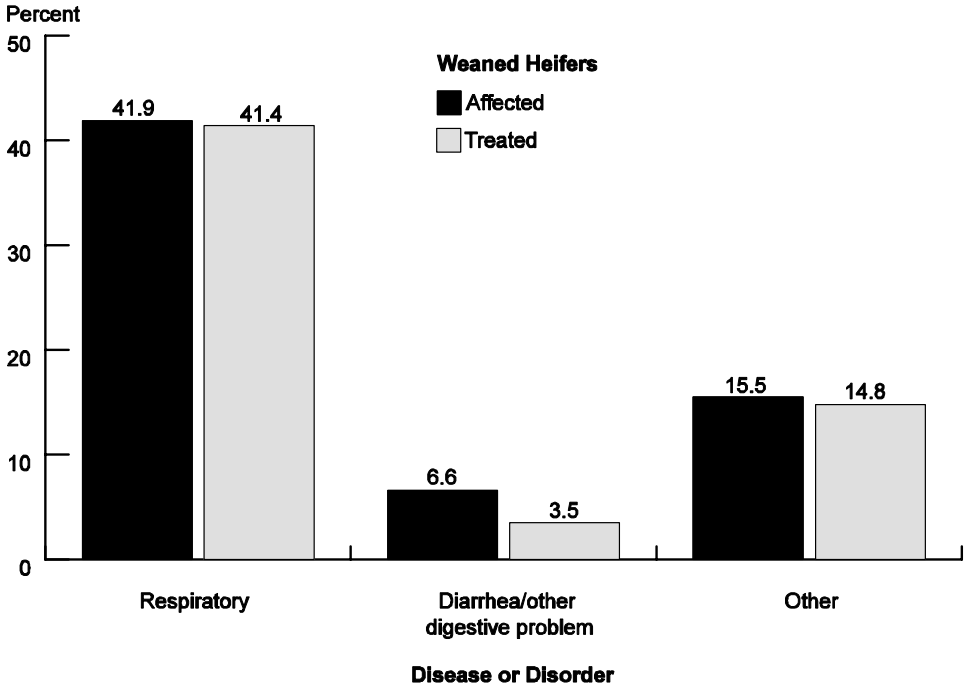
2. Weaned heifers

More than two out of five operations (41.9 percent) had one or more weaned heifers affected with respiratory disease. However, only 4.7 percent of weaned heifers were affected with respiratory disease (table c), indicating that, in general, only a small number of animals on an operation were affected by respiratory disease.

a. Percentage of all operations with any weaned heifers affected with the following diseases or disorders, and percentage of all operations that treated affected heifers with an antimicrobial for the diseases or disorders:

	Percent Operations With:			
	Affected Weaned Heifers		Treated Weaned Heifers	
Disease or Disorder	Percent	Std. Error	Percent	Std. Error
Respiratory	41.9	(2.1)	41.4	(2.1)
Diarrhea or other digestive problem	6.6	(1.0)	3.5	(0.6)
Other	15.5	(1.5)	14.8	(1.4)

Percentage of All Operations With Any Weaned Heifers Affected With the Following Diseases or Disorders, and Percentage of All Operations that Treated Affected Heifers With an Antimicrobial for the Diseases or Disorders



Nearly all operations with respiratory disease in weaned heifers (95.4 percent) treated all affected heifers with an antimicrobial. Approximately half of operations with diarrhea or other digestive diseases (52.0 percent) treated all affected heifers. Nearly half of operations (46.8 percent) did not treat any weaned heifers affected with digestive diseases.

b. For operations with the specified diseases in weaned heifers, percentage of operations by proportion of affected weaned heifers treated with antimicrobials:

	Percent Operations					
	Disease/Disorder					
	Respiratory		Diarrhea/ Digestive		Other	
Proportion Treated	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
None	1.1	(0.6)	46.8	(7.6)	4.6	(2.5)
Some	3.5	(1.1)	1.2	(0.6)	6.7	(2.5)
All	95.4	(1.2)	52.0	(7.5)	88.7	(3.4)
Total	100.0		100.0		100.0	

Diseases and disorders occurred infrequently in weaned heifers—only 4.7 percent were affected with respiratory disease, 0.8 percent with diarrhea or other digestive problems, and 1.5 percent with other ailments. Nearly all heifers affected with respiratory disease (97.5 percent) were treated with an antimicrobial, and about half affected with digestive problems (50.7 percent) were treated. Of the 1.5 percent of weaned heifers affected with other problems, 86.3 percent were treated.

c. Percentage of all weaned heifers affected with the following diseases or disorders, and percentage of all weaned heifers treated with an antimicrobial for the diseases or disorders:

	Percent Weaned Heifers			
	Affected		Treated	
Disease or Disorder	**Percent**	**Std. Error**	**Percent**	**Std. Error**
Respiratory	4.7	(0.3)	4.6	(0.3)
Diarrhea or other digestive problem	0.8	(0.2)	0.4	(0.2)
Other	1.5	(0.2)	1.2	(0.2)

d. For weaned heifers affected with the following diseases or disorders, percentage of weaned heifers treated with an antimicrobial for the diseases or disorders:

Disease or Disorder	Percent Affected Weaned Heifers Treated	Standard Error
Respiratory	97.5	(0.9)
Diarrhea or other digestive problem	50.7	(12.6)
Other	86.3	(4.3)

More than half of operations (58.1 percent) reported no respiratory disease in weaned heifers. When antimicrobials were used to treat respiratory disease, tetracyclines, beta-lactams, and florfenicol were the primary antimicrobials used. More than 9 out of 10 operations (93.4 percent) reported no diarrhea or digestive disease in weaned heifers. When digestive disease was present, nearly half of operations did not treat with an antimicrobial. The majority of operations (84.5 percent) reported no other diseases or disorders. Beta-lactams and tetracyclines were the primary antimicrobials used to treat diseases or disorders in the “other” category.

e. Percentage of operations (including those not reporting diseases or disorders) by primary antimicrobial used to treat weaned heifers for the following diseases or disorders:

	Percent Operations					
	Disease/Disorder					
	Respiratory		Diarrhea/ Digestive		Other	
Primary Antimicrobial Used	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Aminoglycosides	0.0	(0.0)	0.3	(0.1)	0.3	(0.2)
Beta-lactams	7.2	(1.1)	1.0	(0.4)	7.1	(1.0)
Cephalosporins	4.6	(0.8)	0.5	(0.1)	0.6	(0.3)
Florfenicol	8.0	(1.1)	0.0	(--)	0.0	(--)
Macrolides	6.5	(1.0)	0.0	(--)	0.8	(0.4)
Sulfonamides	2.2	(0.7)	0.8	(0.2)	0.4	(0.2)
Tetracyclines	11.6	(1.3)	0.8	(0.3)	5.1	(0.8)
Other	1.3	(0.5)	0.1	(0.1)	0.5	(0.3)
Any antimicrobial	41.4	(2.1)	3.5	(0.6)	14.8	(1.4)
No treatment but disease present	0.5	(0.3)	3.1	(0.8)	0.7	(0.4)
No disease	58.1	(2.1)	93.4	(1.0)	84.5	(1.5)
Total	100.0		100.0		100.0	

Approximately 3 out of 10 weaned heifers treated for respiratory disease (34.3 percent) were on operations where tetracyclines were the primary antimicrobial used to treat respiratory disease, and 1 out of 4 weaned heifers treated for respiratory disease (26.4 percent) were located on operations where florfenicol was the primary antimicrobial used to treat respiratory disease. A small percentage of weaned heifers (0.8 percent) were affected with digestive disorders, and 0.4 percent of weaned heifers were treated for digestive disorders (table c). Of the 0.4 percent treated, 54.3 percent were on operations that primarily used cephalosporins to treat digestive disorders. However, only 0.5 percent of all operations used cephalosporins as the primary antimicrobial treatment for digestive disorders (table e).

f. Percentage of treated weaned heifers by primary antimicrobial used on the operation for treating the following diseases or disorders:

	Percent Treated Weaned Heifers					
	Disease/Disorder					
	Respiratory		Diarrhea/ Digestive		Other	
Primary Antimicrobial Used	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Aminoglycosides	0.4	(0.4)	9.2	(7.8)	1.3	(1.3)
Beta-lactams	9.3	(1.5)	12.6	(7.2)	41.3	(7.2)
Cephalosporins	5.6	(1.2)	54.3	(20.0)	3.7	(2.3)
Florfenicol	26.4	(3.8)	0.0	(--)	0.0	(--)
Macrolides	17.4	(3.4)	0.0	(--)	2.3	(1.2)
Sulfonamides	5.2	(1.8)	11.0	(5.7)	3.0	(1.6)
Tetracyclines	34.3	(3.9)	11.8	(6.7)	46.2	(6.8)
Other	1.4	(0.7)	1.1	(1.2)	2.2	(1.3)
Total	100.0		100.0		100.0	

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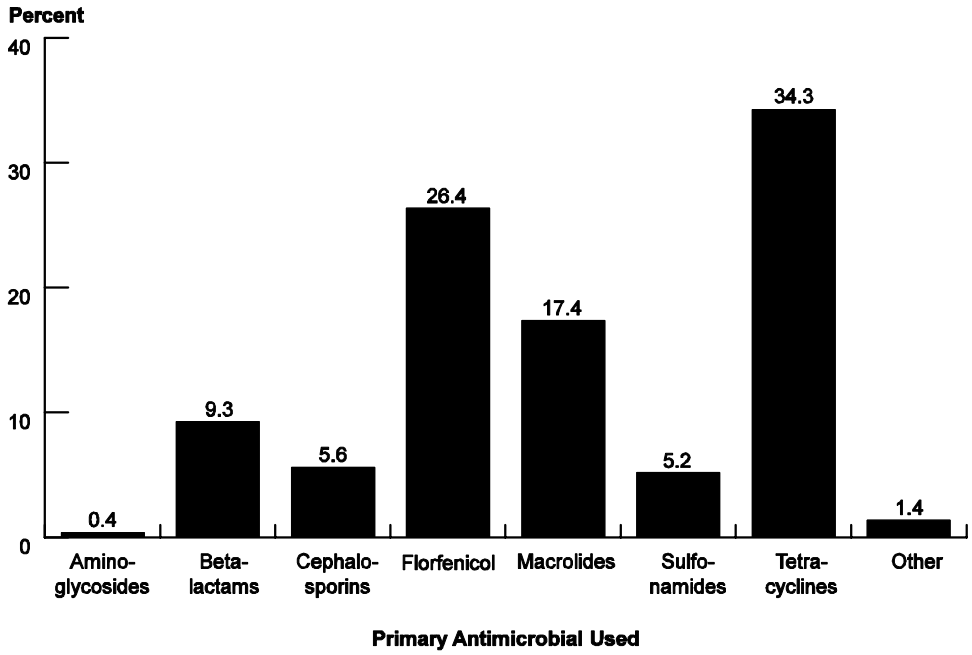
At the animal level, the primary antimicrobial used to treat weaned heifers with respiratory disease varied by operation size. On small and medium operations, 31.7 percent and 41.4 percent of treated weaned heifers, respectively, were on operations where tetracyclines were the primary antimicrobial used. On large operations, 42.4 percent of treated weaned heifers were on operations where florfenicol was the primary choice.

g. For weaned heifers treated for ***respiratory*** disease, percentage of treated weaned heifers by primary antimicrobial used on the operation and by herd size:

	Percent Treated Weaned Heifers							
	Herd Size (Number of Dairy Cows)							
	Small (Less than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Primary Antimicrobial Used	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Aminoglycosides	0.0	(--)	0.0	(--)	1.4	(1.1)	0.4	(0.4)
Beta-lactams	10.9	(3.3)	11.1	(2.6)	5.6	(2.0)	9.3	(1.5)
Cephalosporins	10.3	(3.6)	4.1	(1.2)	3.3	(1.1)	5.6	(1.2)
Florfenicol	17.4	(4.8)	19.7	(3.7)	42.4	(8.5)	26.4	(3.8)
Macrolides	16.4	(4.8)	21.0	(6.3)	13.9	(5.9)	17.4	(3.4)
Sulfonamides	10.2	(4.2)	1.4	(0.7)	5.4	(3.8)	5.2	(1.8)
Tetracyclines	31.7	(6.9)	41.4	(6.6)	28.0	(6.2)	34.3	(3.9)
Other	3.1	(2.2)	1.3	(0.6)	0.0	(--)	1.4	(0.7)
Total	100.0		100.0		100.0		100.0	

For Weaned Heifers Treated for Respiratory Disease, Percentage of Treated Weaned Heifers by Primary Antimicrobial Used on Operation



3. Cows

Mastitis was a common problem for U.S. dairy operations, 85.3 percent of which had one or more cows affected during the 12 months prior to the interview. Digestive disorders were less common, affecting one or more cows on 43.1 percent of operations.

a. Percentage of all operations with any cows affected with the following diseases or disorders, and percentage of all operations that treated affected cows with an antimicrobial for the diseases or disorders:

	Percent Operations With:			
	Affected Cows		Treated Cows	
Disease/Disorder	**Percent**	**Std. Error**	**Percent**	**Std. Error**
Respiratory	50.5	(2.3)	49.0	(2.3)
Diarrhea or other digestive problem	43.1	(2.2)	27.9	(2.0)
Reproductive	52.5	(2.3)	42.1	(2.3)
Mastitis	85.3	(1.7)	84.3	(1.7)
Lameness	60.2	(2.3)	51.6	(2.3)
Other	8.1	(1.4)	4.8	(1.1)

Antimicrobials were used more often in treating respiratory disease and mastitis than for other diseases. Of operations reporting respiratory disease, 94.5 percent treated all cows with an antimicrobial, whereas 35.3 percent of operations reporting digestive disorders and 19.9 percent of operations reporting reproductive disease treated none of their cows with an antimicrobial. (Many reproductive and digestive diseases are not infectious).

b. For operations with a specified disease in cows, percentage of operations by proportion of affected cows treated with antimicrobials:

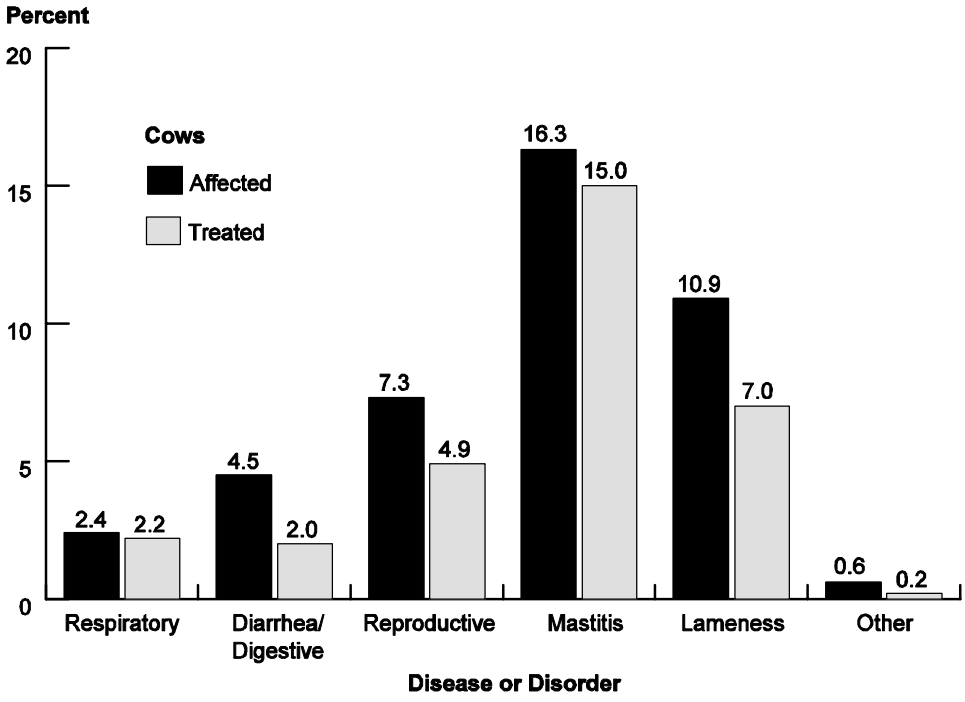
	Percent Operations											
	Disease/Disorder											
	Respiratory		Diarrhea/ Digestive		Reproductive		Mastitis		Lameness		Other	
Proportion Treated	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
None	3.0	(1.1)	35.3	(3.3)	19.9	(2.5)	1.2	(0.5)	14.3	(2.3)	39.9	(8.5)
Some	2.5	(0.8)	17.5	(2.4)	18.8	(2.5)	13.0	(1.7)	19.3	(2.2)	2.2	(1.4)
All	94.5	(1.3)	47.2	(3.4)	61.3	(3.1)	85.8	(1.7)	66.4	(2.8)	57.9	(8.6)
Total	100.0		100.0		100.0		100.0		100.0		100.0	

Mastitis and lameness were the most common diseases or disorders affecting dairy cows (16.3 percent and 10.9 percent of cows, respectively). Of cows affected with mastitis, 91.9 percent were treated with an antimicrobial compared to 64.9 percent of cows affected with lameness (table d).

c. Percentage of all cows affected with the following diseases or disorders, and percentage of all cows treated with an antimicrobial for the diseases or disorders:

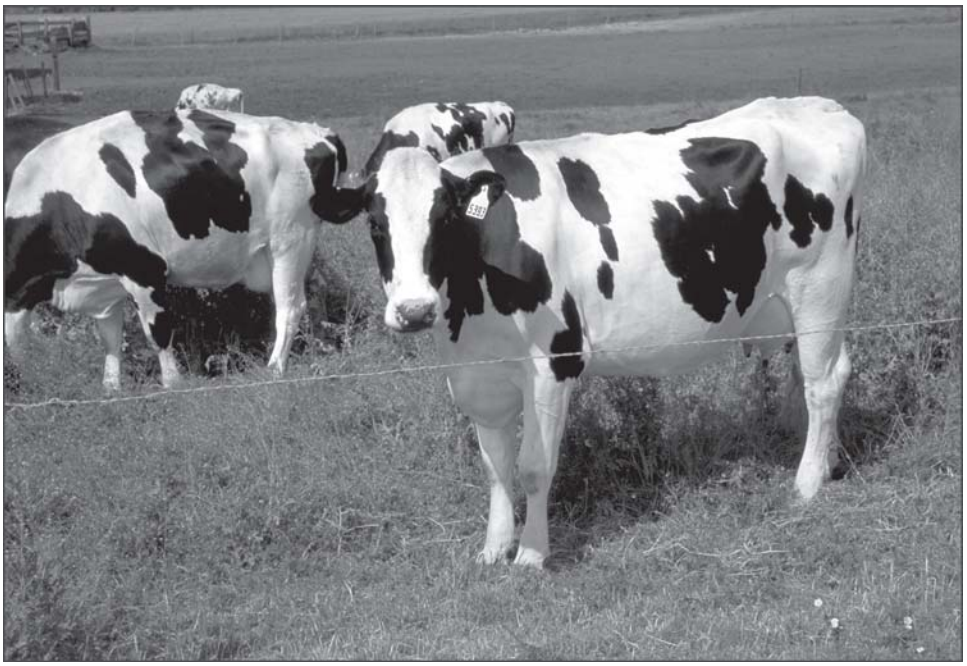
	Percent Cows			
	Affected		Treated	
Disease or Disorder	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Respiratory	2.4	(0.2)	2.2	(0.1)
Diarrhea or other digestive problem	4.5	(0.3)	2.0	(0.2)
Reproductive	7.3	(0.4)	4.9	(0.3)
Mastitis	16.3	(0.7)	15.0	(0.7)
Lameness	10.9	(0.7)	7.0	(0.6)
Other	0.6	(0.1)	0.2	(0.1)

Percentage of All Cows Affected With the Following Diseases or Disorders, and Percentage of All Cows Treated With an Antimicrobial for the Diseases or Disorders



d. For cows affected with the following diseases or disorders, percentage of cows treated with an antimicrobial for the diseases or disorders:

Disease or Disorder	Percent Affected Cows Treated	Standard Error
Respiratory	92.6	(4.0)
Diarrhea or other digestive problem	44.7	(3.7)
Reproductive	66.9	(3.1)
Mastitis	91.9	(1.2)
Lameness	64.9	(3.3)
Other	41.4	(11.0)



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A small percentage of operations had respiratory disease or mastitis problems in cows but did not administer antimicrobials (1.5 percent and 1.0 percent of operations, respectively). A higher percentage of operations did not treat cows with an antimicrobial for diarrhea/digestive and reproductive disorders (15.2 and 10.4 percent of operations, respectively).

e. Percentage of operations (including those not reporting diseases or disorders) by primary antimicrobial used to treat cows for the following diseases or disorders:

Percent Operations (table revised 9-6-06)

	Disease/Disorder											
	Respiratory		**Diarrhea/ Digestive**		**Reproductive**		**Mastitis**		**Lameness**		**Other**	
Primary Antimicrobial Used	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Aminoglycosides	0.5	(0.4)	1.0	(0.5)	0.1	(0.1)	0.9	(0.4)	0.1	(0.1)	0.0	(--)
Beta-lactams	9.0	(1.4)	11.4	(1.4)	15.9	(1.7)	29.0	(2.1)	14.7	(1.6)	3.1	(0.9)
Cephalosporins	27.6	(2.0)	10.1	(1.3)	7.3	(1.0)	33.3	(2.2)	18.3	(1.6)	0.9	(0.5)
Florfenicol	1.3	(0.4)	0.2	(0.1)	0.0	(--)	0.1	(0.1)	0.0	(--)	0.0	(0.0)
Macrolides	1.9	(0.8)	0.3	(0.3)	0.3	(0.3)	14.6	(1.7)	0.5	(0.3)	0.0	(--)
Sulfonamides	1.9	(0.7)	2.8	(0.6)	1.8	(0.8)	1.0	(0.4)	1.8	(0.5)	0.0	(0.0)
Tetracyclines	6.2	(1.0)	2.1	(0.6)	16.7	(1.7)	4.4	(0.9)	13.9	(1.6)	0.8	(0.5)
Other	0.6	(0.3)	0.0	(0.0)	0.0	(0.0)	1.0	(0.5)	2.3	(0.7)	0.0	(--)
Any antimicrobial	49.0	(2.3)	27.9	(2.0)	42.1	(2.3)	84.3	(1.7)	51.6	(2.3)	4.8	(1.1)
No treatment but disease present	1.5	(0.5)	15.2	(1.7)	10.4	(1.4)	1.0	(0.5)	8.6	(1.5)	3.3	(0.9)
No disease	49.5	(2.3)	56.9	(2.2)	47.5	(2.3)	14.7	(1.7)	39.8	(2.3)	91.9	(1.4)
Total	100.0		100.0		100.0		100.0		100.0		100.0	

Nearly 7 out of 10 cows treated for respiratory disease (67.3 percent) were on operations where cephalosporins were the primary antimicrobials used to treat the disease. Beta-lactams and cephalosporins were the primary antimicrobials used to treat diarrhea/digestive disorders: 41.2 percent of treated cows were on operations where beta-lactams were the primary antimicrobials used for diarrhea/digestive disorders, and 37.9 percent of treated cows were on operations where cephalosporins were the primary choice. The primary antimocrobials used for treating reproductive disorders were beta-lactams, cephalosporins, and tetracyclines. More than 9 out of 10 cows treated for mastitis (94.7 percent) were on operations where cephalosporins, beta-lactams, or macrolides were the primary antimicrobials used.

f. Percentage of treated cows by primary antimicrobial used on the operation for treating the following diseases or disorders:

Percent Treated Cows (table revised 9-6-06)

	Disease/Disorder											
	Respiratory		**Diarrhea/ Digestive**		**Reproductive**		**Mastitis**		**Lameness**		**Other**	
Primary Antimicrobial Used	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Aminoglycosides	0.4	(0.4)	3.2	(1.7)	0.1	(0.1)	1.0	(0.5)	0.1	(0.1)	0.0	(--)
Beta-lactams	13.0	(1.9)	41.2	(4.3)	31.1	(3.4)	33.9	(2.9)	17.3	(3.3)	61.4	(15.1)
Cephalosporins	67.3	(3.1)	37.9	(4.3)	23.2	(3.0)	36.8	(3.1)	29.8	(4.4)	16.1	(8.0)
Florfenicol	2.1	(0.8)	0.4	(0.3)	0.0	(--)	0.0	(0.0)	0.0	(--)	0.1	(0.1)
Macrolides	1.3	(0.5)	0.7	(0.7)	0.1	(0.1)	24.0	(3.2)	0.2	(0.1)	0.0	(--)
Sulfonamides	3.1	(1.0)	11.9	(2.4)	4.2	(2.2)	0.7	(0.3)	4.4	(1.1)	7.1	(6.9)
Tetracyclines	11.6	(2.0)	4.6	(1.7)	41.2	(4.1)	3.1	(0.8)	42.4	(5.1)	15.3	(9.8)
Other	1.2	(0.5)	0.1	(0.1)	0.1	(0.1)	0.5	(0.2)	5.8	(1.8)	0.0	(--)
Total	100.0		100.0		100.0		100.0		100.0		100.0	

For small operations, 41.0 percent of cows treated for mastitis were on operations where cephalosporins were the primary antimicrobials used to treat the disease, and 31.7 percent of treated cows were on operations where beta-lactams were the primary choice. For large operations, 36.0 percent of cows treated for mastitis were on operations where cephalosporins were the primary antimicrobials used, and 33.2 percent of treated cows were on operations where beta-lactams were the primary choice.

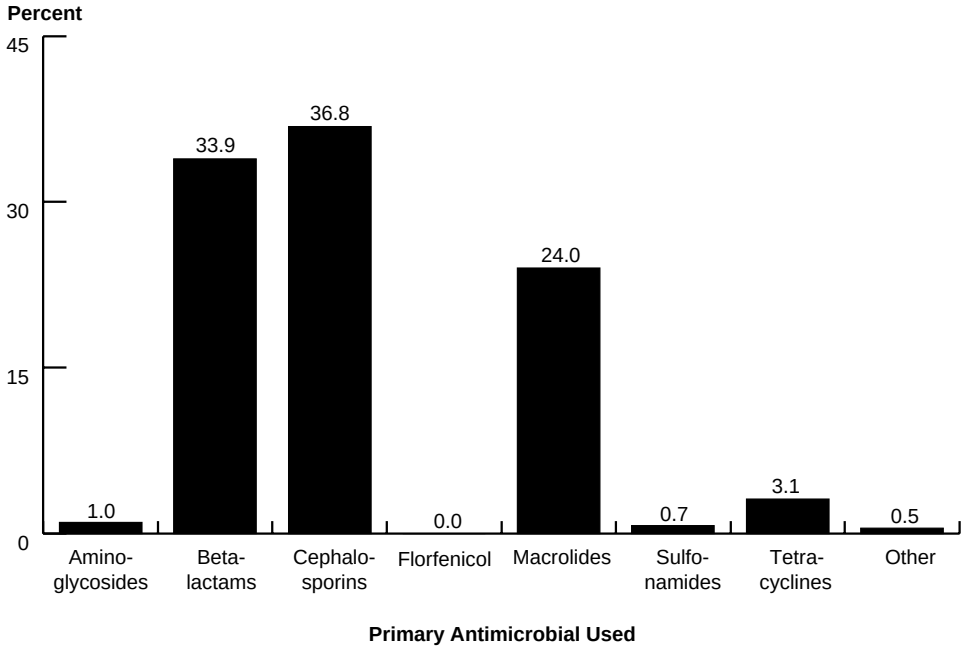
g. For cows treated for **mastitis,** percentage of treated cows by primary antimicrobial used on the operation and by herd size:

Percent Treated Cows (table revised 9-6-06)

Herd Size (Number of Dairy Cows)

	Small (Less than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Primary Antimicrobial Used	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Aminoglycosides	2.3	(1.6)	1.0	(0.7)	0.0	(--)	1.0	(0.5)
Beta-lactams	31.7	(3.9)	36.6	(4.4)	33.2	(6.1)	33.9	(2.9)
Cephalosporins	41.0	(4.4)	33.8	(4.2)	36.0	(6.4)	36.8	(3.1)
Florfenicol	0.1	(0.1)	0.0	(--)	0.0	(--)	0.0	(0.0)
Macrolides	20.1	(3.8)	21.1	(4.7)	29.5	(6.7)	24.0	(3.2)
Sulfonamides	0.9	(0.5)	0.3	(0.2)	0.9	(0.6)	0.7	(0.3)
Tetracyclines	3.0	(1.0)	6.5	(2.2)	0.4	(0.2)	3.1	(0.8)
Other	0.9	(0.6)	0.7	(0.5)	0.0	(--)	0.5	(0.2)
Total	100.0		100.0		100.0		100.0	

For Cows Treated for Mastitis, Percentage of Treated Cows by Primary Antimicrobial Used on the Operation (graph revised 9/6/06)

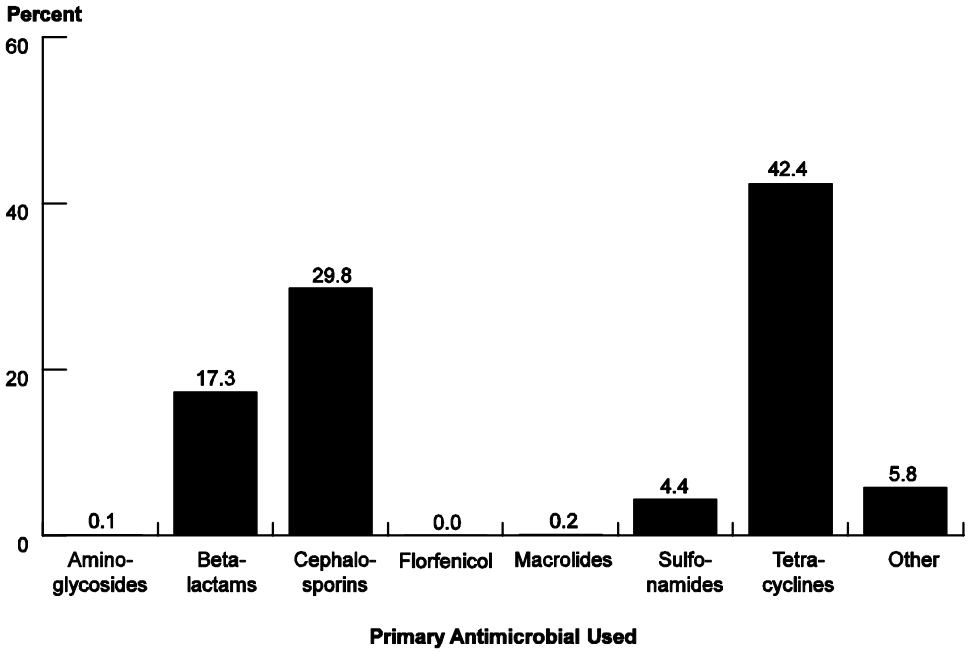


Overall, beta-lactams, cephalosporins, and tetracyclines were the most commonly reported antimicrobials for treating lameness. By herd size, 49.4 percent of treated cows on small operations, 45.0 percent of treated cows on medium operations, and 33.0 percent of treated cows on large operations were on operations where tetracyclines were the primary antimicrobials used to treat lameness. Cephalosporin use was relatively constant across herd sizes.

h. For cows treated for ***lameness,*** percentage of treated cows by primary antimicrobial used on the operation and by herd size:

	Percent Treated Cows							
	Herd Size (Number of Dairy Cows)							
	Small (Less than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Primary Antimicrobial Used	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Aminoglycosides	0.0	(--)	0.2	(0.2)	0.0	(--)	0.1	(0.1)
Beta-lactams	10.4	(2.4)	17.8	(5.9)	22.6	(6.5)	17.3	(3.3)
Cephalosporins	28.3	(5.5)	30.7	(8.5)	29.8	(6.3)	29.8	(4.4)
Florfenicol	0.0	(--)	0.0	(--)	0.0	(--)	0.0	(--)
Macrolides	0.3	(0.2)	0.0	(--)	0.4	(0.3)	0.2	(0.1)
Sulfonamides	2.4	(1.8)	0.7	(0.3)	11.1	(3.2)	4.4	(1.1)
Tetracyclines	49.4	(7.2)	45.0	(9.3)	33.0	(8.3)	42.4	(5.1)
Other	9.2	(3.5)	5.6	(3.2)	3.1	(2.5)	5.8	(1.8)
Total	100.0		100.0		100.0		100.0	

For Cows Treated for Lameness, Percentage of Treated Cows by Primary Antimicrobial Used on Operation



B. Waste Milk and Milk Replacer Management

Note: Population estimates for this section refer to dairy operations with one or more dairy cows.

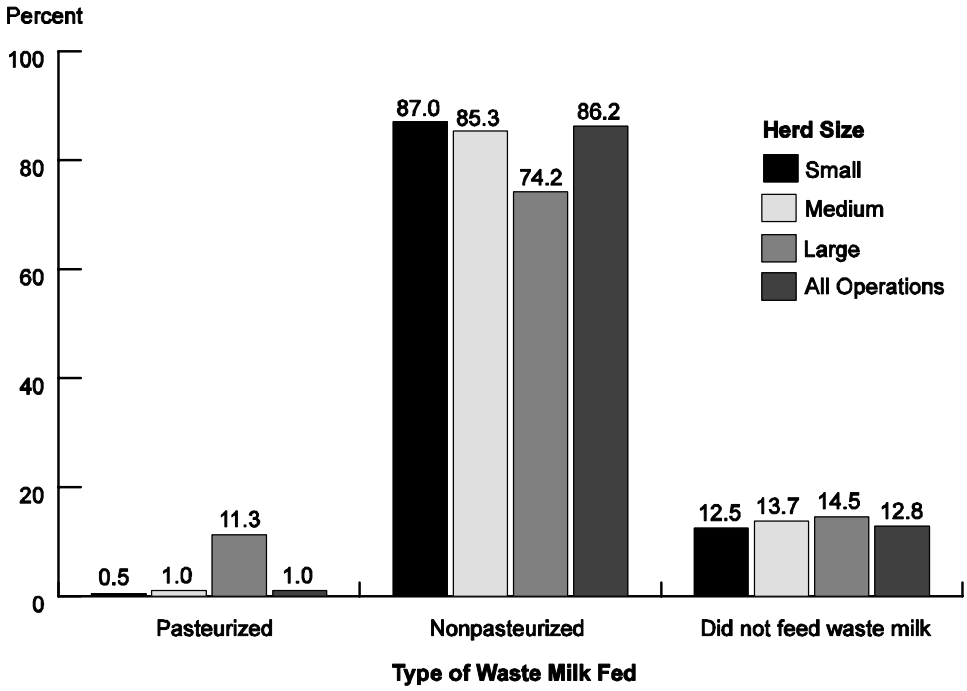
1. Waste milk

A higher percentage of large operations (11.3 percent) fed pasteurized waste milk to heifer calves than did small and medium operations (0.5 percent and 1.0 percent of operations, respectively). Overall, 86.2 percent of operations fed nonpasteurized waste milk to heifers. The percentage of operations that fed nonpasteurized waste milk to heifer calves decreased as operation size increased.

a. Percentage of operations by waste milk feeding practices for heifer calves and by herd size:

	Percent Operations							
	Herd Size (Number of Dairy Cows)							
	Small (Less than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Type of Waste Milk Fed	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Pasteurized	0.5	(0.2)	1.0	(0.4)	11.3	(1.6)	1.0	(0.2)
Nonpasteurized	87.0	(1.1)	85.3	(1.6)	74.2	(2.4)	86.2	(0.9)
Did not feed waste milk	12.5	(1.1)	13.7	(1.5)	14.5	(2.0)	12.8	(0.9)
Total	100.0		100.0		100.0		100.0	

Percentage of Operations by Waste Milk Feeding Practices for Heifer Calves and by Herd Size



Feeding nonpasteurized waste milk to heifers was most common in the Southeast region (95.6 percent of operations) and least common in the Midwest region (82.2 percent of operations). The Midwest region had the highest percentage of operations (16.9 percent) that did not feed waste milk to heifers.

b. Percentage of operations by waste milk feeding practices for heifer calves and by region:

	Percent Operations							
	Region							
	West		Midwest		Northeast		Southeast	
Type of Waste Milk Fed	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Pasteurized	4.7	(0.7)	0.9	(0.3)	0.1	(0.1)	1.3	(0.6)
Nonpasteurized	88.4	(1.4)	82.2	(1.3)	92.5	(1.3)	95.6	(1.3)
Did not feed waste milk	6.9	(1.2)	16.9	(1.3)	7.4	(1.3)	3.1	(1.1)
Total	100.0		100.0		100.0		100.0	

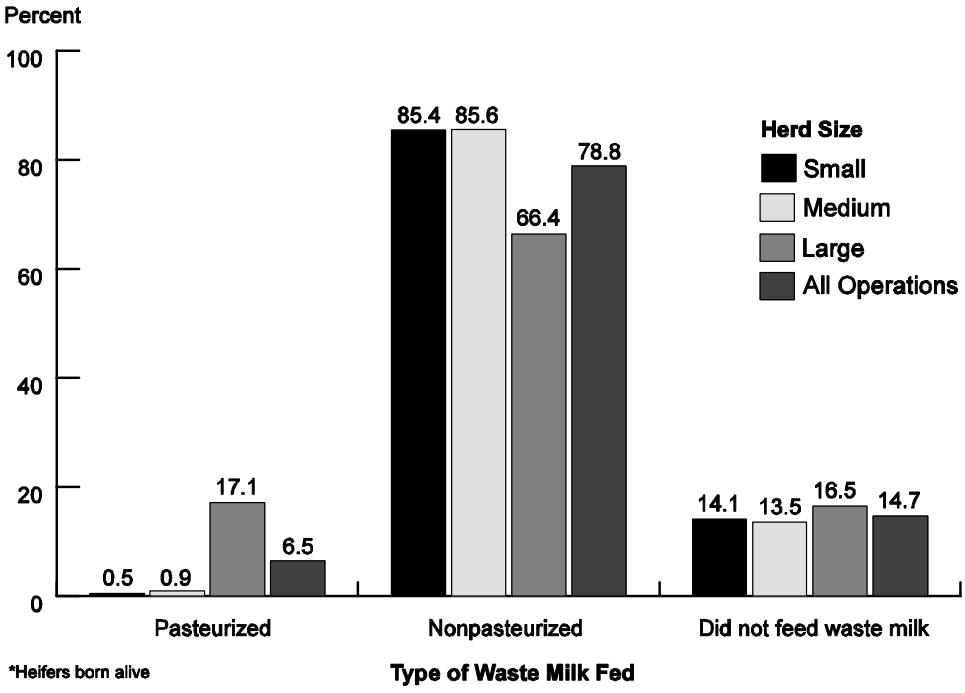
Waste milk feeding practices by herd size at the animal level were consistent with waste milk feeding practices by herd size at the operation level (table a). A smaller percentage of heifers on large operations were fed nonpasteurized waste milk compared to small and medium operations.

c. Percentage of heifers by waste milk feeding practices for heifer calves and by herd size:

	Percent Heifers*							
	Herd Size (Number of Dairy Cows)							
	Small (Less than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Type of Waste Milk Fed	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Pasteurized	0.5	(0.2)	0.9	(0.3)	17.1	(2.0)	6.5	(0.7)
Nonpasteurized	85.4	(1.3)	85.6	(1.6)	66.4	(2.5)	78.8	(1.1)
Did not feed waste milk	14.1	(1.3)	13.5	(1.5)	16.5	(2.2)	14.7	(1.0)
Total	100.0		100.0		100.0		100.0	

*Heifers born alive

Percentage of Heifers* by Waste Milk Feeding Practices for Heifer Calves and by Herd Size



Nearly 9 out of 10 operations in the West region (88.4 percent) fed nonpasteurized waste milk (table b), and these operations accounted for 73.4 percent of heifers in the West region.

d. Percentage of heifers by waste milk feeding practices and by region:

	Percent Heifers*							
	Region							
	West		Midwest		Northeast		Southeast	
Type of Waste Milk Fed	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Pasteurized	14.2	(1.8)	1.8	(0.5)	0.9	(0.3)	7.1	(1.8)
Nonpasteurized	73.4	(2.4)	78.4	(1.6)	87.3	(1.7)	89.0	(1.9)
Did not feed waste milk	12.4	(2.0)	19.8	(1.5)	11.8	(1.7)	3.9	(1.1)
Total	100.0		100.0		100.0		100.0	

*Heifers born alive

2. Medicated milk replacer fed to heifer calves

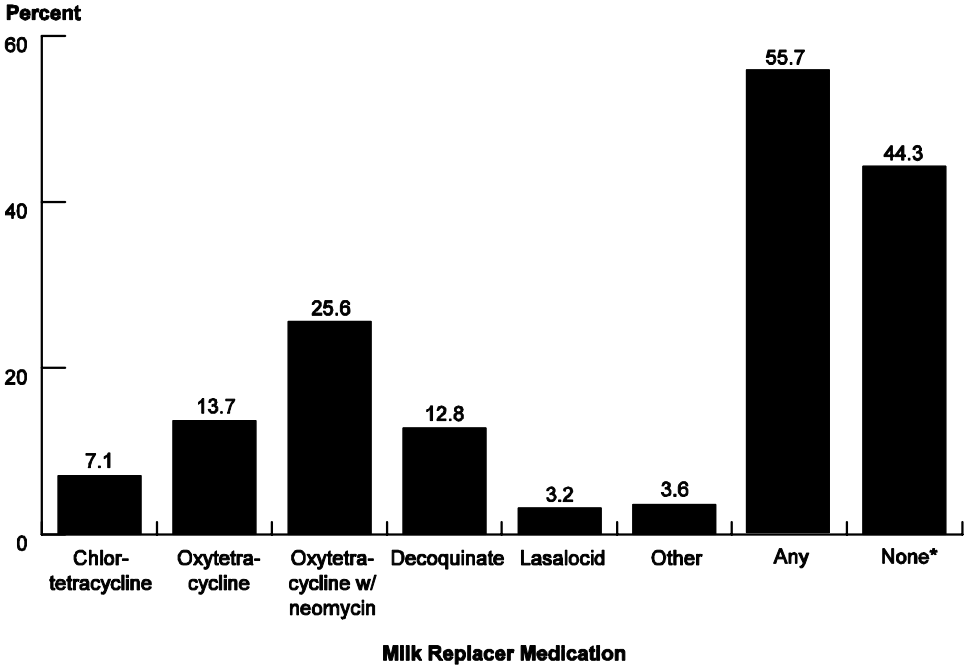
A higher percentage of medium operations (64.1 percent) fed any medicated milk replacer to heifers than did large or small operations (37.7 percent and 54.4 percent, respectively). Across all operation sizes, oxytetracycline with neomycin was the most commonly used medication.

a. Percentage of operations that fed medicated milk replacer to heifers during 2001, by medication used and by herd size:

	Percent Operations							
	Herd Size (Number of Dairy Cows)							
	Small (Less than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Milk Replacer Medication	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Chlortetracycline	6.6	(0.8)	9.5	(1.3)	4.2	(1.1)	7.1	(0.7)
Oxytetracycline	13.5	(1.2)	15.2	(1.5)	8.2	(1.5)	13.7	(0.9)
Oxytetracycline w/neomycin	25.0	(1.5)	28.9	(1.9)	19.0	(2.1)	25.6	(1.2)
Decoquinate	12.1	(1.1)	16.2	(1.7)	7.6	(1.4)	12.8	(0.9)
Lasalocid	3.2	(0.5)	3.3	(0.7)	2.0	(0.9)	3.2	(0.4)
Other	3.5	(0.6)	4.2	(0.9)	2.1	(0.7)	3.6	(0.5)
Any	54.4	(1.6)	64.1	(1.9)	37.7	(2.5)	55.7	(1.3)
None*	45.6	(1.6)	35.9	(1.9)	62.3	(2.5)	44.3	(1.3)

*Did not receive medicated milk replacer

Percentage of Operations that Fed Medicated Milk Replacer to Heifers During 2001, by Medication Used



*Did not receive milk replacer

Operations in the West region were least likely to feed any medicated milk replacer to heifers (33.9 percent of operations), and operations in the Midwest region were most likely to feed any medicated milk replacer to heifers (60.7 percent of operations). In all regions, oxytetracycline (alone or with neomycin) was the medication utilized most commonly.

b. Percentage of operations that fed any medicated milk replacer to heifers during 2001, by medication used and by region:

	Percent Operations							
	Region							
	West		Midwest		Northeast		Southeast	
Milk Replacer Medication	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Chlortetracycline	2.8	(0.8)	8.3	(1.0)	3.8	(0.9)	15.4	(4.0)
Oxytetracycline	8.0	(1.4)	15.8	(1.4)	9.2	(1.5)	19.9	(4.0)
Oxytetracycline w/neomycin	15.2	(2.3)	26.9	(1.6)	26.8	(2.1)	21.2	(4.2)
Decoquinate	4.6	(1.3)	15.5	(1.3)	9.1	(1.4)	12.0	(3.7)
Lasalocid	2.6	(0.8)	3.4	(0.6)	3.0	(0.8)	2.3	(1.5)
Other	2.0	(0.9)	3.3	(0.6)	5.0	(1.2)	2.7	(0.8)
Any	33.9	(2.9)	60.7	(1.8)	52.7	(2.5)	48.1	(4.6)
None*	66.1	(2.9)	39.3	(1.8)	47.3	(2.5)	51.9	(4.6)

*Did not receive medicated milk replacer

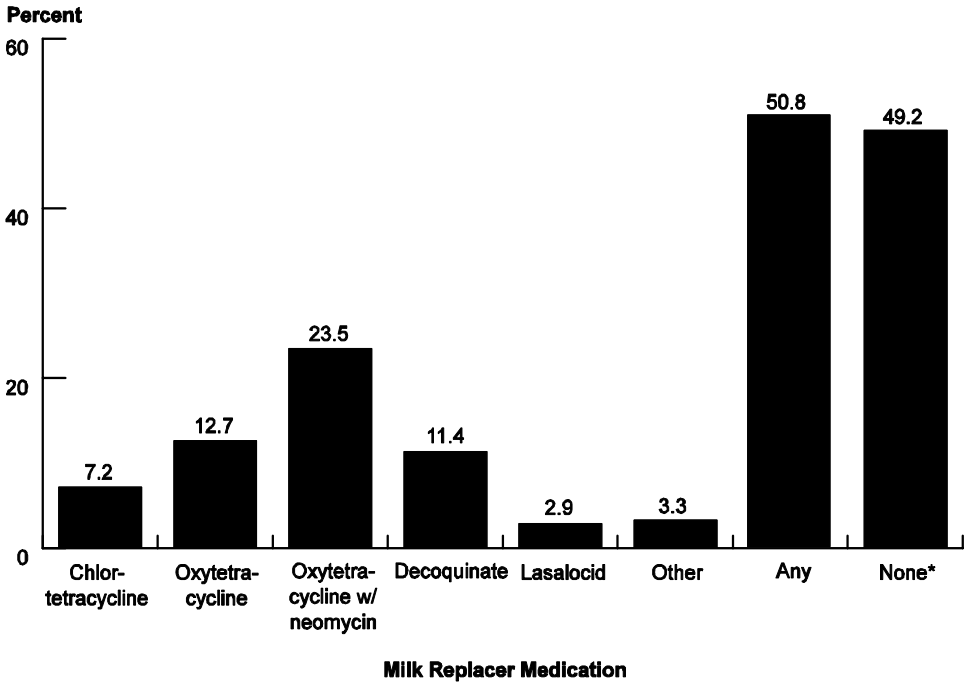
At the animal level, oxytetracycline with neomycin was the most common medication used in milk replacer. Heifers on large operations were less likely to receive any medicated milk replacer (32.8 percent) than heifers on medium and small operations (62.6 percent and 58.6 percent, respectively).

c. Percentage of heifers by type of medicated milk replacer fed on the operation and by herd size:

	Percent Heifers**							
	Herd Size (Number of Dairy Cows)							
	Small (Less than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Milk Replacer Medication	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Chlortetracycline	8.0	(1.1)	9.3	(1.5)	4.4	(1.2)	7.2	(0.7)
Oxytetracycline	14.6	(1.3)	16.1	(1.7)	7.8	(1.3)	12.7	(0.8)
Oxytetracycline w/neomycin	25.6	(1.6)	30.1	(2.1)	15.6	(1.9)	23.5	(1.1)
Decoquinate	14.5	(1.3)	5.1	(1.6)	5.1	(0.8)	11.4	(0.7)
Lasalocid	3.9	(0.7)	3.2	(0.7)	1.6	(0.5)	2.9	(0.4)
Other	4.1	(0.7)	3.8	(0.7)	2.1	(0.8)	3.3	(0.4)
Any	58.6	(1.7)	62.6	(2.0)	32.8	(2.4)	50.8	(1.2)
None*	41.4	(1.7)	37.4	(2.0)	67.2	(2.4)	49.2	(1.2)

*Did not receive medicated milk replacer
**Born alive

Percentage of Heifers by Type of Medicated Milk Replacer Fed on the Operation**



*Did not receive milk replacer
**Born alive

Regional differences in feeding any medicated milk replacer were observed. In the West region, 28.2 percent of heifers were fed any medicated milk replacer, while in the Midwest region 67.8 percent of heifers were fed any medicated milk replacer.

d. Percentage of heifers by type of medicated milk replacer fed on the operation and by region:

	Percent Heifers**							
	Region							
	West		Midwest		Northeast		Southeast	
Milk Replacer Medication	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Chlortetracycline	3.3	(1.0)	11.4	(1.4)	4.1	(0.9)	11.1	(2.9)
Oxytetracycline	7.6	(1.3)	17.3	(1.5)	9.8	(1.4)	19.8	(3.6)
Oxytetracycline w/neomycin	13.0	(1.8)	30.9	(1.8)	29.1	(2.0)	21.8	(3.3)
Decoquinate	3.1	(0.8)	17.9	(1.4)	13.3	(1.7)	13.0	(3.0)
Lasalocid	1.2	(0.4)	4.0	(0.7)	3.2	(0.8)	4.1	(1.7)
Other	1.6	(0.7)	3.5	(0.6)	6.2	(1.2)	3.8	(1.1)
Any	28.2	(2.3)	67.8	(1.7)	58.5	(2.3)	51.5	(4.1)
None*	71.8	(2.3)	32.2	(1.7)	41.5	(2.3)	48.5	(4.1)

*Did not receive milk replacer
**Born alive

C. Disease Prevention and Growth Promotion

Note: Ionophores and coccidiostats were excluded from the definition of antimicrobials in this section.

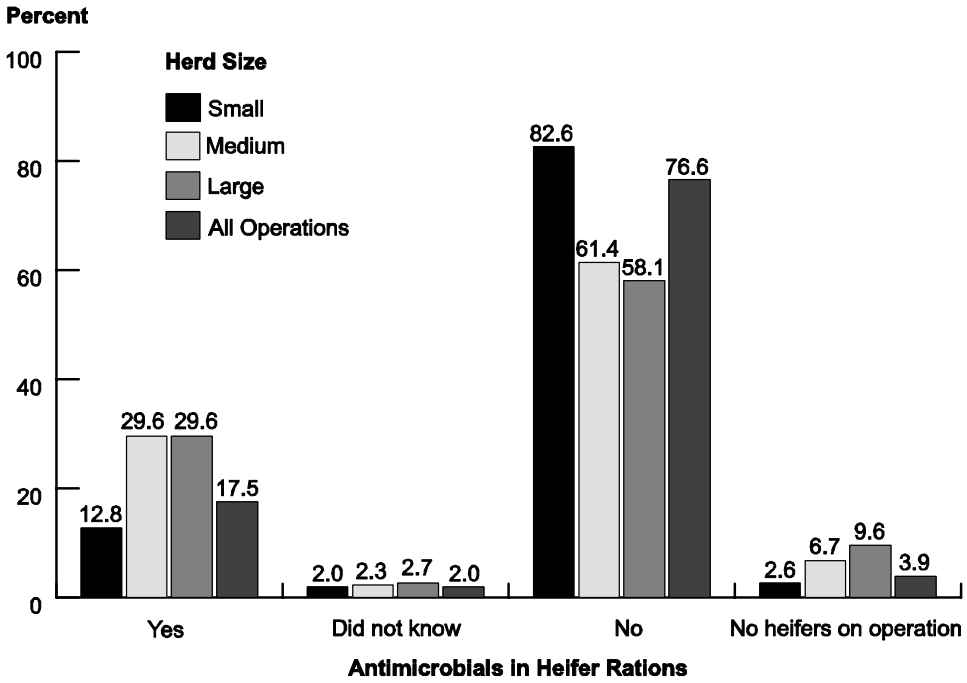
1. Use of antimicrobials in weaned-heifer rations

More than 8 out of 10 small operations (82.6 percent) did not use any antimicrobials in weaned-heifer rations. More than half of large operations (58.1 percent) and medium operations (61.4 percent) did not use any antimicrobials in weaned-heifer rations. Overall, 2.0 percent of operators did not know if antimicrobials were present in weaned-heifer rations.

a. Percentage of operations that used antimicrobials in weaned-heifer rations for disease prevention or growth promotion, by herd size:

	Percent Operations							
	Herd Size (Number of Dairy Cows)							
	Small (Less than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Antimicrobials in Weaned Heifer Rations	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Yes	12.8	(1.7)	29.6	(2.8)	29.6	(3.8)	17.5	(1.5)
Did not know	2.0	(0.8)	2.3	(1.0)	2.7	(1.1)	2.0	(0.6)
No	82.6	(2.0)	61.4	(3.0)	58.1	(3.9)	76.6	(1.7)
No heifers on operation	2.6	(0.8)	6.7	(1.6)	9.6	(2.1)	3.9	(0.7)
Total	100.0		100.0		100.0		100.0	

Percentage of Operations that Used Antimicrobials in Weaned-Heifer Rations for Disease Prevention or Growth Promotion, by Herd Size

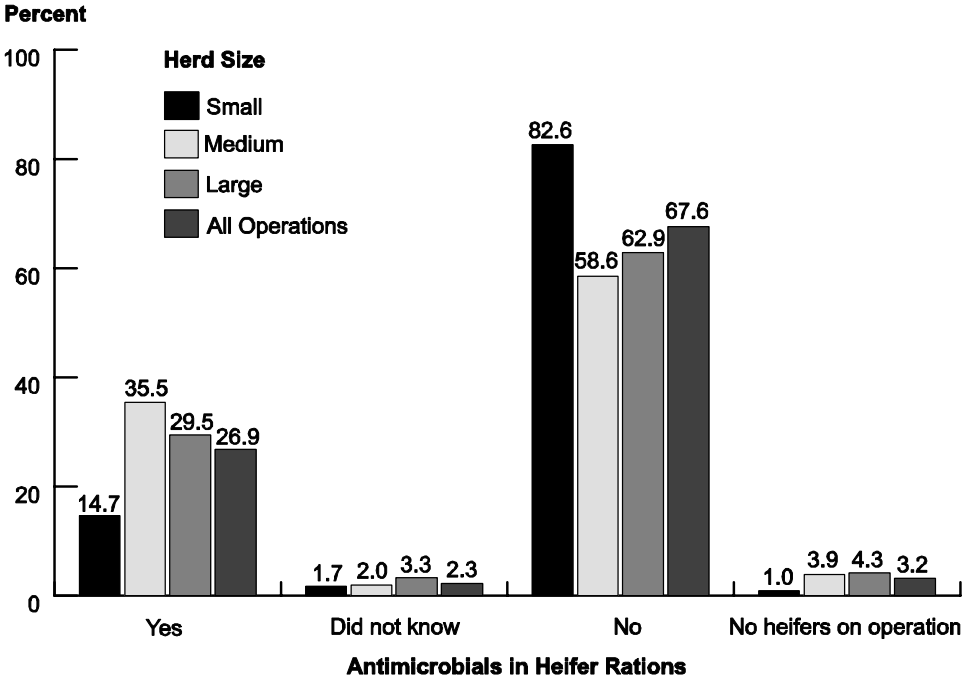


At the animal level, a lower percentage of weaned heifers (14.7 percent) were on small operations that fed antimicrobials in rations than weaned heifers on medium operations (35.5 percent) or large operations (29.5 percent) that fed antimicrobials in rations. More than 8 out of 10 weaned heifers on small operations (82.6 percent) did not receive any antimicrobials in rations. Nearly 6 out of 10 weaned heifers on medium operations (58.6 percent) and more than 6 out of 10 weaned heifers on large operations (62.9 percent) did not receive any antimicrobials in rations.

b. Percentage of weaned heifers, by operations' use of antimicrobials in rations for disease prevention or growth promotion, and by herd size:

	Percent Weaned Heifers							
	Herd Size (Number of Dairy Cows)							
	Small (Less than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Antimicrobials in Heifer Rations	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Yes	14.7	(2.1)	35.5	(3.2)	29.5	(3.6)	26.9	(1.8)
Did not know	1.7	(0.7)	2.0	(0.9)	3.3	(1.7)	2.3	(0.7)
No	82.6	(2.2)	58.6	(3.3)	62.9	(3.9)	67.6	(1.9)
No heifers on operation	1.0	(0.4)	3.9	(1.8)	4.3	(1.4)	3.2	(0.8)
Total	100.0		100.0		100.0		100.0	

Percentage of Weaned Heifers, by Operations' Use of Antimicrobials in Rations for Disease Prevention or Growth Promotion, and by Herd Size



Antimicrobial use in heifer rations did not vary significantly by region.

c. Percentage of operations that used antimicrobials in weaned-heifer rations for disease prevention or growth promotion, by region:

	Percent Operations							
	Region							
	West		Midwest		Northeast		Southeast	
Antimicrobials in Weaned Heifer Rations	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Yes	19.2	(3.7)	19.1	(2.1)	12.9	(2.4)	20.3	(4.7)
Did not know	3.5	(2.0)	2.2	(0.9)	1.5	(0.7)	1.0	(0.9)
No	70.5	(4.4)	75.8	(2.4)	81.1	(2.8)	72.5	(5.1)
No heifers on operation	6.8	(1.9)	2.9	(0.9)	4.5	(1.6)	6.2	(2.8)
Total	100.0		100.0		100.0		100.0	

The percentage of heifers on operations that fed antimicrobials in rations did not vary significantly by region.

d. Percentage of weaned heifers, by operations' use of antimicrobials in rations for disease prevention or growth promotion, and by region:

	Percent Weaned Heifers							
	Region							
	West		Midwest		Northeast		Southeast	
Antimicrobials in Weaned Heifer Rations	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Yes	22.5	(3.3)	30.5	(2.9)	23.4	(2.9)	35.4	(7.6)
Did not know	3.3	(1.7)	1.7	(0.6)	1.6	(0.8)	4.7	(3.8)
No	70.8	(3.7)	63.9	(3.0)	72.1	(3.0)	55.5	(7.4)
No heifers on operation	3.4	(1.3)	3.9	(1.5)	0.9	(0.6)	4.4	(1.8)
Total	100.0		100.0		100.0		100.0	

At the operation level, across all herd sizes, chlortetracycline was the antimicrobial used most frequently in weaned-heifer rations.

e. For operations that used antimicrobials in weaned-heifer rations for disease prevention or growth promotion, percentage of operations by type of antimicrobial used and by herd size:

	Percent Operations*							
	Herd Size (Number of Dairy Cows)							
	Small (Less than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Antimicrobial Used	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Bacitracin methylene disalicylate	5.3	(3.2)	2.3	(1.4)	0.0	(--)	3.7	(1.8)
Bambermycins	0.9	(0.9)	0.5	(0.5)	2.8	(1.9)	0.9	(0.5)
Chlortetracycline compounds	55.7	(7.3)	69.9	(5.0)	77.4	(5.9)	62.8	(4.5)
Neomycin sulfate	5.5	(2.7)	3.4	(2.1)	4.4	(2.2)	4.6	(1.7)
Neomycin-oxytetracycline	17.5	(5.3)	12.3	(3.5)	5.0	(2.6)	14.6	(3.2)
Oxytetracycline	20.5	(5.8)	23.5	(4.7)	19.5	(5.8)	21.6	(3.6)
Sulfamethazine	26.1	(6.5)	28.4	(5.2)	30.4	(6.7)	27.3	(4.1)
Tylosin phosphate	0.0	(--)	0.0	(--)	0.6	(0.6)	0.0	(0.0)
Virginiamycin	0.0	(--)	0.0	(--)	0.0	(--)	0.0	(--)
Other	3.9	(3.8)	0.6	(0.6)	0.0	(--)	2.4	(2.1)

*Estimates vary slightly from DRIII, p. 74, due to the elimination of one operation with questionable data.

Chlortetracycline was the antimicrobial used most frequently in weaned-heifer rations. Use of chlortetracycline ranged from 44.3 percent of operations in the West region to 75.8 percent of operations in the Southeast region.

f. For operations that used antimicrobials in weaned-heifer rations for disease prevention or growth promotion, percentage of operations by type of antimicrobial used and by region:

	Percent Operations							
	Region							
	West		Midwest		Northeast		Southeast	
Antimicrobial Used	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Bacitracin methylene disalicylate	0.0	(--)	3.1	(2.3)	8.8	(5.0)	0.0	(--)
Bambermycins	0.0	(--)	1.0	(0.8)	1.3	(1.0)	0.0	(--)
Chlortetracycline compounds	44.3	(10.8)	67.2	(5.7)	52.1	(9.8)	75.8	(11.6)
Neomycin sulfate	2.4	(1.7)	3.9	(1.7)	7.7	(5.8)	4.9	(4.8)
Neomycin-oxytetracycline	5.1	(3.3)	18.9	(4.8)	4.9	(2.6)	14.6	(7.8)
Oxytetracycline	36.9	(10.2)	17.1	(4.5)	30.2	(9.0)	18.1	(11.0)
Sulfamethazine	43.2	(12.1)	26.5	(5.5)	23.8	(7.0)	24.9	(11.7)
Tylosin phosphate	0.0	(--)	0.0	(--)	0.2	(0.2)	0.0	(--)
Virginiamycin	0.0	(--)	0.0	(--)	0.0	(--)	0.0	(--)
Other	0.0	(--)	0.0	(--)	11.7	(9.4)	0.0	(--)

At the animal level, across all herd sizes, chlortetracycline was the antimicrobial used most frequently in weaned-heifer rations.

g. For weaned dairy heifers on operations that used antimicrobials in weaned-heifer rations for disease prevention or growth promotion, percentage of heifers by type of antimicrobial used in rations and by herd size:

	Percent Weaned Heifers							
	Herd Size (Number of Dairy Cows)							
	Small (Less than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Antimicrobial Used	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Bacitracin methylene disalicylate	5.3	(3.3)	1.6	(1.0)	0.0	(--)	1.7	(0.7)
Bambermycins	1.7	(1.7)	0.3	(0.3)	2.4	(1.4)	1.3	(0.6)
Chlortetracycline compounds	57.3	(7.7)	70.7	(5.0)	76.3	(5.8)	70.4	(3.4)
Neomycin sulfate	5.3	(2.5)	4.1	(3.2)	2.9	(1.3)	3.9	(1.6)
Neomycin-oxytetracycline	19.0	(5.7)	11.8	(3.4)	4.2	(2.1)	10.2	(2.0)
Oxytetracycline	19.7	(6.0)	24.0	(4.6)	21.7	(5.8)	22.4	(3.2)
Sulfamethazine	31.2	(7.5)	29.4	(5.8)	37.0	(6.2)	32.5	(3.7)
Tylosin phosphate	0.0	(--)	0.0	(--)	0.7	(0.6)	0.2	(0.2)
Virginiamycin	0.0	(--)	0.0	(--)	0.0	(--)	0.0	(--)
Other	3.1	(3.0)	0.8	(0.8)	0.0	(--)	0.9	(0.6)

2. Intramammary antimicrobials

Use of intramammary antimicrobials at dry-off increased as herd size increased. A higher percentage of large operations (89.2 percent) treated all cows with intramammary antimicrobials compared to small operations (71.9 percent).

a. Percentage of operations by proportion of cows treated with intramammary antimicrobials at dry-off, and by herd size:

	Percent Operations							
	Herd Size (Number of Dairy Cows)							
	Small (Less than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Proportion Treated	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
None	6.7	(1.4)	3.8	(1.4)	4.1	(1.8)	5.9	(1.0)
Some	21.4	(2.3)	13.3	(2.4)	6.7	(2.1)	18.9	(1.8)
All	71.9	(2.5)	82.9	(2.5)	89.2	(2.6)	75.2	(1.9)
Total	100.0		100.0		100.0		100.0	

About three in four operations in each region treated all cows with intramammary antimicrobials at dry-off.

b. Percentage of operations by proportion of cows treated with intramammary antimicrobials at dry-off, and by region:

	Percent Operations							
	Region							
	West		**Midwest**		**Northeast**		**Southeast**	
Proportion Treated	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
None	10.7	(3.9)	6.0	(1.5)	3.3	(1.2)	9.0	(4.3)
Some	17.2	(4.4)	20.9	(2.5)	17.0	(3.3)	11.3	(4.7)
All	72.1	(4.9)	73.1	(2.7)	79.7	(3.4)	79.7	(5.8)
Total	100.0		100.0		100.0		100.0	

For operations that used intramammary antimicrobials at dry-off, cephapirin was the most common intramammary antimicrobial used on small and medium operations (71.2 and 56.2 percent, respectively). By contrast, only 37.6 percent of large operations used cephapirin. Penicillin G (procaine)/streptomycin was used on 42.9 percent of large operations.

c. For operations that used intramammary antimicrobials for cows at dry-off, percentage of operations by type of antimicrobial used and by herd size:

	Percent Operations							
	Herd Size (Number of Dairy Cows)							
	Small (Less than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Antimicrobial Used	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Cephapirin (benzathine)	71.2	(2.6)	56.2	(3.0)	37.6	(4.2)	66.1	(2.0)
Cloxacillin (benzathine)	12.6	(2.0)	12.7	(2.1)	20.2	(3.5)	13.0	(1.5)
Erythromycin	2.2	(0.8)	4.8	(1.3)	0.3	(0.3)	2.8	(0.6)
Novobiocin	5.4	(1.6)	6.9	(1.5)	9.0	(2.4)	5.9	(1.2)
Penicillin G (procaine)	2.5	(1.1)	0.7	(0.4)	1.6	(0.8)	2.0	(0.8)
Penicillin G (procaine)/ streptomycin	29.3	(2.7)	39.2	(2.9)	42.9	(4.2)	32.3	(2.1)
Penicillin G (procaine)/ novobiocin	5.2	(1.2)	8.5	(1.6)	8.9	(2.1)	6.1	(0.9)
Other	0.6	(0.4)	0.2	(0.2)	0.3	(0.3)	0.5	(0.3)

Cephapirin was administered to a higher percentage of cows on small operations (61.0 percent) than cows on large operations (28.1 percent). In contrast, cloxacillin and penicillin G (procaine)/streptomycin were administered to a higher percentage of cows on large operations than cows on small operations.

d. For cows treated with intramammary antimicrobials at dry-off, percentage of cows by type of antimicrobial used and by herd size:

	Percent Cows							
	Herd Size (Number of Dairy Cows)							
	Small (Less than 100)		**Medium** (100-499)		**Large** (500 or More)		**Total**	
Antimicrobial Used	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Cephapirin (benzathine)	61.0	(2.7)	41.0	(3.0)	28.1	(3.7)	42.1	(1.8)
Cloxacillin (benzathine)	9.2	(1.6)	11.1	(1.9)	17.3	(3.1)	12.8	(1.4)
Erythromycin	0.8	(0.3)	1.7	(0.7)	0.0	(0.0)	0.8	(0.3)
Novobiocin	2.6	(0.9)	6.9	(2.0)	7.0	(2.2)	5.7	(1.1)
Penicillin G (procaine)	2.0	(0.9)	0.3	(0.2)	1.7	(0.9)	1.3	(0.4)
Penicillin G (procaine)/ streptomycin	21.4	(2.3)	33.6	(3.0)	38.1	(4.3)	31.7	(2.0)
Penicillin G (procaine)/ novobiocin	4.0	(1.0)	5.5	(1.4)	7.5	(2.2)	5.8	(1.0)
Other	0.4	(0.2)	0.0	(0.0)	0.1	(0.1)	0.2	(0.1)

Across all regions, cephapirin and penicillin G (procaine)/streptomycin were the most common antimicrobials used on operations that used intramammary antimicrobials at dry-off. A higher percentage of operations in the Midwest and Southeast regions (69.4 percent and 75.4 percent, respectively) used cephapirin at dry-off than did operations in the West region (51.0 percent).

e. For operations that used intramammary antimicrobials for cows at dry-off, percentage of operations by type of antimicrobial used and by region:

	Percent Operations							
	Region							
	West		Midwest		Northeast		Southeast	
Antimicrobial Used	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Cephapirin (benzathine)	51.0	(4.8)	69.4	(2.8)	61.8	(4.0)	75.4	(5.2)
Cloxacillin (benzathine)	15.0	(3.1)	11.5	(1.9)	17.5	(3.7)	3.8	(2.7)
Erythromycin	1.1	(1.0)	2.8	(0.9)	3.1	(1.2)	3.6	(2.4)
Novobiocin	12.5	(3.4)	5.6	(1.6)	4.9	(2.4)	4.7	(2.2)
Penicillin G (procaine)	0.6	(0.4)	2.3	(1.2)	2.1	(1.2)	1.1	(1.1)
Penicillin G (procaine)/ streptomycin	25.2	(3.6)	29.1	(2.7)	40.7	(4.2)	33.6	(8.8)
Penicillin G (procaine)/ novobiocin	12.2	(3.2)	4.7	(1.2)	7.3	(2.0)	5.5	(2.5)
Other	0.2	(0.2)	0.2	(0.2)	1.3	(0.9)	0.0	(--)

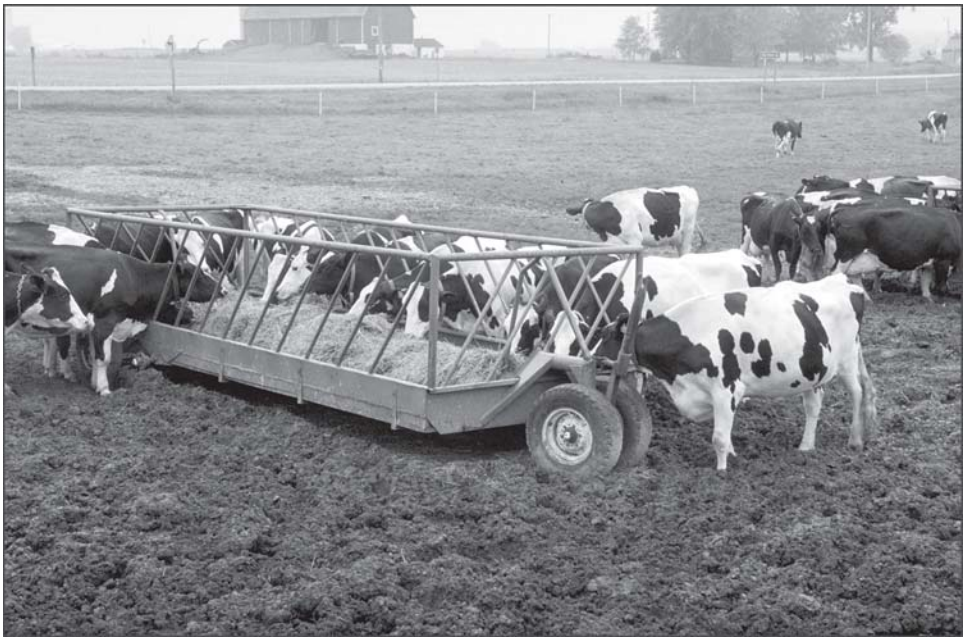


Photo: USDA photo library

Cephapirin was the most common intramammary antimicrobial administered to cows in the Midwest, Northeast, and Southeast regions (49.1, 44.1, and 54.6 percent of cows, respectively). Cloxacillin was administered to 17.2 percent of cows in the West region but only to 2.6 percent of cows in the Southeast region.

f. For cows treated with intramammary antimicrobials at dry-off, percentage of cows by type of antimicrobial used and by region:

	Percent Cows							
	Region							
	West		Midwest		Northeast		Southeast	
Antimicrobial Used	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Cephapirin (benzathine)	31.3	(3.7)	49.1	(2.7)	44.1	(3.2)	54.6	(6.6)
Cloxacillin (benzathine)	17.2	(3.1)	10.7	(1.8)	12.5	(2.1)	2.6	(2.0)
Erythromycin	0.0	(0.0)	1.4	(0.6)	1.3	(0.5)	0.6	(0.5)
Novobiocin	8.5	(2.4)	4.2	(1.2)	1.9	(0.8)	9.7	(5.4)
Penicillin G (procaine)	1.4	(0.9)	1.3	(0.6)	1.3	(0.8)	0.8	(0.8)
Penicillin G (procaine)/ streptomycin	32.4	(4.2)	30.7	(2.7)	35.7	(3.0)	22.4	(5.9)
Penicillin G (procaine)/ novobiocin	9.1	(2.4)	2.7	(0.7)	4.6	(1.2)	9.3	(4.1)
Other	0.1	(0.1)	0.2	(0.2)	0.2	(0.2)	0.0	(--)

Section II: Methodology

A. Needs Assessment

NAHMS develops study objectives by exploring existing literature and contacting industry members about their informational needs and priorities during a needs assessment phase. The objective of the needs assessment for the NAHMS Dairy 2002 study was to conduct a national survey to collect information from U.S. dairy producers and other commodity specialists about what they perceived to be the most important dairy health and productivity issues. A driving force of the needs assessment was the desire of NAHMS researchers to receive as much input as possible from a variety of producers, as well as from industry experts and representatives, veterinarians, extension specialists, universities, and dairy organizations.

Focus-group meetings were held at various locations across the United States to help determine the focus of the study:

Birmingham, AL October 21, 2000
United States Animal Health Association

Kansas City, MO October 31, 2000
American Feed Industry Association
Dairy Nutrition Committee

Teleconference December 15, 2000
Bovine Association of Management and Nutrition

San Antonio, TX February 4, 2001
American Farm Bureau Federation
Dairy Advisory Committee

Riverdale, MD February 16, 2001
Government Perspective Meeting
APHIS, Food Safety and Inspection Service,
Food and Drug Administration, and Agricultural Research Service

In addition, a short survey asking for rankings of major dairy issues was provided via multiple data collection modes. There were 155 surveys completed via the Internet, 90 by hard copy, and 1 by telephone.

The focus-group meeting input was merged with survey results to determine Dairy 2002 study objectives.

B. Sampling and Estimation

1. State selection

The preliminary selection of States to be included in the study was done in January 2001 using the NASS, USDA January 28, 2000, Cattle Report. A goal for NAHMS national studies is to include States that account for at least 70 percent of the animal and producer populations in the United States. The initial review of States identified 20 major States with 84 percent of the milk cow inventory and 81 percent of the operations with milk cows (dairy herds). The States were: CA, FL, ID, IL, IN, IA, KY, MI, MN, MO, NM, NY, OH, PA, TN, TX, VT, VA, WA, and WI.

A memo identifying these 20 States was provided in February 2001 to the USDA-APHIS-VS CEAH Director and, in turn, the VS Regional Directors. Regional Directors sought input from their respective States about being included or excluded from the study. By midyear, Colorado was included, based on the State's interest.

2. Operation selection

The list sampling frame was provided by NASS. Within each State a stratified random sample was selected. The size indicator was the number of milk cows for each operation. NASS selected a sample of dairy producers in each State for making the NASS January 1 cattle estimates. The list sample from the January 2001 survey was used as the screening sample. Producers reporting one or more milk cows on January 1, 2001, were included in the sample for contact in January 2002. Due to the predicted large workload, the sample was reduced in 2 States (KY and PA), for a final screening sample of 3,876 operations for Phase I data collection. For Phase II data collection, operations with 30 or more dairy cows on January 1, 2002, that participated in Phase I were invited to continue in the study.

3. Population inferences

Inferences for Phase I cover the population of dairy producers with at least 1 milk cow in the 21 participating States. As of January 1, 2002, these States accounted for 85.7 percent (7,799,000 head) of milk cows in the United States and 83.0 percent (80,910) of operations with milk cows in the United States. (see Appendix II for respective data on individual States.) All respondent data were statistically weighted to reflect the population from which they were selected. The inverse of the probability of selection for each operation was the initial selection weight. This selection weight was adjusted for nonresponse within each State and size group to allow for inferences back to the original population from which the sample was selected. Heifer-rearing operations without lactating cows are not included in the inference population.

For operations eligible for Phase II data collection (those with 30 or more dairy cows) weights were adjusted for operations that did not want to continue to the study's second phase. This weight was adjusted again for nonresponse to Phase II data collection. The 21-State target population of operations with 30 or more dairy cows represented 97.3 percent of dairy cows and 74.3 percent of dairy operations in the 21 States (see Appendix II).

Additional weighting procedures were used for some items published in Dairy 2002, Part IV.

The Phase II VS Initial Visit Questionnaire was comprised of a section that asked producers about diseases and disorders of unweaned heifers, weaned heifers that had not calved, and cows. This portion also requested specific information regarding the number of animals affected with specific diseases that were treated with antimicrobials. Of the 1,013 producers that were eligible to answer these questions, 858 (84.7 percent) and 919 (90.7 percent) responded to the cow and heifer portions, respectively, of the questionnaire.

C. Data Collection

1. Phase I

General Dairy Management Report, December 31, 2001, to February 12, 2002. NASS enumerators administered the General Dairy Management Report. The interview took slightly over 1 hour.

2. Phase II

VS Initial Visit, February 25 to April 30, 2002. Federal and State VMOs or AHTs collected the data from producers during an interview lasting approximately 1 hour. Johne's risk assessments were completed from March 15 to October 17, 2002.

Biological samples for Johne's testing (see report Johne's Disease on U.S. Dairy Operations, 2002) included individual fecal samples collected from March 25 to August 5, 2002; serologic samples were collected from March 25 to September 25, 2002; milk samples were collected from June 1, 2002, to January 9, 2003; and environmental samples, which include feces from alleyways, lagoons, etc., were collected from March 25 to September 25, 2002.

D. Data Analysis

1. Validation and estimation

a. Phase I: General Dairy Management Report

Initial data entry and validation for the general dairy management report were performed in individual NASS State offices. Data were entered into a SAS data set. NAHMS national staff performed additional data validation on the entire data set after data from all States were combined.

b. Phase II: VS Initial Visit Questionnaire and risk assessment

After completing the VS Initial Visit Questionnaire and risk assessment, data collectors sent them to the State NAHMS coordinators, who manually reviewed them for accuracy and then sent them to CEAH. Data entry and validations were completed using SAS.

c. Estimates

Estimates for the proportion of affected animals were determined over all herds by summing the number of affected animals during the previous 12 months and dividing, respectively, the summed January 1 cow inventory, summed January 1 weaned heifer inventory, or summed previous year's heifer calf crop, as appropriate. Estimates for the proportion of animals were determined over all herds by summing the number of treated animals during the previous 12 months and dividing by the sum of affected animals during the previous 12 months. Appropriate weights were used in generating all estimates.

2. Response rates

a. Phase I: general dairy management report – screening questionnaire

Of the 3,876 operations in the screening sample, 410 operations had no milk cows on January 1, 2002, and were therefore ineligible for the NAHMS Dairy 2002 study. Of these 3,466 dairy operations, 2,461 participated in the initial phase of the study, and of these, 1,438 agreed to be contacted for Phase II.

Response Category	Number Operations	Percent Operations
No milk cows on Jan 1, 2002	227	5.9
Out of business	183	4.7
Refusal	821	21.2
Survey complete and VMO consent	1,438	37.1
Survey complete, refused VMO consent	905	23.3
Survey complete, ineligible for VMO	118	3.0
Out of scope (prison, research farm, etc.)	45	1.2
Unknown (code 8)	2	0.1
Inaccessible	137	3.5
Total	3,876	100.0

b. Phase II: VS Initial Visit Questionnaire

VS initial visit response categories are shown below for all 1,438 operations with 30 or more dairy cows turned over to VS. Of these, 1,013 producers participated.

Response Category	Number Operations	Percent Operations
Survey completed	1,013	70.4
Producer not contacted	76	5.3
Poor time of year or no time	161	11.2
Did not want anyone on operation	4	0.3
Bad experience with government veterinarians	0	0.0
Did not want to do another survey or divulge information	136	9.5
Told NASS they did not want to be contacted	6	0.4
Ineligible (no dairy cows)	14	1.0
Other reason	28	1.9
Total	1,438	100.0

c. Phase II: Johne's Risk Assessment

Of the 1,013 operations that participated in the Phase II Initial Visit Questionnaire, 815 participated in the Johne's risk assessment.

Appendix I: Sample Profile

A. Responding Sites

1a. Number of responding operations by herd size

	Phase I: General Dairy Management Report	Phase II: VS Initial Visit	Johne's Risk Assessment
Herd Size (Dairy Cow Inventory, January 1, 2002)	**Number of Responding Operations**	**Number of Responding Operations**	**Number of Responding Operations**
Less than 30 (ineligible for Phase II)	118	0	
30-100	1,013	400	325
100 to 499	820	392	304
500 or more	510	221	186
Total	2,461	1,013	815

1b. Number of responding operations, by region

	Phase I: General Dairy Management Report	Phase II: VS Initial Visit	Johne's Risk Assessment
Region	**Number of Responding Operations**	**Number of Responding Operations**	**Number of Responding Operations**
West	525	208	168
Midwest	1,085	448	349
Northeast	596	278	239
Southeast	255	79	29
Total	2,461	1,013	815

Appendix II: U.S. Milk Cow Population and Operations

		Number of Milk Cows on January 1, 2002[1] (Thousand Head)			Number of Operations 2001		
Region	**State**	**Milk cows on operations with 1 or more head**	**Milk cows on operations with 30 or more head**	**30 or more head percent**	**Operations with 1 or more head**	**Operations with 30 or more head**	**30 or more head percent**
West	California	1,620	1,618.4	99.9	2,500	2,200	88.0
	Colorado	93	92.0	98.9	800	220	27.5
	Idaho	377	375.5	99.6	1,000	770	77.0
	New Mexico	290	289.4	99.8	500	165	33.0
	Texas	315	311.9	99.0	2,100	1,150	54.8
	Washington	247	246.3	99.7	1,000	665	66.5
	Total	2,942	2,933.5	99.7	7,900	5,170	65.4
Midwest	Illinois	115	111.6	97.0	1,900	1,420	74.7
	Indiana	154	140.1	91.0	2,900	1,400	48.3
	Iowa	205	194.8	95.0	3,500	2,680	76.6
	Michigan	299	284.1	95.0	3,300	2,250	68.2
	Minnesota	500	480.0	96.0	7,800	6,700	85.9
	Missouri	140	133.0	95.0	3,700	2,100	56.8
	Ohio	260	234.0	90.0	5,200	2,800	53.8
	Wisconsin	1,280	1,232.6	96.3	19,100	15,950	83.5
	Total	2,953	2,810.2	95.2	47,400	35,300	74.5
Northeast	New York	675	661.5	98.0	7,300	6,000	82.2
	Pennsylvania	588	564.5	96.0	10,300	8,500	82.5
	Vermont	154	150.9	98.0	1,600	1,410	88.1
	Total	1,417	1,376.9	97.3	19,200	15,910	82.9
Southeast	Florida	152	151.4	99.6	510	220	43.1
	Kentucky	125	115.0	92.0	2,900	1,600	55.2
	Tennessee	90	87.7	97.5	1,500	870	58.0
	Virginia	120	116.4	97.0	1,500	1,010	67.3
	Total	487	470.5	96.6	6,410	3,700	57.7
Total (21 States)		7,799 (85.7% of U.S.)	7,591.1 (85.7% of U.S.)	97.3	80,910 (83.0% of U.S.)	60,080 (86.9% of U.S.)	74.3
Total U.S. (50 states)		9,105.6	8,859.7	97.3	97,460	69,140	70.9

[1] Source: NASS April 2004 Cattle Final Estimates, 1999-2003—(revised January 1, 2002, number of milk cows and number of operations in 2001 with milk cows. An operation is any place having one or more milk cows, excluding cows used to nurse calves, on hand at any time during the year.

Appendix III: Antimicrobial Class Categories

Antimicrobial Class	Product Name	Active Ingredient
Aminoglycosides	Biosol® Liquid	Neomycin sulfate
	Neomix® 325	Neomycin sulfate
	Neomix® Ag 325	Neomycin sulfate
	Neomycin 325 Soluble Powder	Neomycin sulfate
	Neomycin Oral Solution	Neomycin sulfate
	Neo-Sol 50	Neomycin sulfate
	Strep Sol 25%	Streptomycin sulfate
Beta-lactams	Amoxi-Bol®	Amoxicillin
	Amoxi-Inject®	Amoxicillin
	Amoxi-Mast®	Amoxicillin trihydrate
	Aqua-Mast II	Penicillin G (procaine)
	Combicillin	Penicillin G (procaine)
	Crysticillin 300 A.S. Veterinary	Penicillin G (procaine)
	Dariclox®	Cloxacillin (sodium)
	Flo-Cillin/Dura-Biotic	Penicillin G (procaine)
	Hanford's/ US Vet Masti-Clear	Penicillin G (procaine)
	Hetacin-K Intramammary Infusion	Hetacillin (potassium)
	Microcillin	Penicillin G (procaine)
	Penicillin G Procaine	Penicillin G Procaine
	Penicillin G Procaine (Aqueous Suspension)	Penicillin G Procaine
	PFI-Pen G®	Penicillin G (procaine)
	Polyflex	Ampicillin
	Princillin Bolus	Ampicillin trihydrate
	Sterile Penicillin G Benzathine/ Penicillin G Procaine Aqueous Solution	Penicillin (procaine)
Cephalosporins	Cefa-Lak/ Today Intramammary infusion	Cephapirin (sodium)
	Excenel®	Ceftiofur hydrochloride
	Naxcel®	Ceftiofur sodium
Florfenicol	Nuflor Injectable Solution	Florfenicol
Macrolides	Erythro- 36/Gallimycin-36	Erythromycin
	Gallimycin	Erythromycin
	Micotil Injection	Tilmicosin phosphate
	Tylan Injection 50/200 Tylosin Injection	Tylosin

Antimicrobial Class	Product Name	Active Ingredient
Sulfonamides	Albon® Bolus	Sulfadimethoxine
	Albon® Concentrated Sol. 25%	Sulfadimethoxine
	Albon® Injection 40%	Sulfadimethoxine
	Albon® Soluble Powder	Sulfadimethoxine
	Albon® SR Bolus	Sulfadimethoxine
	Di-Methox & 12.5% Oral Solution	Sulfadimethoxine
	Di-Methox Injection 40%	Sulfadimethoxine
	Di-Methox Soluble Powder	Sulfadimethoxine
	Liquid Sul-Q-Nox	Sulfaquinoxaline (sodium)
	SDM Injection	Sulfadimethoxine
	SDM Injection 40%	Sulfadimethoxine
	SDM Solution	Sulfadimethoxine
	20% SQX Solution	Sulfaquinoxaline
	Sulfadimethoxine Inj. 40%	Sulfadimethoxine
	Sulfadiomethoxine 12.5% Oral Solution	Sulfadimethoxine
	Sulfadimethoxine Soluble Powder	Sulfadimethoxine
	Sulfa-Nox Concentrate	Sulfaquinoxaline
	Sulfa-Nox Liquid	Sulfaquinoxaline (sodium)
	SulfaSure™ SR Cattle/Calf Bolus	Sulfamethazine
	Sulmet Drinking Water Solution 12.5%	Sulfamethazine (sodium)
	Sulmet Soluble Powder	Sulfamethazine (sodium)
	Sulmet Sulfamethazine Oblets	Sulfamethazine
	Sulquin 6-50 Concentrate	Sulfaquinoxaline (sodium)
	Sustain III	Sulfamethazine
	Vetisulid Injection	Sulfachlorpyridazine (sodium)
Tetracyclines	Aureomycin Soluble Calf Oblets	Chlortetracycline hydrochloride
	Aureomycin Soluble Powder	Chlortetracycline hydrochloride
	Aureomycin Tablets 25 Mg	Chlortetracycline hydrochloride
	Bio-Mycin® 200	Oxytetracycline
	Bio-Mycin® C	Oxytetracycline hydrochloride
	CLTC 100 MR	Chlortetracycline calcium
	Liquamycin® LA-200®	Oxytetracycline
	Maxim-100	Oxytetracycline hydrochloride
	Maxim-200	Oxytetracycline
	Medamycin® 100	Oxytetracycline hydrochloride
	Oxy 500 and 1000 Calf Bolus	Oxytetracycline hydrochloride
	Oxyshot LA	Oxytetracycline
	Oxy-Tet™ 100	Oxytetracycline hydrochloride
	Oxytetracycline HCL Soluble Powder	Oxytetracycline hydrochloride
	Panmycin® 500 Bolus	Tetracycline hydrochloride
	Pennchlor 64 Soluble Powder	Chlortetracycline hydrochloride
	Pennox 200™	Oxytetracycline
	Pennox 343 Soluble Powder	Oxytetracycline hydrochloride
	Polyotic Oblets Tablets	Tetracycline hydrochloride
	Polyotic Soluble Powder/Concentrate	Tetracycline hydrochloride
	Promycin™ 100	Oxytetracycline hydrochloride
	Status™ SQ	Oxytetracycline hydrochloride
	Terramycin® 343 Soluble Powder	Oxytetracycline hydrochloride
	Terramycin® Scours Tablets	Oxytetracycline hydrochloride

Appendix IV: Study Objectives and Related Outputs

1. Describe baseline dairy cattle health and management practices and trends in dairy farm health management.

- Part I: Reference of Dairy Health and Management in the United States, 2002, December 2002
- Part II: Changes in the United States Dairy Industry, 1991-2002, June 2003
- Part III: Reference of Dairy Cattle Health and Health Management Practices in the United States, 2002, December 2003
- **Part IV: Antimicrobial Use on U.S Dairy Operations, 2002, September 2005**
- Colostrum and bST info sheets, December 2002
- Mycoplasma and HBS info sheets, June 2003
- Milking Procedures info sheet, August 2003

2. Describe strategies to prevent and reduce Johne's disease.

- Johne's Disease on United States Dairy Operations, 2002, February 2005

3. Evaluate management factors associated with the presence of certain food safety pathogens.

- *Salmonella* and Campylobacter, *Salmonella* and *Listeria*, and *E. coli* info sheets, December 2003

4. Describe the preparedness of producers to respond to foreign animal diseases, such as foot-and-mouth disease.
Animal Disease Exclusion Practices on U.S. Dairy Operations, 2002, August 2004

5. Describe waste handling systems
Nutrient Management and the U.S. Dairy Industry in 2002, August 2004