United States Department of Agriculture

Animal and Plant Health Inspection Service

Veterinary Services

National Animal Health Monitoring System

September 2008

Dairy 2007

Part III: Reference of Dairy Cattle Health and Management Practices in the United States, 2007

USDA-APHIS-VS-CEAH
NRRC Building B, M.S. 2E7
2150 Centre Avenue
Fort Collins, CO 80526-8117
970.494.7000
E-mail: NAHMS@aphis.usda.gov
http://nahms.aphis.usda.gov

#N482.0908

Cover photo courtesy of
Judy Rodriguez

Acknowledgments

This report was a cooperative effort between two U.S. Department of Agriculture (USDA) Agencies: the National Agricultural Statistics Service (NASS) and the Animal and Plant Health Inspection Service (APHIS).

Thank you to the NASS enumerators, State and Federal veterinary medical officers (VMOs), and animal health technicians (AHTs) who visited the operations and collected the data for the Dairy 2007 study. Their hard work and dedication to USDA's National Animal Health Monitoring System (NAHMS) were invaluable. The roles of the producers, area veterinarians in charge (AVICs), NAHMS coordinator, VMOs, AHTs, and NASS enumerators were critical in providing quality data for Dairy 2007 reports. Thanks also to the personnel at the Centers for Epidemiology and Animal Health for their efforts in generating and distributing valuable reports from Dairy 2007 data.

Additional biological sampling and testing for the Dairy 2007 study were afforded by the generous contributions of collaborators, including:

- USDA-APHIS, National Veterinary Services Laboratories
- USDA-ARS, Beltsville Agricultural Research Center
- USDA-ARS, Russell Research Center
- Antel BioSystems, Inc.
- Cornell University Animal Health Diagnostic Laboratory
- Quality Milk Production Services
- Tetracore, Inc.
- University of Pennsylvania, New Bolton Center
- University of Wisconsin, Madison
- Wisconsin Veterinary Diagnostic Laboratory

All participants are to be commended, particularly the producers whose voluntary efforts made the Dairy 2007 study possible.

Larry M. Granger
Director
Centers for Epidemiology and Animal Health

Suggested bibliographic citation for this report:
USDA. 2008. Dairy 2007, Part III: Reference of Dairy Cattle Health and Management Practices in the United States, 2007
USDA–APHIS–VS, CEAH. Fort Collins, CO
#N482.0908

Contacts for further information:
Questions or comments on data analysis: Dr. Jason Lombard 970.494.7000
Information on reprints or other reports: Ms. Kathy Snover 970.494.7000
E-mail: NAHMS@aphis.usda.gov

Table of Contents

Introduction

The National Animal Health Monitoring System (NAHMS) is a nonregulatory program of the U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service. NAHMS is designed to help meet the Nation's animal-health information needs and has collected data on dairy health and management practices through three previous 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 (BVD) surfaced in the United States following a 1993 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 was reported in 1993 in the Pacific Northwest, this time related to *Escherichia coli* 0157:H7. 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 also helped identify additional research and educational efforts in various production areas, such as feed management and weaning age.

Information from the NAHMS Dairy 1996 study helped the U.S. dairy industry identify educational needs and prioritize research efforts on such timely topics as antibiotic usage and Johne's disease, as well as digital dermatitis, bovine leukosis virus, and potential foodborne pathogens, including *E. coli*, *Salmonella*, and *Campylobacter.*

A major focus of the Dairy 2002 study was to describe management strategies that prevent and reduce Johne's disease and to determine management factors associated with *Mycoplasma* and *Listeria* in bulk-tank milk. Additionally, levels of participation in quality assurance programs, the incidence of digital dermatitis, a profile of animal-waste handling systems used on U.S. dairy operations, and industry changes since the NDHEP in 1991 and Dairy 1996 were examined.

The Dairy 2007 study was conducted in 17 of the Nation's major dairy States (see map on next page) and provides participants, stakeholders, and the industry as a whole with valuable information representing 79.5 percent of U.S. dairy operations and 82.5 percent of U.S. dairy cows.

Part I: Reference of Dairy Cattle Health and Management Practices in the United States, 2007 (October 2007) was the first in a series of reports containing national information from the NAHMS Dairy 2007 study. This report contains information collected from 2,194 dairy operations.

Part II: Changes in the United States Dairy Industry, 1991-2007 (March 2008) provides national estimates of animal health management practices for comparable populations from the NAHMS 1991 NDHEP, Dairy 1996, Dairy 2002, and Dairy 2007.

Part III: Reference of Dairy Cattle Health and Management Practices in the United States, 2007 is the third in a series of reports containing national information from the NAHMS Dairy 2007 study. Data from this report were collected from 582 operations with 30 or more dairy cows. State and Federal veterinary medical officers (VMOs) and animal health technicians (AHTs) collected the data between February 26 and August 3, 2007.

All Dairy 2007 study reports as well as reports from previous NAHMS dairy studies are available online at http://nahms.aphis.usda.gov.

Dairy 2007 Participating States and Number of Respondents by State

The methods used and number of respondents in the study can be found in Section II and Appendix I of this report, respectively.

Further information on NAHMS studies and reports is available at: http://nahms.aphis.usda.gov.

For questions about this report or additional copies, please contact:

USDA-APHIS-VS-CEAH
NRRC Building B, M.S. 2E7
2150 Centre Avenue
Fort Collins, CO 80526-8117
970.494.7000

Terms Used In This Report

Antibiotics: Substances produced by microorganisms that kill or inhibit the growth of other microorganisms. For the purpose of this report, antibiotics are synonymous with antimicrobials.

Antimicrobial: Any substance that kills or inhibits the growth of microorganisms.

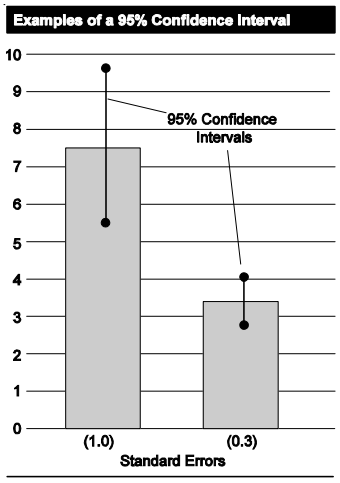
Cow: Female dairy bovine that has calved at least once.

Heifer: Female dairy bovine that has not yet calved.

Herd size: Herd size is based on January 1, 2007, 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.

Operation: Premises with at least 30 dairy cows on January 1, 2007.

Operation average: The average value for all operations. A single value for each operation is summed over all operations reporting divided by the number of operations reporting. For example, the operation average number of employees (see table 4b on p 11) is calculated by dividing the total number of employees by the total number of operations.



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, Idaho, New Mexico, Texas, and Washington
East: Indiana, Iowa, Kentucky, Michigan, Minnesota, Missouri, New York, Ohio, Pennsylvania, Vermont, Virginia, and Wisconsin

Sample profile: Information that describes characteristics of the operations from which Dairy 2007 data were collected.

Usual calving area: An area separate from housing for lactating cows designated specifically for calving.

Section I: Population Estimates

A. Disease Familiarity and Biosecurity Practices

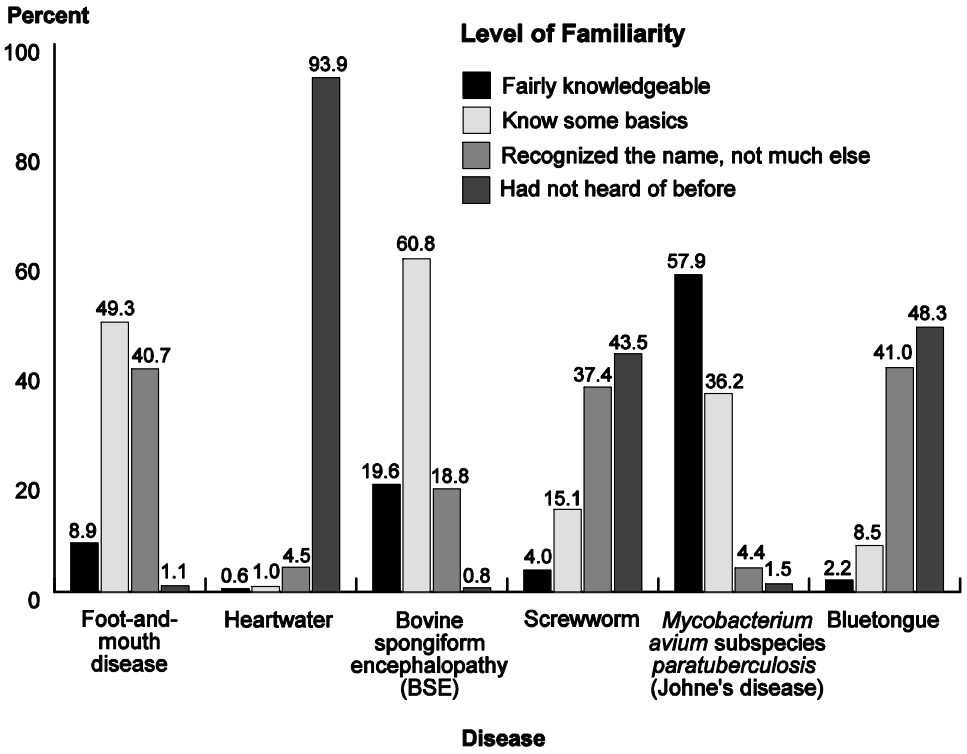
1. Producer familiarity with disease

Almost half of producers (49.3 percent) knew some basics about foot-and-mouth disease, while an additional 8.9 percent were fairly knowledgeable about the disease. More than 8 of 10 producers (80.4 percent) knew some basics or were fairly knowledgeable about bovine spongiform encephalopathy (BSE). Almost 60 percent of producers (57.9 percent) were fairly knowledgeable about Johne's disease, while an additional 36.2 percent knew some basics about the disease. Additionally, more than 50 percent of producers at least knew some basics about *Mycoplasma* mastitis, bovine viral diarrhea (BVD), and *Leptospira hardjo bovis*. Almost all producers (93.9 percent) had not heard of heartwater, which is a ruminant disease not present in the United States. More than 8 of 10 producers (80.9 percent) either only recognized the name screwworm or had not heard of it before. The United States has been free of screwworm since 1966.

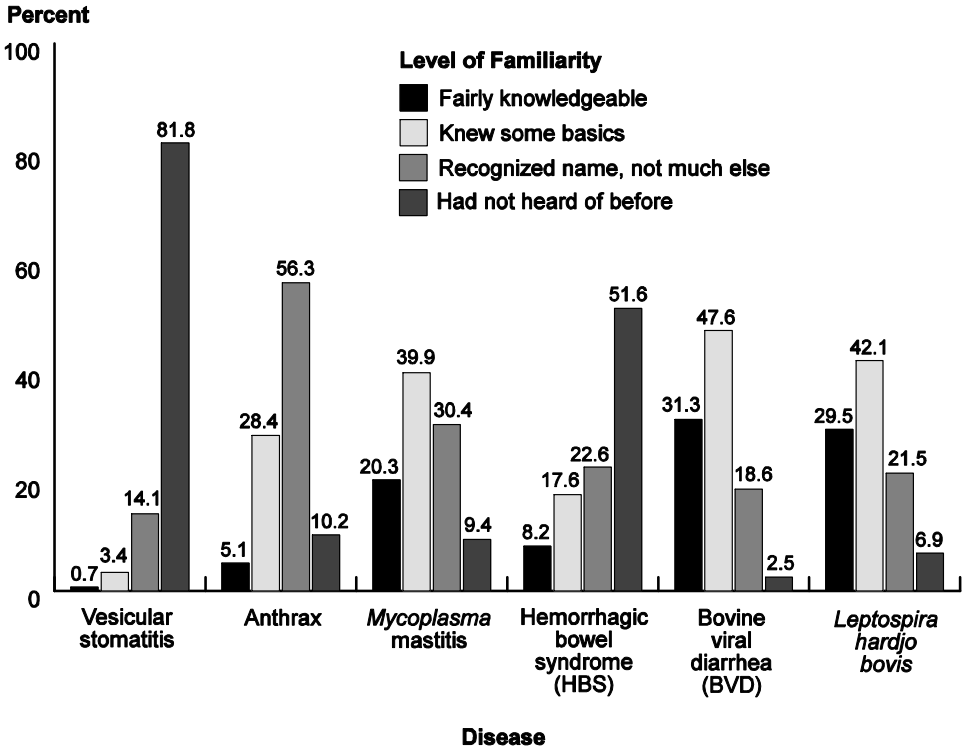
a. Percentage of operations by level of familiarity with specific cattle diseases:

	Percent Operations								
	Level of Familiarity								
	Fairly Knowledge-able		Knew Some Basics		Recognized Name, Not Much Else		Had Not Heard of Before		
Disease	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Total
Foot-and-mouth disease	8.9	(1.2)	49.3	(2.9)	40.7	(2.9)	1.1	(0.7)	100.0
Heartwater	0.6	(0.3)	1.0	(0.4)	4.5	(1.0)	93.9	(1.1)	100.0
Bovine spongiform encephalopathy (BSE)	19.6	(2.0)	60.8	(2.7)	18.8	(2.2)	0.8	(0.6)	100.0
Screwworm	4.0	(0.8)	15.1	(1.9)	37.4	(2.6)	43.5	(2.7)	100.0
Mycobacterium avium subspecies *paratuberculosis* (Johne's disease)	57.9	(2.9)	36.2	(2.8)	4.4	(1.2)	1.5	(0.6)	100.0
Bluetongue	2.2	(0.9)	8.5	(1.2)	41.0	(2.8)	48.3	(2.8)	100.0
Vesicular stomatitis	0.7	(0.3)	3.4	(0.8)	14.1	(1.7)	81.8	(1.9)	100.0
Anthrax	5.1	(1.2)	28.4	(2.6)	56.3	(2.8)	10.2	(1.8)	100.0
Mycoplasma mastitis	20.3	(1.8)	39.9	(2.8)	30.4	(2.8)	9.4	(1.8)	100.0
Hemorrhagic bowel syndrome (HBS)	8.2	(1.1)	17.6	(1.9)	22.6	(2.3)	51.6	(2.7)	100.0
Bovine viral diarrhea (BVD)	31.3	(2.5)	47.6	(2.9)	18.6	(2.4)	2.5	(1.1)	100.0
Leptospira hardjo bovis	29.5	(2.4)	42.1	(2.9)	21.5	(2.4)	6.9	(1.5)	100.0

Percentage of Operations by Level of Familiarity with Specific Cattle Diseases



Percentage of Operations by Level of Familiarity with Specific Cattle Diseases



When producers that were fairly knowledgeable or knew some basics about each disease were combined and evaluated by region, differences in familiarity were observed for screwworm, bluetongue, vesicular stomatitis, and *Mycoplasma*. Producers in the West region were more familiar with the above diseases than producers in the East region. A higher percentage of producers in the West region (17.9 percent) at least knew some basics about vesicular stomatitis than operations in the East region (2.7 percent). Almost 9 of 10 producers in the West region (90.2 percent) at least knew some basics about *Mycoplasma* mastitis compared with producers in the East region (57.3 percent).

b. Percentage of operations that were fairly knowledgeable or knew some basics about specific cattle diseases:

	Percent Operations					
	Region					
	West		East		All Operations	
Disease	Percent	Std. Error	Percent	Std. Error	Percent	Std. Error
Foot-and-mouth disease	71.0	(4.7)	57.0	(3.1)	58.2	(2.8)
Heartwater	4.7	(2.1)	1.3	(0.6)	1.6	(0.5)
Bovine spongiform encephalopathy (BSE)	82.6	(4.1)	80.1	(2.5)	80.4	(2.3)
Screwworm	34.5	(5.5)	17.6	(2.2)	19.1	(2.0)
Mycobacterium avium subspecies *paratuberculosis* (Johne's disease)	85.9	(3.9)	94.9	(1.4)	94.1	(1.3)
Bluetongue	25.2	(4.5)	9.3	(1.5)	10.7	(1.4)
Vesicular stomatitis	17.9	(4.0)	2.7	(0.8)	4.1	(0.8)
Anthrax	41.7	(5.9)	32.7	(2.9)	33.5	(2.7)
Mycoplasma mastitis	90.2	(3.8)	57.3	(3.1)	60.2	(2.9)
Hemorrhagic bowel syndrome (HBS)	38.5	(5.4)	24.5	(2.2)	25.8	(2.1)
Bovine viral diarrhea (BVD)	85.7	(4.5)	78.2	(2.7)	78.9	(2.5)
Leptospira hardjo bovis	77.8	(5.1)	71.0	(2.9)	71.6	(2.7)

2. Information sources in case of a foreign animal disease outbreak

Almost all operations (93.6 percent) would very likely use a private veterinarian for information regarding a foreign animal disease outbreak in the United States. Approximately 4 of 10 operations would very likely seek information from other dairy producers or magazines (41.4 and 39.0 percent, respectively). The Internet was not a likely source of information for 48.1 percent of operations.

Percentage of operations by likelihood of using the following information sources if an outbreak of foreign animal disease occurred in the United States (e.g., foot-and-mouth disease):

	Percent Operations						
	Likelihood						
	Very Likely		Somewhat Likely		Not Likely		
Information Source	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Total
Other dairy producers	41.4	(2.8)	37.8	(2.7)	20.8	(2.3)	100.0
Private veterinarian	93.6	(1.3)	5.4	(1.3)	1.0	(0.5)	100.0
Extension agent	32.5	(2.7)	38.9	(2.9)	28.6	(2.5)	100.0
Dairy organization or cooperative	30.7	(2.6)	42.3	(2.8)	27.0	(2.6)	100.0
Magazines	39.0	(2.8)	49.4	(2.8)	11.6	(1.5)	100.0
Internet	23.1	(2.2)	28.8	(2.6)	48.1	(2.8)	100.0
State Veterinarian's office	26.7	(2.4)	37.4	(2.8)	35.9	(2.9)	100.0
USDA	22.6	(2.4)	42.5	(2.8)	34.9	(2.7)	100.0
Television/ newspapers	25.8	(2.5)	38.8	(2.8)	35.4	(2.6)	100.0
Other	4.7	(1.2)	2.4	(1.0)	92.9	(1.6)	100.0

3. Resource contacts

If a foreign animal disease was introduced into the United States, infected animals would need to be identified and diagnosed quickly to stop the spread of disease. Most operations (98.6 percent) would contact a private veterinarian if an animal on the operation was suspected of having a foreign animal disease.

a. Percentage of operations that would contact the following resources if an animal on the operation was suspected of having foot-and-mouth disease or another foreign animal disease:

Resource	Percent Operations	Standard Error
Extension agent/university	20.8	(2.3)
State Veterinarian's office	35.7	(2.6)
USDA	21.8	(2.3)
Private veterinarian	98.6	(0.5)
Feed company or milk cooperative representative	25.7	(2.3)
Other	4.1	(1.3)

Photo courtesy of Chuck Greiner, Agricultural Research Service

Decreased milk production, cows with fever, deaths, and/or abortions could indicate that a new disease has been introduced into the herd. On average, an operation would have to have a 20.6 percent decrease in milk production before a veterinarian would be contacted for assistance or consultation. Large operations had a lower threshold (12.9 percent reduction) compared with small operations (22.3 percent reduction). Operations reported that a veterinarian would be contacted if 9.6 percent of cows exhibited a fever, 5.8 percent of cows died within a short period, or 6.8 percent of cows aborted.

b. Operation average percentage change at which a veterinarian would be contacted for assistance, by potential problem sign and by herd size:

Operation Average Percent Change

Herd Size (Number of Cows)

	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Potential Problem Sign	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Decline in total daily milk production	22.3	(1.2)	18.0	(1.1)	12.9	(1.2)	20.6	(0.9)
Milk cows exhibiting fever within a short time period	10.7	(1.2)	7.3	(0.9)	6.0	(1.8)	9.6	(0.9)
Milk cows dying within a short time period	6.8	(1.1)	3.2	(0.7)	4.2	(1.9)	5.8	(0.8)
Milk cows aborting within a short time period	8.1	(1.1)	3.9	(0.7)	4.6	(1.8)	6.8	(0.8)

Operations in the West region would seek veterinary assistance if daily milk production declined by 14.1 percent, while operations in the East region would do so at a 21.3 percent decline. For the other three potential problem signs, there were no regional differences in the average percentage change at which operations would seek assistance from a veterinarian.

c. Operation average percentage change at which a veterinarian would be contacted for assistance, by potential problem sign and by region:

	Operation Average Percent Change			
	Region			
	West		East	
Potential Problem Sign	**Percent**	**Std. Error**	**Percent**	**Std. Error**
Decline in total daily milk production	14.1	(1.1)	21.3	(1.0)
Milk cows exhibiting fever within a short time period	5.7	(1.3)	10.0	(0.9)
Milk cows dying within a short time period	3.8	(1.3)	5.9	(0.9)
Milk cows aborting within a short time period	4.5	(1.3)	7.0	(0.9)

4. Employees and visitors

Not surprisingly, a lower percentage of small operations (65.6 percent) had employees compared with medium and large operations (95.0 and 98.0 percent, respectively).

a. Percentage of operations that had employees* during the previous 12 months, by herd size:

Percent Operations							
Herd Size (Number of Cows)							
Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Pct.	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
65.6	(4.1)	95.0	(2.0)	98.0	(1.9)	75.7	(2.8)

*Excludes owners and family members.

The number of full-time employees increased as herd size increased. Small operations averaged 2.0 full-time employees, compared with 3.8 and 12.9 full-time employees on medium and large operations, respectively. Medium operations employed more part-time people on average than large operations (2.4 and 1.2, respectively).

b. Operation average number of employees, by employee type and by herd size:

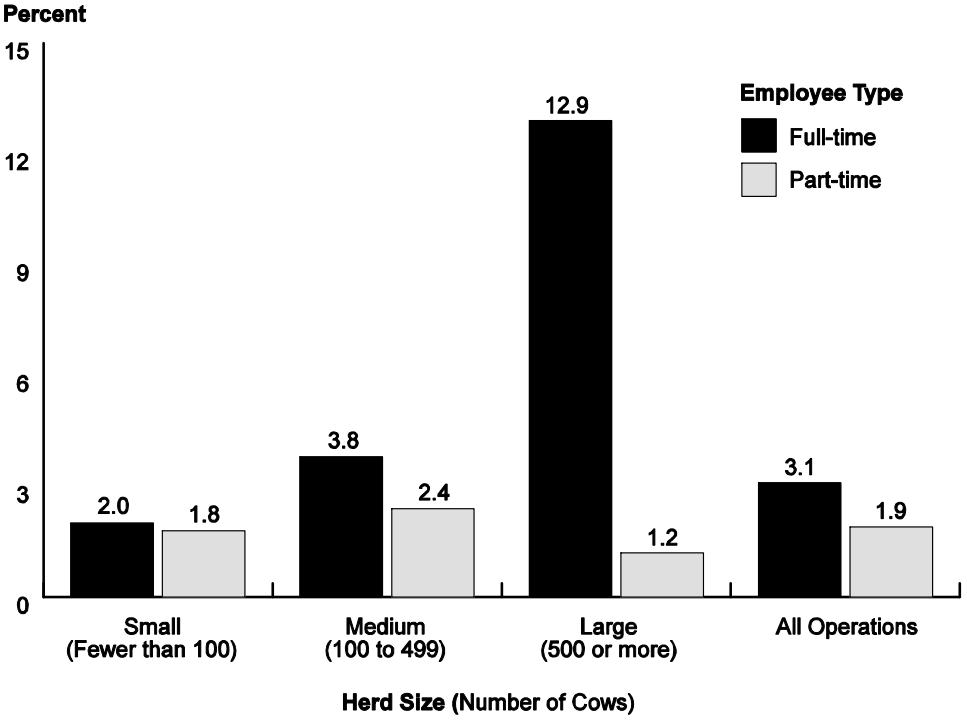
Operation Average Number Employees*

Herd Size (Number of Cows)

	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Employee Type	**Avg.**	**Std. Error**	**Avg.**	**Std. Error**	**Avg.**	**Std. Error**	**Avg.**	**Std. Error**
Full-time	2.0	(0.1)	3.8	(0.1)	12.9	(0.8)	3.1	(0.1)
Part-time	1.8	(0.1)	2.4	(0.2)	1.2	(0.2)	1.9	(0.1)

*Paid and unpaid, including owners and family members assigned work duties directly related to the dairy's operation.

Operation Average Number of Employees*, by Employee Type and by Herd Size



*Paid and unpaid, including owners and family members assigned work duties directly related to the dairy's operation.

Operations in the West region averaged more full-time employees (7.8) compared with operations in the East region (2.7). Operations in the East region averaged more part-time employees. These differences were likely related to the larger herd sizes in the West region.

c. Operation average number of employees, by employee type and by region:

	Operation Average Number Employees*			
	Region			
	West		East	
Employee Type	Average	Std. Error	Average	Std. Error
Full-time	7.8	(0.7)	2.7	(0.1)
Part-time	1.0	(0.1)	2.0	(0.1)

*Paid and unpaid, including owners and family members assigned work duties directly related to the dairy's operation.

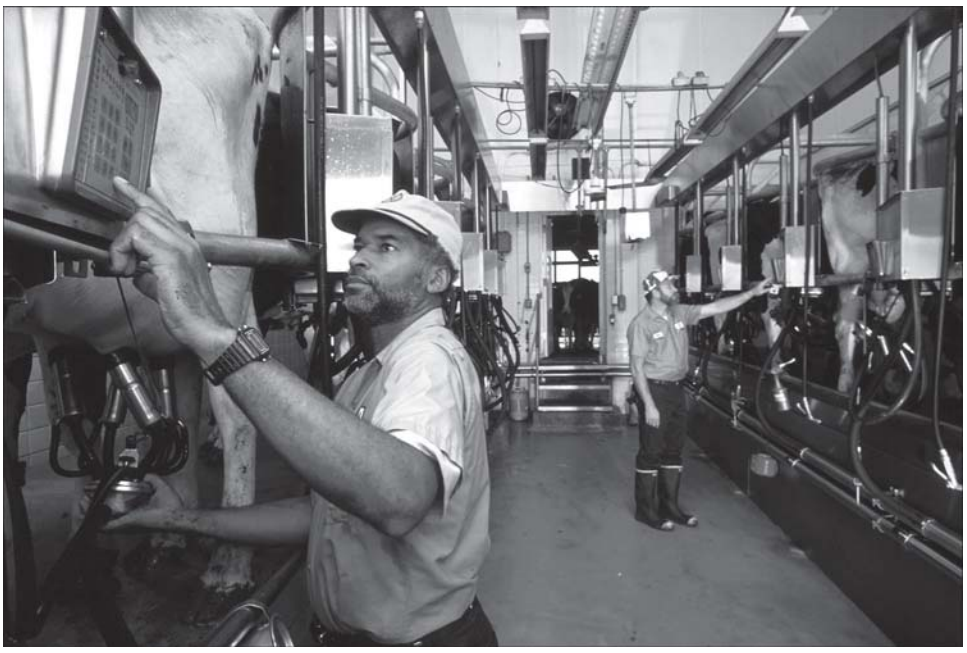


Photo courtesy of Keith Weller, Agricultural Research Service

Implementing biosecurity practices reduces the introduction of disease. Employees and visitors are potential sources of disease, and operations should have restrictions and guidelines—for both employees and visitors—designed to limit the introduction of disease.

A higher percentage of large operations (47.3 percent) trained employees in performing biosecurity practices compared with small and medium operations (17.8 and 23.7 percent, respectively). Other than employee training, less than 20 percent of all operations implemented the other biosecurity practices listed.

d. For operations with employees, percentage of operations by biosecurity practices used and by herd size:

Percent Operations

Herd Size (Number of Cows)

	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Biosecurity Practice	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Restrictions on employee livestock ownership outside this operation	17.4	(3.7)	18.6	(3.5)	20.1	(4.7)	18.1	(2.5)
Guidelines regarding foreign travel by employees	9.7	(2.7)	16.0	(3.6)	14.7	(3.7)	12.0	(2.0)
Written standard operating procedures (other than milking procedures)	10.9	(2.7)	13.2	(2.9)	23.0	(4.8)	12.2	(2.0)
Training for employees in performing biosecurity practices	17.8	(3.4)	23.7	(3.6)	47.3	(6.2)	21.9	(2.5)

Nearly all operations, regardless of herd size, allowed visitors in the animal area.

e. Percentage of operations in which visitors were allowed in the animal area:

Percent Operations

Herd Size (Number of Cows)

Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Pct.	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
98.6	(0.8)	95.9	(1.8)	97.9	(1.6)	97.9	(0.7)

About one of three operations (30.4 percent) had guidelines regarding which visitors were allowed in animal areas, and 51.3 percent of operations had restrictions on vehicles entering animal areas. A lower percentage of small operations (22.7 percent) provided disposable or clean boots for visitors entering animal areas compared with medium operations (42.1 percent).

f. For operations that allowed visitors in the animal area, percentage of operations by biosecurity practices used and by herd size:

Percent Operations

Herd Size (Number of Cows)

	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Biosecurity Practice	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Guidelines regarding which visitors are allowed in animal areas	28.0	(3.4)	35.2	(4.3)	39.9	(5.9)	30.4	(2.6)
Footbaths for visitors entering animal areas	6.3	(1.7)	7.2	(1.9)	12.1	(3.5)	6.9	(1.3)
Disposable or clean boots for visitors entering animal areas	22.7	(3.3)	42.1	(4.2)	36.3	(5.5)	28.3	(2.6)
Restrictions on vehicles entering animal areas	51.0	(3.8)	54.5	(4.1)	41.9	(6.1)	51.3	(2.9)

Employees, veterinarians, nutritionists, and milk and cattle haulers routinely come onto dairy operations. Employees and visitors, who may or may not have contact with cattle on the operation, are potential sources of disease introduction. As expected, the number of visits per week increased as herd size increased; 72.2 percent of large operations had 29 or more visits per week compared with 47.6 and 20.0 percent of medium and small operations, respectively.

g. Percentage of operations by number of visits* to the operation per week and by herd size:

Percent Operations

Herd Size (Number of Cows)

	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Number of Visits (Per Week)	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
1 to 7	35.6	(3.7)	13.7	(3.0)	1.2	(0.7)	28.0	(2.7)
8 to 14	28.4	(3.6)	16.5	(3.3)	0.8	(0.5)	23.6	(2.6)
15 to 21	9.0	(2.0)	12.5	(2.8)	13.7	(4.8)	10.2	(1.6)
22 to 28	7.0	(1.7)	9.7	(2.6)	12.1	(4.0)	8.0	(1.4)
29 or more	20.0	(3.1)	47.6	(4.1)	72.2	(5.3)	30.2	(2.4)
Total	100.0		100.0		100.0		100.0	

*Includes employees, veterinarians, neighbors, nutritionists, milk haulers, etc.

Of operations that had visits, more than 9 of 10 (93.6 percent) had visits that involved contact with animals on the operation.

h. For operations that had visits, percentage of operations in which visits involved contact with animals on the operation:

Percent Operations

Herd Size (Number of Cows)

Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Percent	**Std. Error**	**Percent**	**Std. Error**	**Percent**	**Std. Error**	**Percent**	**Std. Error**
91.3	(1.9)	98.5	(0.7)	100.0	(0.0)	93.6	(1.3)

For operations in which any visits to the operation involved contact with animals on the operation, about half of operations (54.2 percent) reported one to seven visits per week that involved contact with animals on the operation. About 1 of 6 operations (17.1 percent) had 29 or more visits that resulted in contact with animals. The number of visits that involved animal contact increased as herd size increased.

i. For operations in which any visits to the operation involved contact with animals on the operation, percentage of operations by number of visits per week that involved animal contact, and by herd size:

Percent Operations

Herd Size (Number of Cows)

	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Number of Visits (Per Week)	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
1 to 7	67.1	(3.8)	31.4	(3.9)	10.3	(3.7)	54.2	(2.8)
8 to 14	7.9	(2.0)	13.3	(2.9)	10.9	(3.8)	9.5	(1.6)
15 to 21	11.5	(2.6)	13.8	(3.2)	7.9	(3.4)	11.8	(1.9)
22 to 28	6.5	(2.0)	9.9	(2.3)	6.2	(3.1)	7.4	(1.5)
29 or more	7.0	(1.9)	31.6	(3.7)	64.7	(5.4)	17.1	(1.7)
Total	100.0		100.0		100.0		100.0	

For Operations in Which Any Visits to the Operation Involved Contact with Animals on the Operation, Percentage of Operations by Number of Visits Per Week that Involved Animal Contact, and by Herd Size

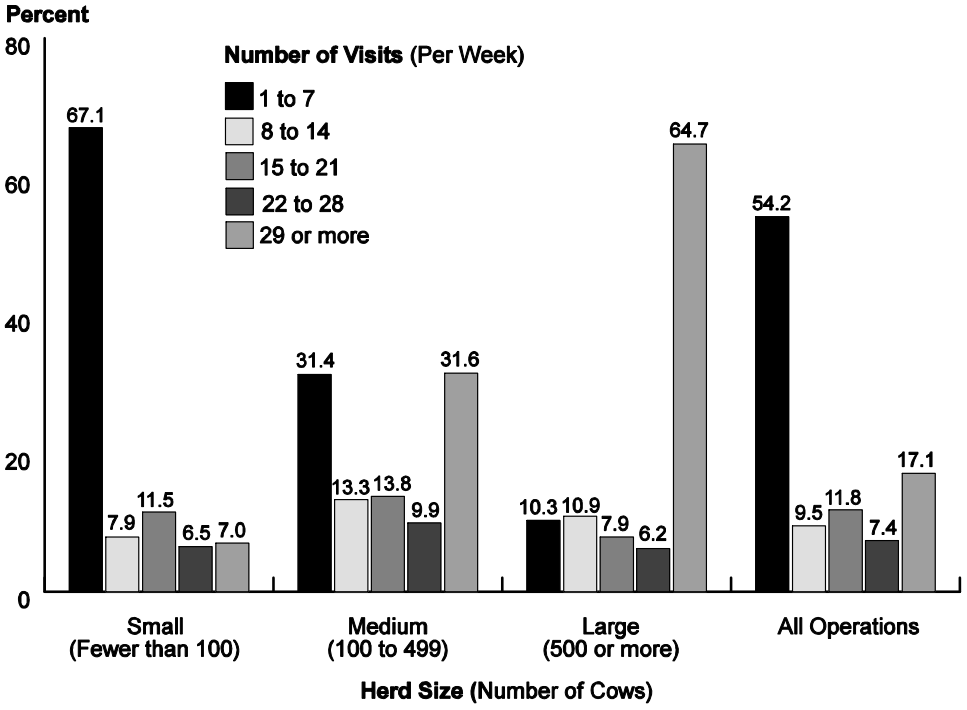


Photo courtesy of Keith Weller, Agricultural Research Service

5. Specific animal exclusion practices

In order to effectively exclude specific diseases from an operation, all potential disease sources should be considered. Many diseases are initially introduced into a herd through the purchase of an infected animal. Knowing the source of purchased cattle may provide the buyer the opportunity to inquire directly about any diseases on the source operation or any testing that may have been done. About 6 of 10 operations (64.2 percent) did not introduce cattle into their herds during the previous 12 months. Only 2.6 percent of operations did not know the source of any new cattle, while 24.2 percent knew the source of all cattle introduced. The percentage of operations that had no incoming cattle decreased as herd size increased.

a. Percentage of operations in which the producer was aware of the source and geographic origin of all, some, or none of the incoming cattle during the previous 12 months, and by herd size:

Percent Operations

Herd Size (Number of Cows)

	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Knew the Source and Geographic Origin of . . .	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
All	22.0	(3.3)	28.0	(3.8)	32.0	(5.2)	24.2	(2.4)
Some	8.6	(2.3)	7.8	(2.3)	19.1	(3.7)	9.0	(1.7)
None	2.0	(1.2)	3.6	(1.6)	5.4	(2.9)	2.6	(0.9)
No incoming cattle*	67.4	(3.7)	60.6	(4.2)	43.5	(5.7)	64.2	(2.8)
Total	100.0		100.0		100.0		100.0	

*If the operation sent heifers off-site but cattle were not commingled with cattle from other operations, these operations were considered to have had no incoming cattle.

There were no regional differences in the percentage of operations by producer knowledge of the source and geographic origin of incoming cattle.

b. Percentage of operations in which the producer was aware of the source and geographic origin of all, some, or none of the incoming cattle during the previous 12 months, by region:

Percent Operations

	Region			
	West		East	
Knew the Source and Geographic Origin of . . .	**Percent**	**Std. Error**	**Percent**	**Std. Error**
All incoming cattle	16.5	(3.6)	24.9	(2.7)
Some incoming cattle	10.9	(3.0)	8.9	(1.9)
None	7.3	(2.8)	2.1	(1.0)
No incoming cattle*	65.3	(4.7)	64.1	(3.0)
Total	100.0		100.0	

*If the operation sent heifers off-site but cattle were not commingled with cattle from other operations, these operations were considered to have had no incoming cattle.

The majority of operations used insect and rodent control practices, and maintained a closed herd. There were no differences across herd sizes in the percentages of operations that implemented specific biosecurity practices.

c. Percentage of operations that used the following biosecurity practices to prevent disease during the previous 12 months, by herd size:

	Percent Operations							
	Herd Size (Number of Cows)							
	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Biosecurity Practice	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Insect control	86.5	(2.7)	88.3	(2.7)	93.6	(3.0)	87.4	(2.0)
Rodent control	95.7	(1.4)	91.8	(2.0)	90.3	(3.4)	94.4	(1.1)
Bird control	29.4	(3.6)	44.3	(4.2)	41.4	(5.6)	33.8	(2.7)
Limit cattle contact with other livestock, elk, and deer	44.8	(3.8)	55.7	(4.2)	59.6	(5.6)	48.5	(2.8)
Control access to cattle feed by other livestock and wildlife	52.0	(3.9)	46.8	(4.2)	40.1	(5.4)	49.9	(2.9)
Closed herd*	60.1	(3.9)	49.5	(4.2)	40.6	(5.6)	56.2	(2.9)

*All replacements are from the operation; no contact with cattle from other operations.

6. Equipment handling for manure and feeding

Manure is a source of bacteria that can cause disease in animals if feedstuffs are contaminated. It is generally recommended that equipment used for manure handling not be used for handling feed. If the equipment is used to handle manure, it should be cleaned and disinfected before handling feed. Approximately the same percentages of operations (one-third) routinely, rarely, or never used the same equipment for manure and feed, and no differences were observed across herd sizes.

a. Percentage of operations by frequency that the same equipment was used to handle manure and feed cattle during the previous 12 months, and by herd size:

	Percent Operations							
	Herd Size (Number of Cows)							
	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Frequency	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Routinely	34.1	(3.6)	29.8	(3.9)	20.3	(4.7)	32.2	(2.7)
Rarely	34.4	(3.6)	36.4	(4.0)	46.0	(5.6)	35.6	(2.7)
Never	31.5	(3.6)	33.8	(3.9)	33.7	(5.5)	32.2	(2.7)
Total	100.0		100.0		100.0		100.0	

For operations that used the same equipment to handle manure and feed cattle, the majority (61.0 percent) washed equipment with water or steam after handling manure and before handling feed. The majority of the approximately one of four operations (23.2 percent) that used “other” procedures reported using separate loader buckets.

b. For operations that used the same equipment to handle manure and feed cattle, percentage of operations by procedure that best describes what is usually done with equipment after handling manure:

Procedure	Percent Operations	Standard Error
Wash equipment with water or steam only	61.0	(3.4)
Chemically disinfect only	0.1	(0.1)
Wash equipment and chemically disinfect	4.6	(1.5)
Other	23.2	(3.1)
No procedures done	11.1	(2.3)
Total	100.0	

7. Equipment sharing with other livestock operations

Sharing equipment between operations can spread disease from one operation to another. Ideally, equipment should be disinfected before it is transported and used on another operation. A lower percentage of operations in the West region (13.6 percent) shared equipment compared with operations in the East region (38.4 percent).

a. Percentage of operations that shared any heavy equipment (tractors, feeding equipment, manure spreaders, trailers, etc.) with other livestock operations during the previous 12 months, by region:

Percent Operations					
Region					
West		East		All Operations	
Percent	Std. Error	Percent	Std. Error	Percent	Std. Error
13.6	(3.5)	38.4	(3.0)	36.2	(2.8)

The majority of operations, regardless of herd size, had not shared any heavy equipment with other livestock operations during the previous 12 months. Overall, 63.8 percent of operations had not shared equipment. More than 12 percent of operations across all herd sizes shared equipment at least six times during the previous 12 months.

b. Percentage of operations by number of times heavy equipment was shared during the previous 12 months, and by herd size:

Percent Operations

Herd Size (Number of Cows)

	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Number of Times	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
0	64.1	(3.7)	59.0	(4.1)	78.7	(4.3)	63.8	(2.8)
1 to 2	11.1	(2.6)	15.5	(3.1)	5.3	(2.3)	11.8	(2.0)
3 to 5	12.6	(2.5)	7.0	(2.4)	3.1	(1.1)	10.6	(1.8)
6 or more	12.2	(2.3)	18.5	(3.4)	12.9	(3.8)	13.8	(1.8)
Total	100.0		100.0		100.0		100.0	

Photo courtesy of Keith Weller, Agricultural Research Service

The majority of producers that shared equipment with other operations (63.0 percent) performed no cleaning procedures prior to using the equipment on their own operations, while 26.6 percent washed equipment with water or steam.

c. For operations that shared equipment with other livestock operations, percentage of operations by cleaning procedure usually performed on equipment shared with other operations prior to use on the operation:

Procedure	Percent Operations	Standard Error
Wash equipment with water or steam only	26.6	(3.9)
Chemically disinfect only	0.0	(--)
Wash equipment and chemically disinfect	0.5	(0.3)
Other	9.9	(3.2)
No procedures done	63.0	(4.6)
Total	100.0	

8. Johne's disease

Herd-level control programs on operations infected with *Mycobacterium avium* subspecies *paratuberculosis* (the causative agent of Johne's disease) are critical in controlling the disease. Almost one of three operations (31.7 percent) participated in some type of Johne's disease control program. A higher percentage of medium operations (24.7 percent) had a unique Johne's disease program developed specifically for the operation compared with small operations (12.1 percent). There were no differences across herd sizes in the percentage of operations that used the other program types.

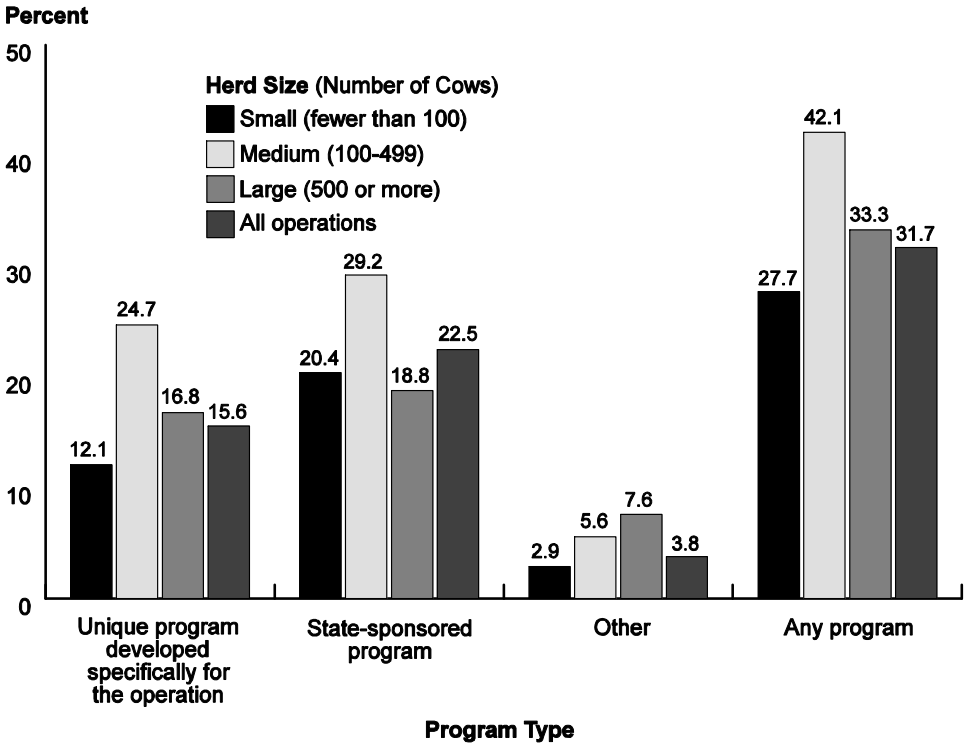
a. Percentage of operations that participated in Johne's disease control or certification programs, by type of program and by herd size:

Percent Operations

Herd Size (Number of Cows)

	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Program Type	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Unique program developed specifically for the operation	12.1	(2.4)	24.7	(3.6)	16.8	(3.8)	15.6	(1.9)
State-sponsored program	20.4	(3.0)	29.2	(3.8)	18.8	(2.9)	22.5	(2.2)
Other	2.9	(1.1)	5.6	(2.0)	7.6	(2.8)	3.8	(0.9)
Any program	27.7	(3.3)	42.1	(4.1)	33.3	(4.5)	31.7	(2.5)

Percentage of Operations that Participated in Johne's Disease Control or Certification Programs, by Type of Program and by Herd Size



A higher percentage of operations in the East region (33.0 percent) participated in any Johne's disease control program compared with operations in the West region (18.3 percent).

b. Percentage of operations that participated in a Johne's disease control or certification program, by type of program and by region:

	Percent Operations			
	Region			
	West		East	
Program Type	Percent	Std. Error	Percent	Std. Error
Unique program developed specifically for this operation	11.0	(3.3)	16.0	(2.1)
State-sponsored program	8.0	(2.1)	23.9	(2.5)
Other	2.6	(1.6)	4.0	(1.0)
Any	18.3	(3.8)	33.0	(2.7)

A Johne's disease control program may include testing individual animals in order to identify those that are shedding *Mycobacterium avium* subspecies *paratuberculosis* and are, therefore, presenting a risk to noninfected animals on the operation. More than one-third of operations (35.3 percent) tested for Johne's disease. A higher percentage of medium operations tested for Johne's disease compared with small operations (47.6 and 30.7 percent, respectively).

c. Percentage of operations that tested for Johne's disease, by herd size:

Percent Operations

Herd Size (Number of Cows)							
Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Pct.	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
30.7	(3.4)	47.6	(4.1)	37.5	(5.7)	35.3	(2.6)

9. Calving areas

Ideally, calving areas are clean, dry, quiet, and provide enough room for a cow to comfortably lie down and deliver a calf. The majority of operations (70.0 percent) used a multiple-animal calving area/pen. A lower percentage of small operations (65.6 percent) used a multiple-animal calving area compared with medium operations (79.8 percent). Approximately one-quarter of operations used an individual calving area that was either cleaned between each calving or cleaned after two or more calvings (25.5 and 26.2 percent, respectively). A higher percentage of small operations (30.6 percent) used an individual-animal pen that was cleaned between each calving compared with medium and large operations (14.6 and 13.5 percent, respectively).

a. Percentage of operations by area usually used for calving and by herd size:

Percent Operations

	Herd Size (Number of Cows)							
	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Calving Area	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Multiple animal area/pen	65.6	(3.5)	79.8	(3.5)	78.5	(4.3)	70.0	(2.6)
Individual animal area/pen cleaned between each calving	30.6	(3.4)	14.6	(3.3)	13.5	(3.9)	25.5	(2.5)
Individual animal area/pen cleaned after two or more calvings	25.4	(3.3)	27.4	(3.7)	30.3	(5.6)	26.2	(2.5)
Other	5.1	(1.7)	3.6	(1.4)	3.1	(1.7)	4.6	(1.2)

The percentage of operations with a usual calving area ranged from 62.5 percent of small operations to 98.2 percent of large operations.

b. Percentage of operations that had a usual calving area:

Percent Operations

Herd Size (Number of Cows)							
Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Percent	**Std. Error**	**Percent**	**Std. Error**	**Percent**	**Std. Error**	**Percent**	**Std. Error**
62.5	(3.8)	83.7	(3.3)	98.2	(1.2)	70.1	(2.7)

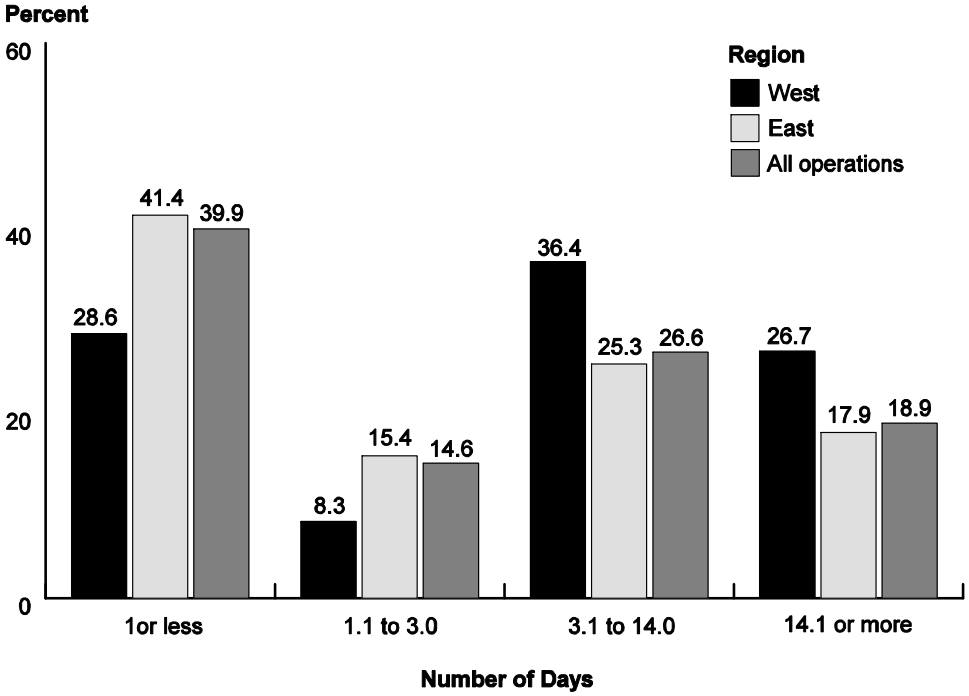
For operations with a usual calving area, 4 of 10 operations (39.9 percent) moved cows into the calving area within a day prior to calving. There were no regional differences. Cows were kept in the calving area prior to calving for 3.1 to 14.0 days on 26.6 percent of operations and for 14.1 or more days on 18.9 percent of operations.

c. For operations with a usual calving area, percentage of operations by number of days cows remained in the usual calving area/pen ***prior*** to calving, and by region:

Percent Operations

	Region					
	West		East		All Operations	
Number of Days	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
1 or less	28.6	(4.9)	41.4	(3.6)	39.9	(3.2)
1.1 to 3.0	8.3	(2.9)	15.4	(2.6)	14.6	(2.3)
3.1 to 14.0	36.4	(5.6)	25.3	(3.1)	26.6	(2.8)
14.1 or more	26.7	(4.9)	17.9	(2.5)	18.9	(2.3)
Total	100.0		100.0		100.0	

For Operations with a Usual Calving Area, Percentage of Operations by Number of Days Cows were in the Usual Calving Area/Pen *Prior* to Calving, and by Region



For operations with a usual calving area, few operations (12.9 percent) removed cows from the calving area in the first hour after calving. A lower percentage of large operations (6.2 percent) allowed cows to remain in the usual calving area for 14.1 or more hours compared with small operations (25.0 percent).

d. For operations with a usual calving area, percentage of operations by number of hours cows remained in the usual calving area/pen ***after*** calving, and by herd size:

Percent Operations

Herd Size (Number of Cows)

Number of Hours	**Small** (Fewer than 100) Pct.	Std. Error	**Medium** (100-499) Pct.	Std. Error	**Large** (500 or More) Pct.	Std. Error	**All Operations** Pct.	Std. Error
Removed immediately	4.4	(1.8)	2.7	(1.3)	7.2	(3.0)	4.2	(1.2)
.25 to 1.0	8.0	(2.3)	7.8	(2.1)	16.5	(3.8)	8.7	(1.6)
1.1 to 3.0	22.5	(4.0)	26.1	(4.0)	28.0	(5.4)	24.1	(2.8)
3.1 to 14.0	40.1	(4.6)	44.0	(4.4)	42.1	(5.5)	41.4	(3.2)
14.1 or more	25.0	(4.2)	19.4	(3.9)	6.2	(3.2)	21.6	(2.8)
Total	100.0		100.0		100.0		100.0	

There were no regional differences by length of time that cows remained in the usual calving area after calving.

e. For operations with a usual calving area, percentage of operations by number of hours cows remained in the usual calving area/pen ***after*** calving, and by region:

	Percent Operations			
	Region			
	West		East	
Number of Hours	**Percent**	**Std. Error**	**Percent**	**Std. Error**
Removed immediately	6.7	(2.7)	3.9	(1.3)
.25 to 1.0	7.3	(2.7)	8.9	(1.7)
1.1 to 3.0	22.6	(4.9)	24.3	(3.1)
3.1 to 14.0	44.6	(5.8)	41.0	(3.5)
14.1 or more	18.8	(4.9)	21.9	(3.2)
Total	100.0		100.0	

Allowing sick cows into the calving area is a potential source of disease for other cows and newborn calves. A higher percentage of small and medium operations (37.3 and 33.0 percent, respectively) allowed sick cows in calving areas than large operations (16.5 percent). Approximately half of operations (51.6 percent) allowed lame cows into the calving area. A lower percentage of large operations (28.6 percent) allowed lame cows into the calving area than medium and small operations (57.9 and 51.8 percent, respectively).

f. For operations with a usual calving area, percentage of operations that allowed sick/lame cows in the usual calving area, by cattle class and by herd size:

	Percent Operations							
	Herd Size (Number of Cows)							
	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Cattle Class	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Sick cows	37.3	(4.6)	33.0	(4.5)	16.5	(4.4)	34.2	(3.2)
Lame cows	51.8	(4.6)	57.9	(4.4)	28.6	(4.5)	51.6	(3.1)
Other	5.4	(2.0)	5.8	(2.3)	4.1	(2.2)	5.4	(1.4)
Any of the above	56.4	(4.6)	62.3	(4.2)	30.7	(4.6)	55.8	(3.1)

Cows that test positive for Johne's disease present a risk of contaminating the usual calving area and transmitting the disease to newborn calves. To prevent calving-area contamination and the potential for infecting calves, test-positive animals should not be allowed in the calving area or other calf areas. There were no differences by operation size in the percentage of operations that allowed Johne's disease test-positive animals in the calving area; 15.5 percent of operations that tested for Johne's disease allowed test-positive cows in the calving area.

g. For operations with a usual calving area and that tested for Johne's disease, percentage of operations that allowed Johne's test-positive cows in the usual calving area, by herd size:

Percent Operations

Herd Size (Number of Cows)

Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Pct.	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
12.0	(4.5)	18.0	(5.0)	30.2	(8.3)	15.5	(3.2)

The percentage of calves born in the usual calving area increased as herd size increased. Overall, 89.8 percent of calves were born in the usual calving area.

h. For operations with a usual calving area, percentage of calves born in the usual calving area, by herd size:

Percent Calves

Herd Size (Number of Cows)

Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Pct.	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
79.9	(2.0)	89.0	(1.3)	93.6	(1.3)	89.8	(0.9)

Photo courtesy of Judy Rodriguez

A higher percentage of small operations than large operations reported that less than three-fourths of their calves were born in the usual calving area. A higher percentage of large operations (45.8 percent) reported that 91 to 99 percent of calves were born in the calving area compared to 16.6 percent of small operations.

i. Percentage of operations by percentage of calves born in the usual calving area/pen, and by herd size:

Percent Operations

Herd Size (Number of Cows)

	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Percent Calves	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
0 to 50	19.3	(3.8)	8.4	(2.5)	3.7	(2.0)	14.7	(2.5)
51 to 75	18.3	(3.9)	6.5	(2.3)	3.6	(2.0)	13.5	(2.5)
76 to 90	28.6	(4.3)	29.0	(4.2)	24.0	(4.5)	28.3	(3.0)
91 to 99	16.6	(3.2)	38.4	(4.5)	45.8	(5.7)	25.6	(2.5)
100	17.2	(3.3)	17.7	(3.3)	22.9	(5.5)	17.9	(2.3)
Total	100.0		100.0		100.0		100.0	

Colostrum from Johne's test-positive cows could transmit the disease to calves. Studies suggest that colostrum is approximately three times as likely as milk to contain *Mycobacterium avium* subspecies *paratuberculosis*. Operations should either use colostrum from a test-negative cow or pasteurize colostrum prior to feeding. Approximately 1 of 20 operations (4.9 percent) fed colostrum from test-positive cows to calves. There were no differences by herd size.

j. For operations that tested for Johne's disease, percentage of operations in which calves were fed colostrum from cows that tested positive for Johne's disease, by herd size:

Percent Operations

Herd Size (Number of Cows)

Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Pct.	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
6.0	(2.9)	3.8	(2.8)	0.6	(0.4)	4.9	(2.0)

B. Source of Replacements

NOTE: Estimates for sources of cow replacements were published in NAHMS Dairy 2007 Part I, p 62. Cow-replacement estimates in this report (Part III) are similar, with the exception of the percentage of operations that had cow replacements born on the operation and raised off-site—which is higher in this report than in Part I.

1. Cow replacements in the milking herd

Approximately one-third of the dairy cow inventory (36.2 percent) was replaced (primarily by heifers that calved) during the previous 12 months. There were no differences by herd size.

a. Cow replacements that entered the milking herd during the previous 12 months, as a percentage of cow inventory on the day of interview, by herd size:

Percent Cow Inventory

Herd Size (Number of Cows)

Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Pct.	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
33.0	(1.1)	34.5	(1.1)	39.0	(2.6)	36.2	(1.2)

Almost 9 of 10 operations (88.0 percent) had cow replacements enter the milking herd that were born and raised on the operation. A lower percentage of large operations (50.7 percent) raised cow replacements on their operations compared with medium and small operations (84.7 and 92.6 percent, respectively). Off-site heifer raising of cow replacements was practiced by 13.9 percent of all operations and was highest for large operations (50.9 percent). Cow replacements were purchased directly from other dairies by 15.3 percent of operations. A higher percentage of large operations (20.2 percent) purchased cow replacements from a dealer compared with medium and small operations (8.9 and 1.7 percent, respectively). Purchasing cow replacements from auction markets was practiced by 7.0 percent of operations.

b. Percentage of operations by source of cow replacements that entered the milking herd during the previous 12 months:

Percent Operations

Herd Size (Number of Cows)

Source of Cow Replacements	Small (Fewer than 100) Pct.	Std. Error	Medium (100-499) Pct.	Std. Error	Large (500 or More) Pct.	Std. Error	All Operations Pct.	Std. Error
Born and raised on the operation	92.6	(1.9)	84.7	(3.2)	50.7	(6.2)	88.0	(1.6)
Born on operation, raised off-site	9.3	(2.2)	17.2	(3.3)	50.9	(5.7)	13.9	(1.8)
Purchased directly from other dairies	12.6	(2.7)	21.5	(3.5)	20.7	(4.5)	15.3	(2.1)
Purchased from a dealer	1.7	(0.7)	8.9	(2.6)	20.2	(4.3)	4.6	(0.9)
Purchased from auction markets	7.3	(2.4)	4.3	(1.6)	14.3	(4.0)	7.0	(1.7)
Purchased from other source	2.7	(1.4)	1.6	(0.7)	6.1	(2.6)	2.6	(1.0)

All operations had cow replacements enter the milking herd during the previous 12 months. The majority of cow replacements for small and medium operations were born and raised on the operation (81.5 and 73.8 percent of replacements, respectively). Cow replacements for large operations were either “home-raised” or born on the operation and raised off-site (40.5 and 47.8 percent of replacements, respectively). Less than 15 percent of all cow replacements were purchased from other dairies, a dealer, auction market, or other source.

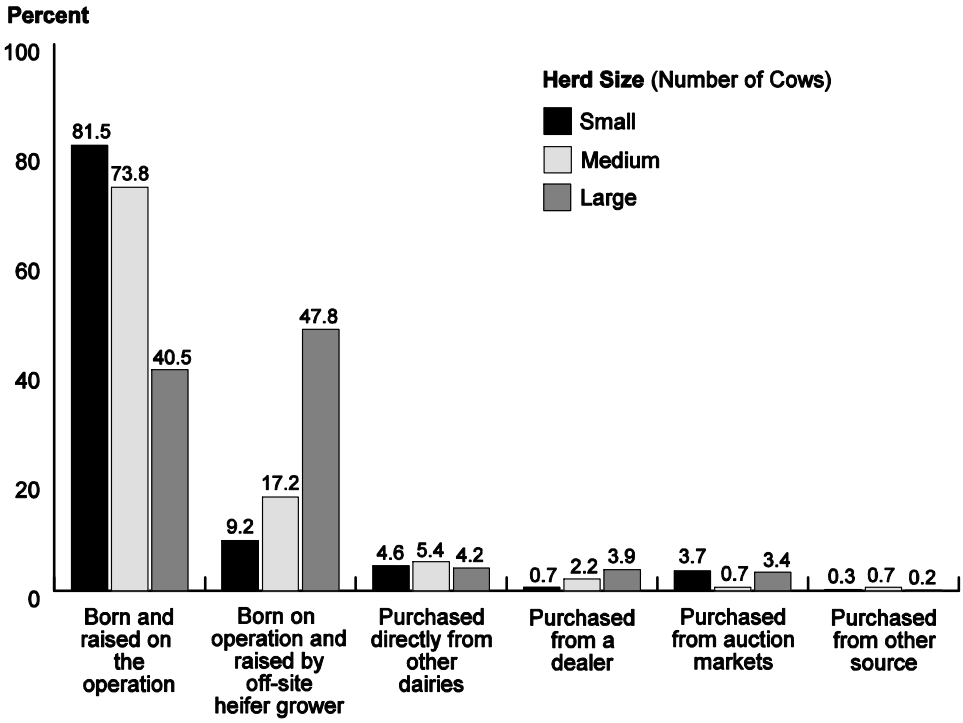
c. Percentage of cow replacements that entered the milking herd during the previous 12 months, by source and by herd size:

Percent Cow Replacements

Herd Size (Number of Cows)

Source of Cow Replacements	Small (Fewer than 100)		Medium (100-499)		Large (500 or More)		All Operations	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Born and raised on the operation	81.5	(3.3)	73.8	(3.5)	40.5	(6.3)	58.8	(3.5)
Born on operation, raised off-site	9.2	(2.2)	17.2	(3.4)	47.8	(6.0)	30.8	(3.3)
Purchased directly from other dairies	4.6	(1.6)	5.4	(1.1)	4.2	(1.2)	4.6	(0.8)
Purchased from a dealer	0.7	(0.4)	2.2	(0.6)	3.9	(1.0)	2.7	(0.5)
Purchased from auction markets	3.7	(1.4)	0.7	(0.3)	3.4	(1.9)	2.7	(1.0)
Purchased from other source	0.3	(0.2)	0.7	(0.5)	0.2	(0.1)	0.4	(0.1)
Total	100.0		100.0		100.0		100.0	

Percentage of Cow Replacements that Entered the Milking Herd During the Previous 12 Months, by Source and by Herd Size



There were no regional differences in source of cow replacements.

d. Percentage of cow replacements that entered the milking herd during the previous 12 months, by source and by region:

	Percent Cow Replacements			
	Region			
	West		East	
Source of Cow Replacements	**Percent**	**Std. Error**	**Percent**	**Std. Error**
Born and raised on the operation	50.6	(7.4)	64.3	(3.1)
Born on operation and raised by off-site heifer grower	40.4	(7.1)	24.3	(2.8)
Purchased directly from other dairies	2.3	(1.2)	6.2	(1.0)
Purchased from a dealer	2.2	(0.7)	3.1	(0.7)
Purchased from auction markets	4.2	(2.4)	1.7	(0.6)
Purchased from other source	0.3	(0.2)	0.4	(0.2)
Total	100.0		100.0	

2. Replacement shipments

The number of shipments of cow replacements from off-site heifer growers to the operation increased as herd size increased. During the previous 12 months, large operations received an average of 55.9 shipments from off-site heifer growers compared with an average of 5.5 shipments for small operations.

a. Operation average number of shipments by source of cow replacements during the previous 12 months, and by herd size:

Operation Average Number of Shipments

	Herd Size (Number of Cows)							
	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Source of Cow Replacements	**Avg.**	**Std. Error**	**Avg.**	**Std. Error**	**Avg.**	**Std. Error**	**Avg.**	**Std. Error**
Born on operation and raised by off-site heifer grower	5.5	(1.6)	11.1	(1.3)	55.9	(16.2)	20.9	(5.1)
Purchased directly from other dairies	1.5	(0.2)	2.3	(0.3)	5.3	(1.0)	2.1	(0.2)
Purchased from a dealer	1.4	(0.3)	2.9	(0.5)	6.0	(1.0)	3.3	(0.5)
Purchased from auction markets	3.0	(1.0)	2.0	(0.7)	28.3	(17.1)	7.8	(3.9)
Purchased from other source	4.0	(0.0)	3.0	(1.1)	2.8	(0.8)	3.3	(0.5)
All sources	2.6	(0.6)	6.0	(0.8)	48.1	(12.3)	9.7	(1.9)

Photo courtesy of Peggy Greb, Agricultural Research Service

Operations in the West region had more shipments from off-site heifer growers during the previous 12 months (65.8) compared to operations in the East region (10.9). Shipments from other sources were similar for both the West and East regions. Although the average number of shipments from auction markets was higher in the West region than in the East region, the standard error for the West region is large and suggests variability in the number of shipments among operations in the West region.

b. Operations average number of shipments by source of cow replacements during the previous 12 months, and by region:

	Operation Average Number of Shipments			
	Region			
	West		East	
Source of Cow Replacement	**Average**	**Std. Error**	**Average**	**Std. Error**
Born on operation and raised by off-site heifer grower	65.8	(24.0)	10.9	(1.3)
Purchased directly from other dairies	5.9	(1.8)	1.9	(0.2)
Purchased from a dealer	5.5	(1.1)	2.7	(0.4)
Purchased from auction markets	28.3	(17.3)	2.9	(0.9)
Purchased from other source	3.7	(1.3)	3.2	(0.6)
All sources	45.5	(14.4)	5.0	(0.5)

C. Disease Confirmation

1. Laboratory testing

Laboratory testing is essential in determining the cause of many diseases and allows the implementation of appropriate preventive or control measures. More than 20 percent of operations (22.7 percent) reported that Johne's disease was confirmed via laboratory testing during the previous 12 months. A lower percentage of small operations received a laboratory diagnosis for Johne's disease (17.4 percent) compared with medium and large operations (35.0 and 34.1 percent, respectively). Less than 10 percent of all operations reported a laboratory confirmation for the other listed diseases. *Neospora* and *Salmonella* were more frequently diagnosed on large operations via laboratory testing than on medium and small operations.

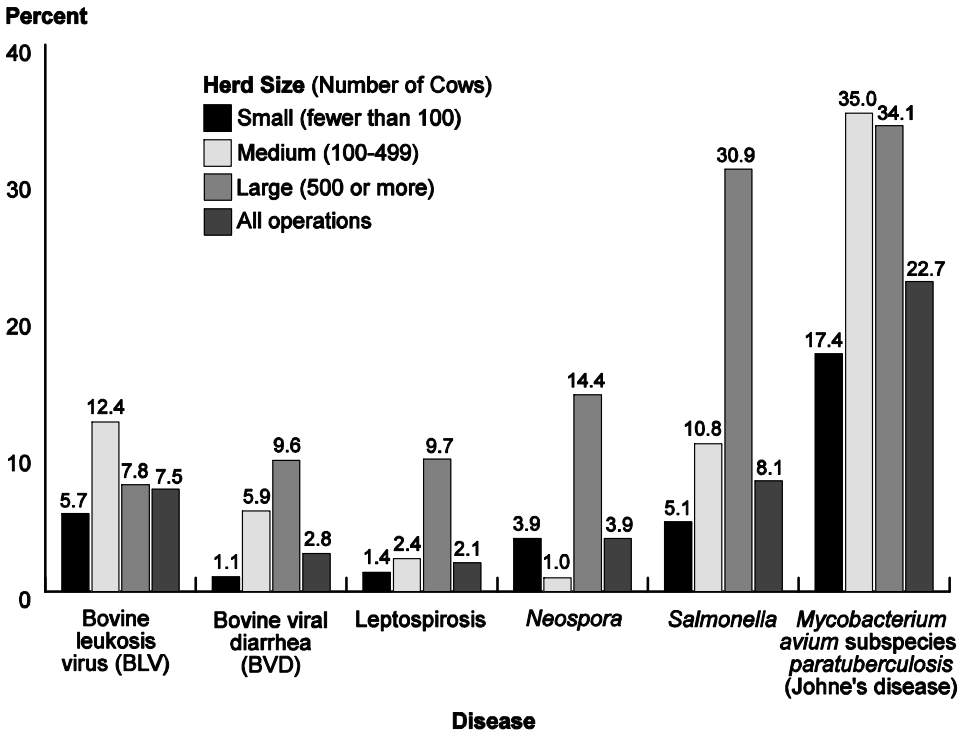
a. Percentage of operations in which the following diseases in cattle on the operation were confirmed via laboratory testing during the previous 12 months, by herd size:

Percent Operations

Herd Size (Number of Cows)

	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Disease	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Bovine leukosis virus (BLV)	5.7	(1.9)	12.4	(2.9)	7.8	(2.9)	7.5	(1.5)
Bovine viral diarrhea (BVD)	1.1	(0.7)	5.9	(2.0)	9.6	(3.3)	2.8	(0.7)
Leptospirosis	1.4	(0.8)	2.4	(1.1)	9.7	(3.8)	2.1	(0.7)
Neospora	3.9	(1.6)	1.0	(0.6)	14.4	(4.4)	3.9	(1.1)
Salmonella	5.1	(1.8)	10.8	(2.3)	30.9	(5.9)	8.1	(1.4)
Mycobacterium avium subspecies *paratuberculosis* (Johne's disease)	17.4	(3.0)	35.0	(3.9)	34.1	(4.8)	22.7	(2.3)

Percentage of Operations in which the Following Diseases in Cattle on the Operation were Confirmed Via Laboratory Testing During the Previous 12 Months, by Herd Size



During the previous 12 months, a higher percentage of operations in the East region received a laboratory confirmation of Johne's disease (23.6 percent) than in the West region (12.8 percent). There were no differences by region in the percentages of operations reporting laboratory confirmation for the other listed diseases.

b. Percentage of operations in which the following diseases in cattle on the operation were confirmed via laboratory testing during the previous 12 months, by region:

	Percent Operations			
	Region			
	West		East	
Disease	**Percent**	**Std. Error**	**Percent**	**Std. Error**
Bovine leukosis virus (BLV)	4.3	(2.0)	7.8	(1.7)
Bovine viral diarrhea (BVD)	5.3	(2.3)	2.5	(0.7)
Leptospirosis	5.2	(2.4)	1.9	(0.7)
Neospora	10.8	(3.5)	3.2	(1.2)
Salmonella	17.2	(4.2)	7.3	(1.5)
Mycobacterium avium subspecies *paratuberculosis* (Johne's disease)	12.8	(3.2)	23.6	(2.5)

BLV was most frequently diagnosed via blood samples (88.5 percent of operations). Blood, ear notches, tissues at necropsy, and aborted fetuses were the most frequently used samples for diagnosing BVD. Leptospirosis and Johne's disease were most frequently diagnosed via blood samples (69.6 and 70.3 percent, respectively). *Neospora* was confirmed using aborted fetuses, blood, and tissues at necropsy. *Salmonella* was most frequently confirmed using fecal samples (49.3 percent).

c. For operations in which disease was confirmed via laboratory testing, percentage of operations by diagnostic samples used to confirm disease, and by confirmed disease:

	Percent Operations											
	Confirmed Disease											
	Bovine Leukosis Virus (BLV)		Bovine Viral Diarrhea (BVD)		Lepto-spirosis		*Neospora*		*Salmonella*		Johne's disease	
Diagnostic Sample	Pct.	Std. Err.	Pct.	Std. Err.	Pct.	Std. Err.	Pct.	Std. Err.	Pct.	Std. Err.	Pct.	Std. Err.
Aborted fetus			13.9	(6.7)	22.8	(11.2)	59.0	(14.2)	7.9	(4.9)		
Blood	88.5	(4.8)	47.5	(12.9)	69.6	(12.5)	40.6	(14.2)	16.9	(5.5)	70.3	(5.3)
Ear notch			41.3	(12.5)								
Feces			7.5	(4.4)					49.3	(9.1)	36.4	(5.5)
Milk			0.6	(0.4)					20.0	(9.9)	12.4	(3.5)
Tissues at necropsy	6.3	(3.5)	15.7	(7.9)	10.3	(7.4)	18.5	(10.1)	15.4	(4.7)	0.1	(0.1)
Urine					8.8	(5.4)						
Other	15.5	(6.3)	3.0	(2.9)	0.0	(--)	9.0	(8.5)	5.0	(4.2)	1.7	(1.6)

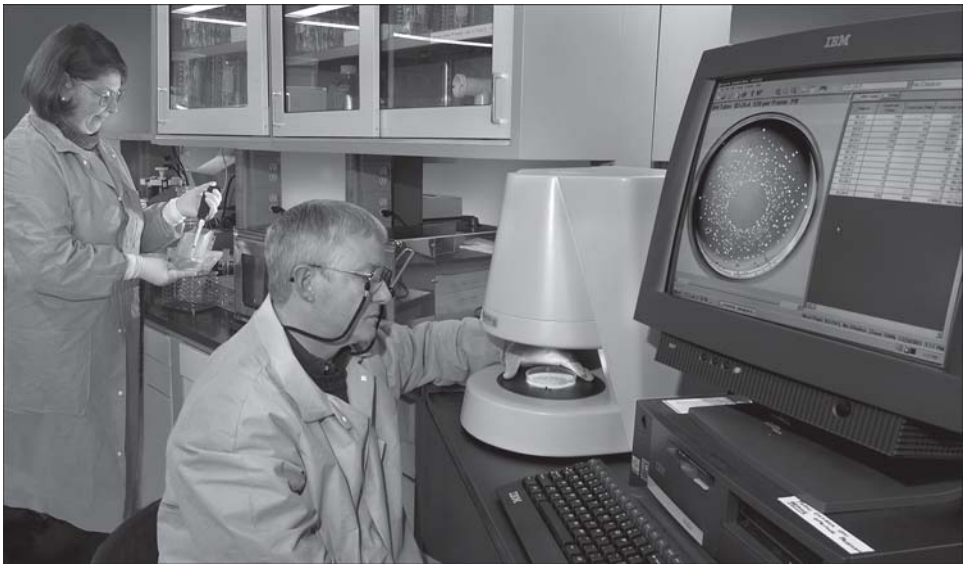


Photo courtesy of Paul Pierlott, Agricultural Research Service

2. Abortions

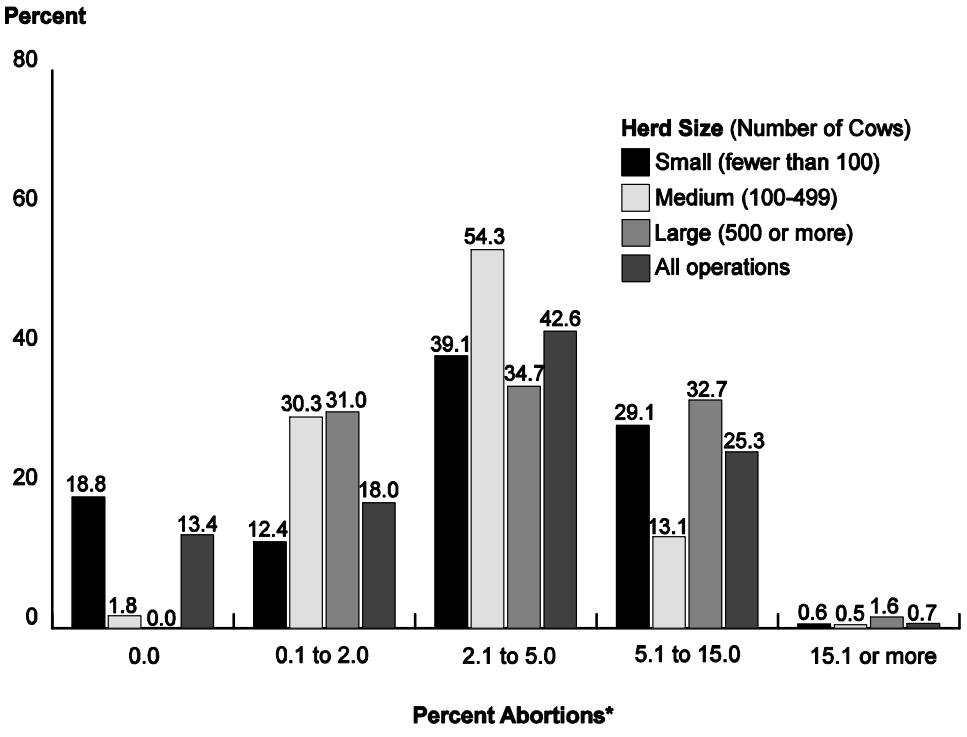
Abortion generally describes the expulsion of a dead fetus at 45 to 265 days of gestation. A goal is to have less than 2 percent of cows and heifers abort each year, although up to 5 percent is considered normal. Across herd sizes, approximately 30 percent of operations reported that 2 percent or less of cows aborted (as a percentage of cow inventory). Few operations (0.7 percent) reported that more than 15.1 percent of cows aborted. No operations had more than 25 percent of cows abort.

a. Percentage of operations by percentage of abortions during the previous 12 months, and by herd size:

	Percent Operations							
	Herd Size (Number of Cows)							
	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Percent Abortions*	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
0.0	18.8	(3.1)	1.8	(1.0)	0.0	(--)	13.4	(2.2)
0.1 to 2.0	12.4	(2.3)	30.3	(3.8)	31.0	(4.9)	18.0	(1.9)
2.1 to 5.0	39.1	(3.8)	54.3	(4.2)	34.7	(5.5)	42.6	(2.9)
5.1 to 15.0	29.1	(3.6)	13.1	(2.9)	32.7	(5.1)	25.3	(2.6)
15.1 or more	0.6	(0.5)	0.5	(0.5)	1.6	(1.5)	0.7	(0.4)
Total	100.0		100.0		100.0		100.0	

*As a percentage of cow inventory at time of interview.

Percentage of Operations by Percentage of Abortions During the Previous 12 Months, and by Herd Size



*As a percentage of cow inventory on day of interview.

Almost 9 of 10 operations (86.6 percent) had at least one cow or heifer abort during the previous 12 months.

b. Percentage of operations that had any abortions:

Percent Operations	Standard Error
86.6	(2.2)

Determining the cause of abortion can be difficult. In many cases, the event that caused the fetus to die occurs days to weeks before the actual abortion. Frequently, the cause of an abortion is no longer detectable, or the fetus is too decomposed to evaluate or never found at all. Generally, a diagnosis is determined in less than 40 percent of samples from abortions submitted to diagnostic laboratories. To improve the chances of diagnosing the cause of abortion, a detailed history and the proper diagnostic specimens should be submitted to the laboratory. Specific samples recommended for submission include sera from the dam, the entire fetus, or specific tissues and placenta. Approximately one of eight operations (12.4 percent) submitted samples to determine the cause of abortion.

c. For operations that had any abortions, percentage of operations that submitted any samples for diagnosis:

Percent Operations	Standard Error
12.4	(1.7)

For operations that submitted samples, 70.2 percent submitted serum from the dam and 32.7 percent submitted the placenta.

d. For operations that submitted samples to determine cause of abortion, percentage of operations by type of sample:

Sample Type	Percent Operations	Standard Error
Placenta	32.7	(6.9)
Entire fetus	53.8	(7.6)
Serum of dam	70.2	(6.6)
Other	4.0	(3.2)

Of the total abortions reported, the placenta was submitted for testing for 1.3 percent of abortions. The entire fetus was submitted for 1.7 percent of abortions, and serum from the dam experiencing the abortion was submitted for 3.1 percent of abortions.

e. For operations that had at least one abortion during the previous 12 months, percentage of abortions by type of sample submitted for laboratory diagnosis:

Sample Type	Percent Abortions Submitted	Standard Error
Placenta	1.3	(0.3)
Entire fetus	1.7	(0.3)
Serum of dam	3.1	(0.6)
Other	0.1	(0.1)

The majority of operations that had any abortions but did not submit samples for diagnosis (69.6 percent) did not perceive abortion as a problem on their operations.

f. For any aborted fetuses that were not submitted for diagnosis, percentage of operations by reason for not submitting fetus:

Reason	Percent Operations	Standard Error
Cost	2.5	(1.0)
Lack of information obtained from previous abortion submissions	6.6	(1.3)
Inconvenience	7.0	(1.7)
Abortion not perceived as a problem on the operation	69.6	(2.7)
Other	14.3	(2.0)
Total	100.0	

Although only 12.4 percent of operations that had abortions submitted samples for diagnosis, more than 8 of 10 operations (82.0 percent) would submit aborted fetuses for diagnosis if testing was performed at no cost, and 48.5 percent of aborted fetuses would be submitted for diagnosis.

g. Percentage of operations that would submit aborted fetuses to a diagnostic laboratory if testing was performed at no cost, and percentage of aborted fetuses that would be submitted:

Percent Operations	Standard Error	Operation Average Percent Aborted Fetuses	Standard Error
82.0	(2.3)	48.5	(4.9)

D. General Management

1. Primary outside access areas

Operations most frequently allowed lactating cows access to pasture (50.9 percent of operations) during summer. No outside access was allowed on 13.1 percent of operations in summer. In winter, the highest percentages of operations allowed lactating cows access to a concrete alley way or pen, dry lot, or allowed no outside access (35.0, 28.9, and 25.2 percent, respectively).

a. Percentage of operations by primary outside area that ***lactating*** cows had routine access to during summer and winter:

	Percent Operations			
	Summer		Winter	
Primary Outside Area	**Percent**	**Std. Error**	**Percent**	**Std. Error**
Pasture	50.9	(2.7)	9.4	(1.5)
Concrete alleyway or pen	12.8	(1.6)	35.0	(2.8)
Dry lot	20.8	(2.2)	28.9	(2.7)
Other	2.4	(0.8)	1.5	(0.6)
None	13.1	(1.7)	25.2	(2.3)
Total	100.0		100.0	

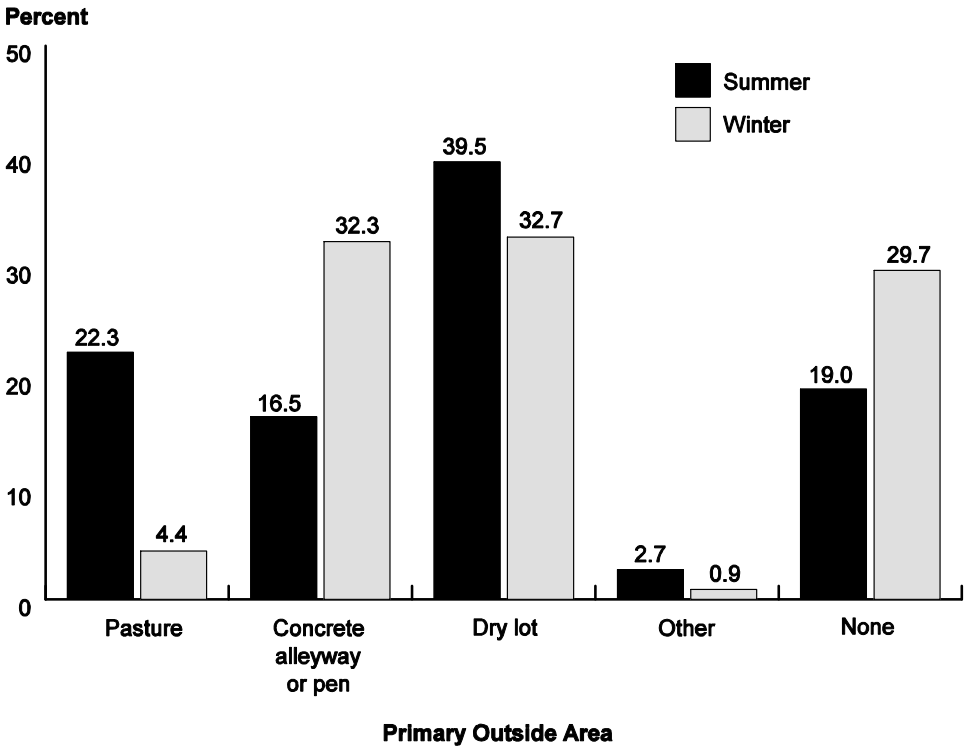
During summer, 39.5 percent of lactating cows were on operations in which the primary outside area was a dry lot, 22.3 percent were on operations in which the primary outside area was pasture, and 19.0 percent were on operations with no outside access. In winter, similar percentages of lactating cows were on operations in which primary outside access was a concrete alleyway or pen, dry lot, or allowed no outside access (32.3, 32.7, and 29.7 percent, respectively).

b. Percentage of cow inventory by primary outside area that ***lactating*** cows had routine access to during summer and winter:*

	Percent Cows			
	Summer		Winter	
Primary Outside Area	**Percent**	**Std. Error**	**Percent**	**Std. Error**
Pasture	22.3	(1.6)	4.4	(0.7)
Concrete alleyway or pen	16.5	(2.1)	32.3	(3.3)
Dry lot	39.5	(3.0)	32.7	(3.5)
Other	2.7	(1.4)	0.9	(0.3)
None	19.0	(2.0)	29.7	(2.9)
Total	100.0		100.0	

*It was presumed that all lactating cows had access to the operation's primary outside area.

Percentage of Cow Inventory by Primary Outside Area that *Lactating* Cows had Routine Access to During Summer and Winter*



*It was presumed that all lactating cows had access to the operation's primary outside area

The majority of operations (67.2 percent) allowed dry cows access to pasture during summer. In winter, operations allowed access to pasture, concrete alleyway or pen, dry lot, or allowed no outside access (18.4, 24.1, 34.2, and 18.5 percent, respectively).

c. Percentage of operations by primary outside area that ***dry*** cows had routine access to during summer and winter:

	Percent Operations			
	Summer		Winter	
Primary Outside Area	**Percent**	**Std. Error**	**Percent**	**Std. Error**
Pasture	67.2	(2.5)	18.4	(2.2)
Concrete alleyway or pen	5.7	(1.1)	24.1	(2.4)
Dry lot	18.5	(2.0)	34.2	(2.7)
Other	2.1	(0.8)	4.8	(1.3)
None	6.5	(1.2)	18.5	(2.1)
Total	100.0		100.0	

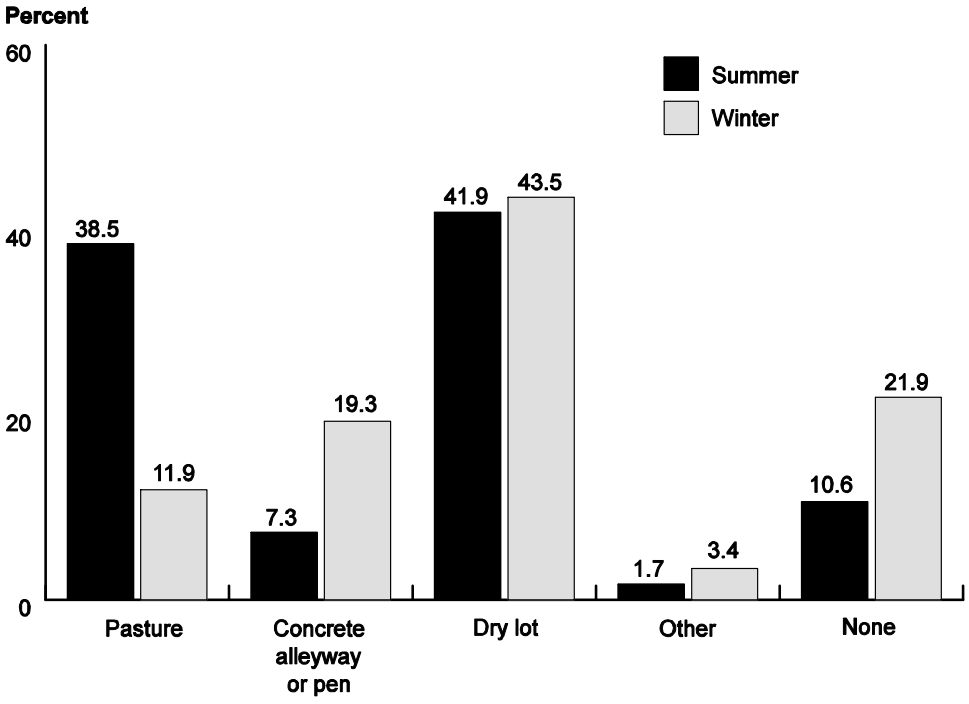
The majority of dry cows were on operations in which pasture (38.5 percent) or dry lot (41.9 percent) were the primary outside access during summer. Dry lot was the most common outside access for dry cows in winter (43.5 percent).

d. Percentage of cow inventory by primary outside area that ***dry*** cows had routine access to during summer and winter:

	Percent Cows			
	Summer		Winter	
Primary Outside Area	**Percent**	**Std. Error**	**Percent**	**Std. Error**
Pasture	38.5	(2.4)	11.9	(1.5)
Concrete alleyway or pen	7.3	(1.3)	19.3	(2.3)
Dry lot	41.9	(2.6)	43.5	(3.2)
Other	1.7	(0.5)	3.4	(0.8)
None	10.6	(1.7)	21.9	(2.5)
Total	100.0		100.0	

*It was presumed that all dry cows had access to the operation's primary outside area.

Percentage of Cow Inventory by Primary Outside Area that *Dry* Cows had Routine Access to During Summer and Winter*



*It was presumed that all dry cows had access to the operation's primary outside area.

2. Flooring type

Flooring surfaces are important to cow health and longevity. When given an option, cows select flooring that compresses and provides cushion, such as rubber mats, pasture, or dirt. Concrete flooring is associated with increased lameness, injuries, and decreased expression of estrus. On approximately half of operations (51.1 percent), flooring for lactating cows was predominately concrete, representing 55.6 percent of cows. Pasture was the predominant flooring on 10.1 percent of operations but for only 5.1 percent of cows. Dirt was the predominate flooring on 5.4 percent of operations, representing 20.0 percent of cows, which probably reflects the use of dry lots on large operations.

a. Percentage of operations (and percentage of cows on these operations) by predominant flooring type that lactating cows stood or walked on when not being milked:

Flooring Type	Percent Operations	Standard Error	Percent Cows	Standard Error
Concrete–grooved/textured	34.3	(2.4)	48.7	(3.5)
Concrete–slatted	1.3	(0.5)	1.1	(0.5)
Concrete–smooth	15.5	(2.3)	5.8	(0.8)
Rubber mats over concrete	22.9	(2.5)	13.9	(2.2)
Pasture	10.1	(1.7)	5.1	(0.9)
Dirt	5.4	(1.1)	20.0	(3.5)
Other	10.5	(1.8)	5.4	(1.1)
Total	100.0		100.0	

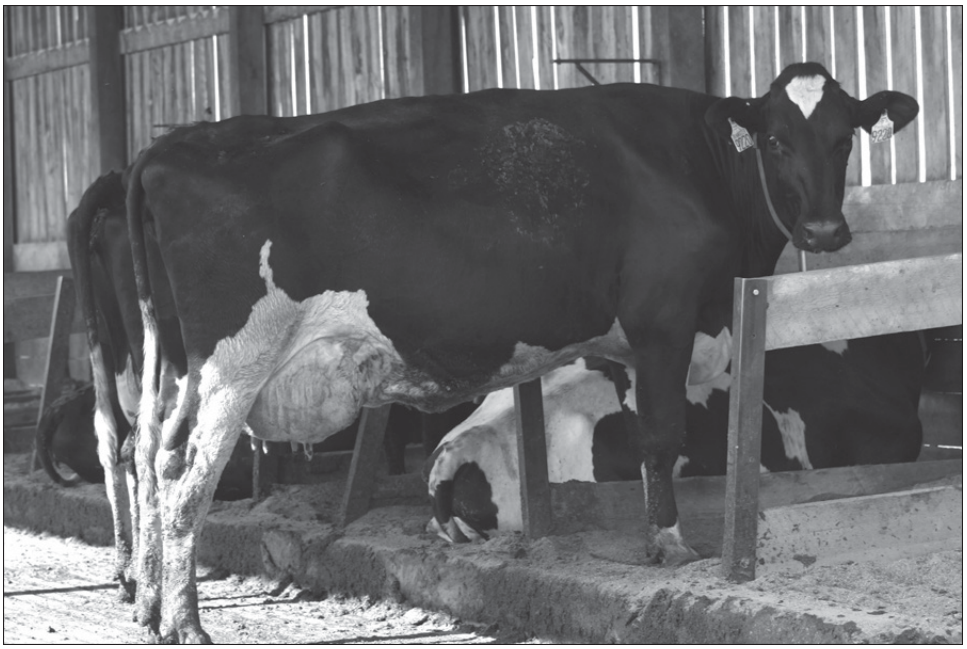


Photo courtesy of Judy Rodriguez

For operations with concrete flooring, the use of rubber belting or a similar material in cow areas reduces the amount of time cows spend on concrete and may decrease lameness and injuries as well as increase time spent at the feed bunk. Any rubber belting was present on 21.2 percent of operations and was accessible to 44.4 percent of cows.

b. For operations that used parlors and in which concrete was the predominant flooring, percentage of operations (and percentage of cows on these operations) that had rubber belting or similar flooring, by location of rubber belting:

Location	Percent Operations	Standard Error	Percent Cows	Standard Error
Immediately in front of feed bunk	11.9	(2.3)	29.2	(5.1)
Walkway to parlor	6.2	(1.4)	18.9	(4.7)
Holding pen	8.1	(1.9)	14.2	(3.1)
Other	7.5	(1.7)	11.1	(1.8)
Any	21.2	(2.8)	44.4	(4.8)

3. Surface moisture

Wet flooring can be detrimental to hoof health. Cows on wet surfaces have increased hoof horn moisture and are more prone to infectious hoof diseases. The ground or flooring surface for lactating cows was usually dry on 60.3 percent of operations during summer and 49.5 percent in winter. Lactating cows usually stood in water or slurry on less than 1 percent of operations (0.6 percent).

Percentage of operations by category that best characterizes the surface moisture of the ground or flooring that lactating cows stood on most during summer and winter:

	Percent Operations			
	Summer		Winter	
Flooring Surface Moisture	**Percent**	**Std. Error**	**Percent**	**Std. Error**
Usually dry	60.3	(2.7)	49.5	(2.6)
Wet about half the time	22.8	(2.4)	21.8	(2.2)
Almost always wet, but no standing water	16.3	(1.7)	28.1	(2.1)
Usually standing water or slurry	0.6	(0.3)	0.6	(0.3)
Total	100.0		100.0	

4. Barn type

The type of freestall barn affects ventilation, feedbunk space, and square footage per cow. Two- and four-row barns require less wind to properly ventilate and provide more feedbunk space per cow and more square footage per cow than three- or six-row barns. Approximately 8 of 10 large and medium operations (83.2 and 81.9 and percent, respectively) housed cows in freestalls, compared with about 3 of 10 small operations (27.2 percent). Less than half of all operations (44.3 percent) housed cows in freestall barns.

a. Percentage of operations that used freestall barns:

Percent Operations

Herd Size (Number of Cows)

Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Pct.	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
27.2	(3.0)	81.9	(3.2)	83.2	(4.2)	44.3	(2.5)

Two-row freestall barns were the predominant setup for small and large freestall operations (48.1 and 49.5 percent, respectively). The percentage of operations with six-row barns increased as herd size increased.

b. For operations that used covered freestall barns to house lactating cows, percentage of operations by type of barn setup that housed the majority of cows, and by herd size:

Percent Operations

Herd Size (Number of Cows)

	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Freestall Barn Setup	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Two-row	48.1	(6.6)	19.5	(3.5)	49.5	(5.3)	35.2	(3.4)
Three-row	20.7	(5.7)	22.2	(3.8)	8.3	(3.3)	19.9	(3.0)
Four-row	22.7	(5.0)	31.7	(4.4)	22.2	(4.8)	26.7	(3.0)
Six-row	1.1	(0.8)	17.9	(3.7)	19.8	(3.4)	11.0	(1.9)
Other	7.4	(3.7)	8.7	(2.6)	0.2	(0.1)	7.2	(2.0)
Total	100.0		100.0		100.0		100.0	

5. Heat abatement

Using methods to cool cows, such as shade, water sprinklers, or increased air circulation is important during summer in almost all areas of the United States. Heat has many deleterious effects on dairy cattle, including decreased feed intake and milk production, reduced estrous behavior, altered formation and ovulation of follicles, and increased susceptibility to mastitis. In most areas of the United States, a combination of sprinklers and fans is recommended. Fans were the most common method of heat abatement provided on small and medium operations (74.3 and 77.7 of operations, respectively), while a similar percentage of large operations provided shade, sprinklers or misters, or fans (55.6, 61.6, and 61.0 percent, respectively). Overall, 94.0 percent of operations provided some form of heat abatement for lactating cows.

a. Percentage of operations that provided heat abatement during summer for ***lactating*** cows, by herd size:

Percent Operations

Herd Size (Number of Cows)

	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Method	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Shade (other than inside building)	49.2	(3.8)	28.7	(3.4)	55.6	(5.6)	44.5	(2.8)
Sprinklers or misters	12.0	(2.4)	32.9	(3.7)	61.6	(5.8)	20.3	(1.9)
Fans	74.3	(3.2)	77.7	(3.3)	61.0	(5.3)	74.3	(2.4)
Tunnel ventilation	28.3	(3.6)	12.7	(3.0)	3.8	(2.2)	22.9	(2.6)
Other	4.9	(1.8)	6.1	(2.3)	2.5	(1.6)	5.0	(1.3)
Any	96.3	(1.2)	89.1	(2.7)	88.5	(3.7)	94.0	(1.1)

Dry cows were most frequently provided shade on small and large operations (61.0 and 49.8 percent of operations, respectively). Shade and fans were the most common heat abatement methods for dry cows on medium operations (41.0 and 37.8 percent of operations, respectively). More than three of four operations (77.5 percent) provided some method of heat abatement for dry cows.

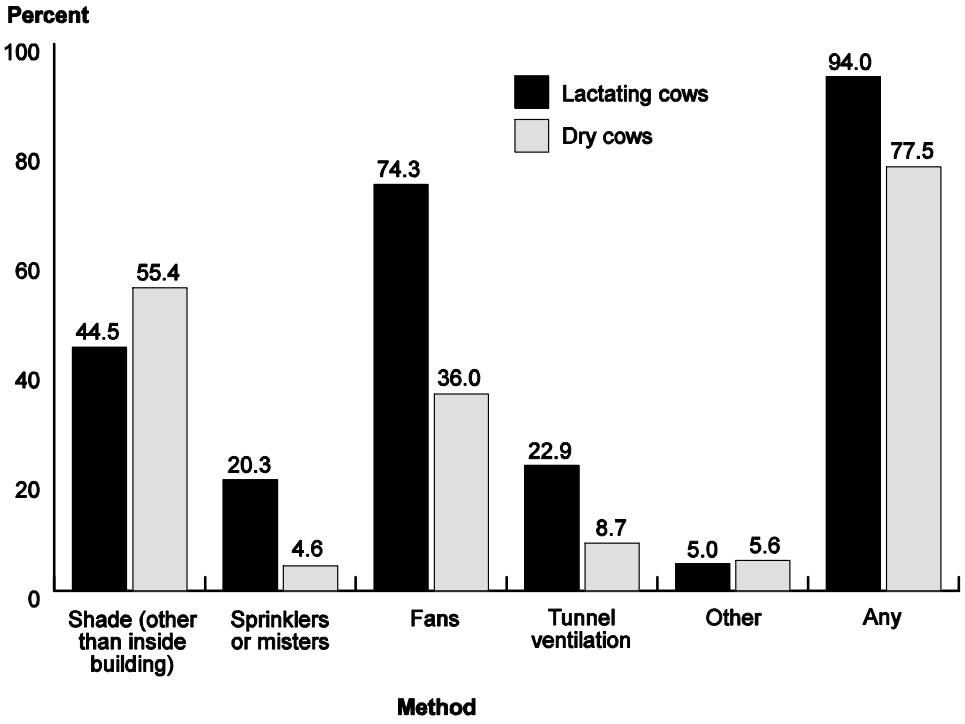
b. Percentage of operations that provided heat abatement during summer for ***dry*** cows, by herd size:

Percent Operations

Herd Size (Number of Cows)

	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Method	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Shade (other than inside building)	61.0	(3.6)	41.0	(3.9)	49.8	(5.4)	55.4	(2.7)
Sprinklers or misters	3.8	(1.6)	3.8	(1.7)	16.2	(4.5)	4.6	(1.2)
Fans	36.2	(3.8)	37.8	(4.0)	27.2	(4.3)	36.0	(2.8)
Tunnel ventilation	11.8	(2.7)	1.7	(0.9)	2.0	(1.3)	8.7	(1.9)
Other	6.3	(2.0)	4.7	(2.1)	1.8	(1.6)	5.6	(1.5)
Any	81.4	(2.8)	68.9	(3.9)	69.2	(5.9)	77.5	(2.2)

Percentage of Operations that Provided Heat Abatement During Summer for Lactating and Dry Cows



6. Bedding types

The ideal bedding for lactating cows is dry and clean, provides cushion, and does not support bacterial growth. Sand has these characteristics and is one of the best bedding options for cows, although sand can lead to excessive wear of manure-handling equipment. Straw and/or hay were used on 54.1 percent of operations, representing 33.4 percent of cows. Sawdust/wood products and rubber mats were used on similar percentages of operations (35.0 and 30.2 percent, respectively), although sawdust/wood products were used for a higher percentage of cows (31.2 percent) than were rubber mats (18.5 percent). Sand was used on 21.9 percent of operations and for 30.3 percent of cows.

Straw and/or hay was used as bedding for dry cows by more than 6 of 10 operations (62.2 percent), representing 47.2 percent of cows. Most operations (92.5 percent) provided bedding to dry cows, and most dry cows (92.7 percent) had access to bedding.

a. Percentage of operations (and percentage of cows on these operations) by type of bedding used for ***lactating*** and ***dry*** cows during the previous 90 days:

	Percent Operations				Percent Cows			
	Lactating Cows		Dry Cows		Lactating Cows		Dry Cows	
Bedding Type	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Straw and/ or hay	54.1	(2.7)	62.2	(2.7)	33.4	(2.8)	47.2	(3.2)
Sand	21.9	(2.0)	14.4	(1.7)	30.3	(2.6)	19.0	(2.0)
Sawdust/wood products	35.0	(2.6)	25.2	(2.3)	31.2	(2.8)	28.2	(2.6)
Composted/ dried manure	3.9	(0.5)	4.8	(0.8)	24.2	(2.6)	23.5	(2.9)
Rubber mats	30.2	(2.7)	15.2	(2.2)	18.5	(2.1)	11.8	(2.3)
Rubber tires	1.6	(0.6)	1.0	(0.5)	1.1	(0.4)	0.7	(0.3)
Shredded newspaper	5.2	(1.2)	3.6	(1.1)	3.1	(0.7)	2.5	(0.8)
Mattresses	23.7	(2.4)	10.6	(1.8)	20.1	(1.9)	9.5	(1.4)
Corn cobs and stalks	11.0	(1.9)	18.5	(2.2)	5.7	(1.0)	10.7	(1.3)
Waterbeds	1.7	(0.8)	0.3	(0.3)	2.3	(1.0)	0.4	(0.3)
Other	11.7	(1.9)	9.5	(1.7)	13.3	(2.5)	12.4	(2.5)
Any	97.0	(0.8)	92.5	(1.4)	94.9	(1.9)	92.7	(1.9)

Photo courtesy of Judy Rodriguez

The primary bedding types used in the last 90 days for lactating and dry cows were straw and/or hay, sand, sawdust/wood products, or composted/dried manure. Composed/dried manure was used on less than 5 percent of operations but represented almost 25 percent of cows, suggesting that primarily large operations were using this bedding type.

b. For operations that used bedding during the previous 90 days, percentage of operations (and percentage of cows on these operations) by bedding type primarily used for ***lactating*** and ***dry*** cows:

	Percent Operations				Percent Cows			
	Lactating Cows		Dry Cows		Lactating Cows		Dry Cows	
Bedding Type	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Straw and/ or hay	37.3	(2.9)	43.1	(3.0)	21.1	(2.6)	27.3	(2.6)
Sand	18.0	(2.0)	13.2	(1.8)	25.8	(2.7)	17.5	(2.1)
Sawdust/wood products	21.1	(2.2)	15.9	(2.1)	16.4	(1.7)	15.6	(2.3)
Composted/ dried manure	3.8	(0.5)	4.0	(0.7)	24.9	(2.5)	23.7	(3.0)
Rubber mats	1.7	(0.7)	2.3	(1.0)	0.8	(0.4)	1.8	(0.9)
Rubber tires	0.0	(--)	0.0	(--)	0.0	(--)	0.0	(--)
Shredded newspaper	1.0	(0.4)	1.0	(0.8)	0.5	(0.2)	0.4	(0.3)
Mattresses	5.6	(1.6)	3.8	(1.5)	2.6	(0.7)	1.8	(0.6)
Corn cobs and stalks	2.7	(1.1)	9.3	(1.6)	1.1	(0.4)	5.1	(0.9)
Waterbeds	0.6	(0.4)	0.4	(0.3)	1.2	(0.8)	0.3	(0.3)
Other	8.2	(1.6)	7.0	(1.6)	5.6	(1.3)	6.5	(1.7)
Total	100.0		100.0		100.0		100.0	

7. Feedstuffs

Dairy operations use a variety of feedstuffs based on factors such as nutrient content, availability, and cost. More than half of operations fed lactating or dry cows alfalfa hay/haylage, corn silage, whole soybeans or soybean meal, or corn.

Percentage of operations by type of feedstuff fed to ***lactating*** and ***dry*** cows during the previous 90 days:

	Percent Operations			
	Cow Type			
	Lactating		Dry	
Feedstuffs	**Percent**	**Std. Error**	**Percent**	**Std. Error**
Alfalfa hay/haylage	92.3	(1.6)	75.9	(2.3)
Corn silage	87.6	(1.8)	80.4	(2.3)
Clover as forage or pasture	23.1	(2.4)	24.1	(2.4)
Whole cottonseed	33.0	(2.5)	8.0	(1.5)
Cottonseed meal or hulls	9.3	(1.5)	3.4	(1.0)
Whole soybeans or soybean meal	84.4	(2.1)	45.7	(2.8)
Bakery byproducts	6.6	(1.0)	1.9	(0.6)
Brewery byproducts	37.1	(2.7)	19.7	(2.3)
Corn	94.2	(1.4)	67.1	(2.7)
Barley	14.1	(1.9)	8.6	(1.6)
Wheat (not silage)	6.7	(1.1)	5.0	(1.0)
Oats (not silage)	17.5	(2.4)	20.4	(2.5)
Green chop	4.9	(1.4)	3.4	(1.1)
Feather/poultry meal	3.2	(0.7)	1.0	(0.3)
Fish meal	4.4	(0.9)	0.8	(0.4)
Fat/tallow	32.7	(2.5)	7.9	(1.4)
Porcine meat and bone meal	8.3	(1.3)	0.8	(0.4)
Blood meal	13.2	(1.7)	2.8	(0.7)

8. Feedline and feeding practices

The configuration of the feedline can impact the feeding behavior of dairy cattle. An increased amount of feedbunk space per cow as well as some form of physical separation between cows—such as the use of headlocks—reduce competition and have the greatest positive impact on subordinate cows. The most common feedline for small operations was a tie stall (46.2 percent of operations) while post and rail was the single most common feedline on medium operations (37.1 percent of operations). The majority of large operations (79.6 percent) used headlocks at the feedline.

a. Percentage of operations by feedline used for the majority of lactating cows, and by herd size:

Percent Operations

Herd Size (Number of Cows)

	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Feedline	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Tie stall	46.2	(3.8)	9.2	(2.8)	0.0	(--)	34.1	(2.8)
Stanchion	14.2	(2.8)	3.9	(1.5)	0.0	(--)	10.7	(1.9)
Post and rail	11.3	(2.2)	37.1	(4.0)	15.7	(4.1)	18.0	(1.9)
Headlocks	3.8	(1.2)	22.2	(3.2)	79.6	(4.7)	13.2	(1.3)
Elevated feed bunk in pen	17.8	(2.7)	20.3	(3.2)	0.1	(0.1)	17.3	(2.0)
Other	6.7	(1.8)	7.3	(2.0)	4.6	(2.5)	6.7	(1.3)
Total	100.0		100.0		100.0		100.0	

Photo courtesy of Judy Rodriguez

Feeding cows based on production or state of lactation can decrease feed costs while providing optimal nutrition. Some operations are limited in their ability to provide separate rations due to facilities or cost constraints. The majority of small and medium operations fed lactating cows the same ration (65.6 and 62.2 percent of operations, respectively), while large operations most frequently fed individuals or groups based on production or stage of lactation (70.5 percent of operations).

b. Percentage of operations by feeding practice used to feed lactating cows, and by herd size:

Percent Operations

Herd Size (Number of Cows)

	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Feeding Practice	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Feed all cows the same ration	65.6	(3.7)	62.2	(4.0)	27.2	(4.6)	62.3	(2.7)
Feed individuals or groups based on production/stage of lactation	32.9	(3.6)	34.0	(4.0)	70.5	(4.5)	35.6	(2.7)
Feed individuals or groups based on lactation number	1.5	(0.8)	1.6	(0.7)	2.2	(1.2)	1.6	(0.6)
Feed individuals or groups based on criteria other than production/stage of lactation or lactation number	0.0	(--)	2.2	(1.1)	0.1	(0.1)	0.5	(0.3)
Total	100.0		100.0		100.0		100.0	

A higher percentage of operations in the West region (52.9 percent) fed individual cows or groups of cows based on production or stage of lactation compared with operations in the East region (33.9 percent). A higher percentage of operations in the East region (63.8 percent) fed all cows the same ration compared with operations in the West region (45.8 percent).

c. Percentage of operations by feeding practice used to feed lactating cows, and by region:

	Percent Operations			
	Region			
	West		East	
Feeding Practice	**Percent**	**Std. Error**	**Percent**	**Std. Error**
Feed all cows the same ration	45.8	(4.7)	63.8	(2.9)
Feed individuals or groups based on production/stage of lactation	52.9	(4.6)	33.9	(2.9)
Feed individuals or groups based on lactation number	0.8	(0.8)	1.7	(0.7)
Feed individuals or groups based on criteria other than production/stage of lactation or lactation number	0.5	(0.5)	0.6	(0.3)
Total	100.0		100.0	

Feeding anionic salts reduces the incidence of milk fever, although accurate delivery and palatability are issues associated with feeding anionic salts. Since heifers are at very low risk for milk fever, feeding them anionic salts is generally not recommended. The percentage of operations feeding anionic salts to close-up cows increased as herd size increased. A lower percentage of operations fed anionic salts to springing heifers compared to close-up cows (15.7 and 22.9 percent, respectively). A lower percentage of small operations (11.1 percent) fed anionic salts to heifers compared with medium and large operations (23.1 and 36.1 percent, respectively).

d. Percentage of operations that fed anionic salts (e.g., BioChlor™, SoyChlor®, ammonium chloride, etc.) to prevent milk fever, by cattle class and by herd size:

	Percent Operations							
	Herd Size (Number of Cows)							
	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Cattle Class	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Close-up cows[1]	16.7	(2.8)	31.4	(3.8)	56.7	(5.5)	22.9	(2.2)
Springing heifers[2]	11.1	(2.4)	23.1	(3.3)	36.1	(5.7)	15.7	(1.9)

[1]Cows 2 to 4 weeks prior to calving.
[2]Springing heifers 2 to 4 weeks prior to calving.

A higher percentage of operations in the West region fed anionic salts to close-up cows or springing heifers compared with operations in the East region.

e. Percentage of operations that fed anionic salts (e.g., BioChlor, SoyChlor, ammonium chloride, etc.) to prevent milk fever, by cattle class and by region:

	Percent Operations			
	Region			
	West		**East**	
Cattle Class	**Percent**	**Std. Error**	**Percent**	**Std. Error**
Close-up cows[1]	49.7	(5.2)	20.3	(2.4)
Springing heifers[2]	33.5	(5.2)	14.0	(2.0)

[1]Cows 2 to 4 weeks prior to calving.
[2]Springing heifers 2 to 4 weeks prior to calving.

Separating close-up cows makes it possible to change feeding strategies, such as increasing energy levels or adding anionic salts to the diet. The percentage of operations that separated close-up cows increased as herd size increased; 57.1 percent of all operations separated close-up cows from other dry cows.

f. Percentage of operations that separated close-up cows from other dry cows, by herd size:

Percent Operations

Herd Size (Number of Cows)							
Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Pct.	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
47.1	(3.9)	74.9	(3.7)	96.0	(2.1)	57.1	(2.9)

Milk urea nitrogen (MUN) testing provides a measure of energy and protein balance in rations fed to cows. The majority of small operations (58.3 percent) never tested MUN, while 48.6 percent of medium operations tested it routinely. A similar percentage of large operations either tested MUN routinely, only tested if there was a problem, or never tested MUN. Half of operations (49.8 percent) tested MUN.

g. Percentage of operations by frequency of milk urea nitrogen testing to determine ration composition, and by herd size:

Percent Operations

	Herd Size (Number of Cows)							
	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Frequency	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Used routinely	24.0	(3.0)	48.6	(4.2)	37.2	(5.7)	30.9	(2.4)
Use only if had a problem	17.7	(2.8)	20.6	(3.4)	24.8	(5.1)	18.9	(2.2)
Never used	58.3	(3.6)	30.8	(3.8)	38.0	(5.6)	50.2	(2.7)
Total	100.0		100.0		100.0		100.0	

9. Water sources

Water is one of the most important nutrients for cows. Lactating cows consume, either directly or in feed, between 20 and 35 gallons of water per day. In addition to providing clean water, cattle water sources should be easy to clean, readily accessible, and always available. The most common water source across all operation sizes was a water tank or trough (93.2 percent of operations).

a. Percentage of operations by source of drinking water for any cows during the previous 12 months, and by herd size:

Percent Operations

Herd Size (Number of Cows)

	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Water Source	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Single cup/bowl waterer used by one cow only	13.3	(2.8)	8.6	(2.6)	2.4	(1.9)	11.4	(2.0)
Single cup/bowl waterer used by multiple cows	74.5	(3.1)	47.7	(4.2)	15.0	(4.4)	64.1	(2.4)
Water tank or trough (covered or uncovered)	91.8	(2.1)	97.4	(1.6)	92.9	(3.4)	93.2	(1.5)
Lake, pond, stream, river, etc.	37.2	(3.7)	29.2	(3.7)	8.7	(2.9)	33.4	(2.7)
Other source	4.4	(1.7)	3.5	(1.5)	0.6	(0.5)	3.9	(1.3)

Photo courtesy of Judy Rodriguez

A higher percentage of operations in the East region used single cup/bowl waterers used by one or multiple cows compared with operations in the West region.

b. Percentage of operations by source of drinking water for any cows during the previous 12 months, by region:

	Percent Operations			
	Region			
	West		East	
Water Source	**Percent**	**Std. Error**	**Percent**	**Std. Error**
Single cup/bowl waterer used by one cow only	2.2	(1.6)	12.3	(2.2)
Single cup/bowl waterer used by multiple cows	12.9	(3.5)	69.0	(2.6)
Water tank or trough (covered or uncovered)	94.8	(2.5)	93.1	(1.6)
Lake, pond, stream, river, etc.	21.7	(4.7)	34.6	(2.9)
Other source	2.1	(1.1)	4.1	(1.4)

Cleaning water sources may reduce cattle's exposure to pathogens such as *E. coli* and *Salmonella*. The average number of times per year that dairy operations cleaned water sources varied. About one of three operations cleaned single cup/bowl for one cow or water tank/trough 13 or more times per year. No cleaning was reported on 14.2 percent of operations using a single cup/bowl for one cow, 24.2 percent of operations using single cup/bowl for multiple cows, and 4.6 percent of operations using a water tank/trough.

c. Percentage of operations by average number of times per year water sources are drained ***and*** cleaned, by water source:

	Percent Operations					
	Water Source					
	Single Cup, One Cow		Single Cup, Multiple Cows		Water Tank/ Trough	
Number of Times	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
0	14.2	(7.3)	24.2	(3.9)	4.6	(1.4)
1 to 4	27.0	(10.4)	37.0	(4.3)	37.1	(3.2)
5 to 12	26.2	(10.4)	18.7	(3.4)	24.1	(2.8)
13 or more	32.6	(10.2)	20.1	(3.1)	34.2	(2.8)
Total	100.0		100.0		100.0	

Chlorinated water sources may reduce bacteria counts. Few operations (8.7 percent) reported using chlorinated water for cows. A higher percentage of medium operations (14.9 percent) used chlorinated water compared with small operations (6.0 percent).

d. Percentage of operations by whether usual water source for cows was chlorinated, and by herd size (table revised 3-12-09):

Percent Operations

Herd Size (Number of Cows)

	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Chlorinated Water	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Yes	6.0	(1.4)	14.9	(2.9)	13.8	(3.8)	8.7	(1.2)
Don’t know	0.9	(0.7)	1.8	(1.0)	0.6	(0.3)	1.1	(0.5)
No	93.1	(1.5)	83.3	(3.0)	85.6	(3.8)	90.2	(1.3)
Total	100.0		100.0		100.0		100.0	

There were no differences by region in the percentages of operations in which cows drank chlorinated water.

e. Percentage of operations by whether usual water source for cows was chlorinated, and by region:

Percent Operations

Region

	West		**East**	
Chlorinated Water	**Percent**	**Std. Error**	**Percent**	**Std. Error**
Yes	16.7	(4.0)	7.9	(1.3)
Don’t know	0.4	(0.4)	1.2	(0.6)
No	82.9	(4.0)	90.9	(1.4)
Total	100.0		100.0	

NOTE: The estimates in tables a and b were calculated using data collected during Phase II of the study (see Methodology). Similar estimates were generated using data collected during Phase I of the study and are included on p 87 and 88 of Part I: Reference of Dairy Cattle Health and Management Practices in the United States, 2007. The estimates from Phase I and Phase II are similar and within two standard errors of one another, even though they represent different 12-month periods.

10. Permanently removed cows

Cows are permanently removed from dairy operations for multiple reasons, including low productivity, clinical disease, and space issues. Excluding those that died, one of four cows (25.8 percent) were removed during the previous 12 months. There were no differences across herd sizes in the percentages of cows removed.

a. Percentage of cows permanently removed from the operation during the previous 12 months (excluding those that died), by herd size:

Percent Cows

Herd Size (Number of Cows)

Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Pct.	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
25.2	(1.1)	24.8	(0.8)	26.7	(1.8)	25.8	(0.9)

The majority of operations that permanently removed cows (87.8 percent) sent cows to a market, auction, or stockyard. No differences were observed across herd sizes in the percentage of operations by destination of permanently removed cows.

b. Percentage of operations by destination for permanently removed cows during the previous 12 months, and by herd size:

Percent Operations

Herd Size (Number of Cows)

	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Destination	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Another dairy	12.0	(2.4)	11.7	(2.6)	8.3	(3.4)	11.7	(1.8)
Market, auction, or stockyard	86.7	(2.7)	90.3	(2.1)	89.8	(3.6)	87.8	(2.0)
Packer or slaughter plant	23.2	(3.4)	26.2	(3.6)	41.1	(5.8)	25.0	(2.5)
Other	3.7	(1.5)	1.7	(0.7)	2.7	(1.9)	3.2	(1.1)

An average of 1.5 shipments per month was made to transport permanently removed cows to a market, auction, or stockyard. The number of shipments increased as herd size increased. On average, few shipments were reported for cows going to another dairy, packer or slaughter plant, or other destination.

c. Operation average number of shipments required to transport permanently removed cows off the operation during an average month, by destination and by herd size:

Operation Average Number of Shipments (Month)

Herd Size (Number of Cows)

	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Destination	**No.**	**Std. Error**	**No.**	**Std. Error**	**No.**	**Std. Error**	**No.**	**Std. Error**
Another dairy	0.6	(0.1)	1.0	(0.2)	1.1	(0.4)	0.8	(0.1)
Market, auction, or stockyard	1.1	(0.1)	2.2	(0.1)	3.8	(0.3)	1.5	(0.1)
Packer or slaughter plant	0.8	(0.1)	1.8	(0.3)	2.7	(0.3)	1.3	(0.1)
Other	0.2	(0.1)	1.2	(0.2)	1.9	(0.7)	0.5	(0.1)

Cows permanently removed later in lactation usually represent a lower financial loss than cows removed prior to peak lactation. The majority of permanently removed cows (58.0 percent) were 200 days or more in milk at the time of removal, while less than 20 percent were fewer than 50 days in milk.

d. For operations that permanently removed cows during the previous 12 months, percentage of cows removed, by days in milk and by herd size:

Percent Cows

Herd Size (Number of Cows)

	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Days in Milk	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Fewer than 50	15.9	(1.5)	19.3	(1.3)	14.4	(1.9)	16.2	(1.1)
50 to 199	24.7	(1.7)	23.3	(1.5)	21.1	(2.5)	22.6	(1.3)
200 or more	54.5	(2.1)	53.7	(2.0)	62.5	(3.3)	58.0	(1.8)
Dry cows	4.9	(0.9)	3.7	(0.9)	2.0	(0.4)	3.2	(0.4)
Total	100.0		100.0		100.0		100.0	

Operations in the West region permanently removed a higher percentage of cows 200 days or more in milk (65.7 percent) compared with operations in the East region (53.1 percent). A higher percentage of dry cows in the East region (4.2 percent) were permanently removed compared with dry cows in the West region (1.7 percent).

e. For operations that permanently removed cows during the previous 12 months, percentage of cows removed, by days in milk and by region:

	Percent Cows			
	Region			
	West		East	
Days in Milk	**Percent**	**Std. Error**	**Percent**	**Std. Error**
Fewer than 50	13.1	(2.2)	18.1	(1.0)
50 to 199	19.5	(2.6)	24.6	(1.3)
200 or more	65.7	(3.5)	53.1	(1.7)
Dry cows	1.7	(0.3)	4.2	(0.6)
Total	100.0		100.0	

The longer a cow stays in the herd and is productive, the more milk and income she generates. Cows removed during first lactation are not able to generate enough income to cover their rearing costs. Approximately one in six permanently removed cows (16.9 percent) was in its first lactation; there were no differences across herd size in the percentage of cows removed in first lactation. A higher percentage of cows on small operations (32.8 percent) were removed at the fifth lactation or more compared with medium and large operations (26.0 and 19.5 percent of cows, respectively).

f. For operations that permanently removed cows during the previous 12 months, percentage of cows removed, by lactation number and by herd size:

Percent Cows

Herd Size (Number of Cows)

	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Lactation Number	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
First	17.5	(1.1)	16.4	(0.9)	17.0	(2.2)	16.9	(1.1)
2 to 4	49.7	(1.8)	57.6	(1.8)	63.5	(2.6)	58.5	(1.4)
5 or more	32.8	(1.9)	26.0	(1.7)	19.5	(2.4)	24.6	(1.4)
Total	100.0		100.0		100.0		100.0	

E. Milk Quality and Milking Procedures

1. Bulk tank somatic cell count

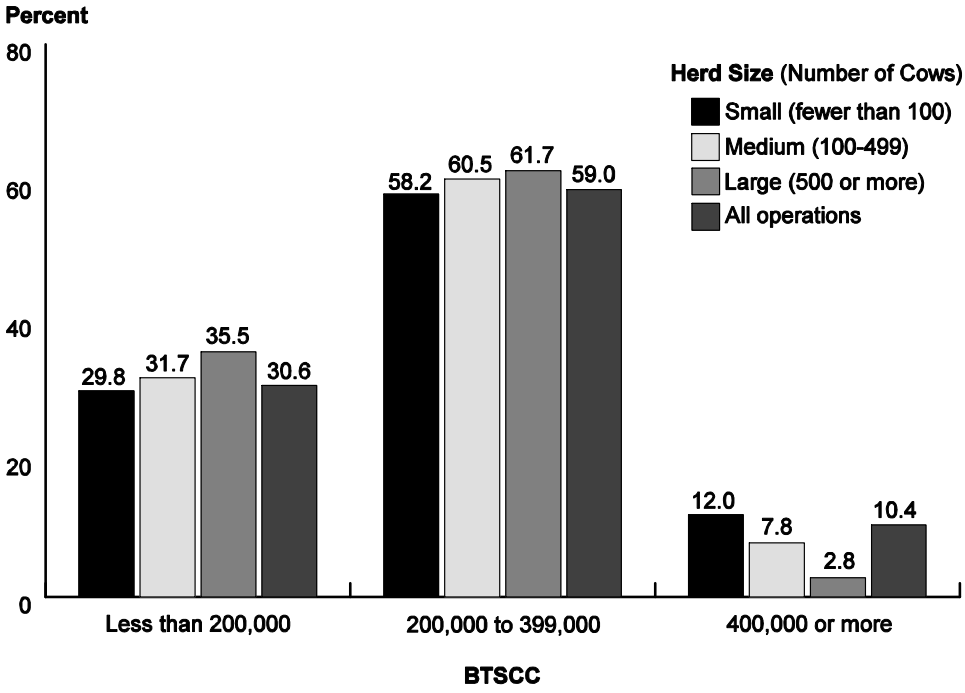
Bulk tank somatic cell count (BTSCC) refers to the number of white blood cells (leukocytes) and secretory cells per milliliter of raw milk and is used a measure of milk quality and udder health. Increased BTSCCs are generally associated with increased intramammary infection and decreased milk production. The current regulatory limit for BTSCC in the United States is 750,000 cells/ml. Although the U.S. regulatory limit is 750,000 cells/ml, producers may lose quality premiums or receive less money for their milk if it does not meet the quality guidelines determined by the processor who purchases their milk. Almost 9 of 10 operations (89.6 percent) reported an average BTSCC below 400,000 cells/ml, and 70.9 percent reported less than 300,000 cells/ml. Herd-size differences were minimal, with a lower percentage of medium operations having a BTSCC of less than 100,000 cells/ml compared with small and large operations.

a. Percentage of operations by average BTSCC for milk shipped during the previous 12 months, and by herd size:

Percent Operations

	Herd Size (Number of Cows)							
	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
BTSCC (cells/ml)	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Less than 100,000	3.7	(1.4)	0.3	(0.2)	3.2	(1.8)	2.8	(1.0)
100,000 to 199,000	26.1	(3.5)	31.4	(4.0)	32.3	(5.5)	27.8	(2.6)
200,000 to 299,000	38.4	(3.7)	43.5	(4.3)	47.6	(6.2)	40.3	(2.8)
300,000 to 399,000	19.8	(2.7)	17.0	(3.0)	14.1	(4.1)	18.7	(2.0)
400,000 to 499,000	9.6	(2.6)	7.8	(2.3)	2.3	(1.2)	8.7	(1.9)
500,000 or more	2.4	(1.5)	0.0	(--)	0.5	(0.5)	1.7	(1.0)
Total	100.0		100.0		100.0		100.0	

Percentage of Operations by Average BTSCC for Milk Shipped During the Previous 12 Months, and by Herd Size



There were no substantial differences by region in the percentages of operations by average BTSCC.

b. Percentage of operations by average BTSCC for milk shipped during the previous 12 months, and by region:

	Percent Operations			
	Region			
	West		East	
BTSCC (cells/ml)	**Percent**	**Std. Error**	**Percent**	**Std. Error**
Less than 100,000	2.7	(1.4)	2.8	(1.1)
100,000 to 199,000	34.6	(5.1)	27.2	(2.8)
200,000 to 299,000	38.2	(4.9)	40.5	(3.0)
300,000 to 399,000	18.9	(4.5)	18.7	(2.2)
400,000 to 499,000	4.7	(2.1)	9.1	(2.1)
500,000 or more	0.9	(0.6)	1.7	(1.1)
Total	100.0		100.0	

2. Milking personnel and training

Owners of large operations are usually more involved with the overall management of the operation than with specific labor-intensive procedures such as milking cows. The percentage of owners/operators that milked the majority of cows decreased from 74.8 percent for small operations to 0.0 percent of large operations. Family members milked the majority of cows on 17.4 percent of small operations and on 14.3 percent of medium operations. No large operations reported family members performing the majority of milking. The number of employees increased as herd size increased. Large operations averaged almost 13 full-time employees, while small operations averaged 2 (see table 4b p 11). The percentage of operations in which hired workers milked the majority of cows increased as herd size increased. Hired workers milked the majority of cows on 100.0 percent of large operations.

a. Percentage of operations by personnel who milked the majority of cows, and by herd size:

	Percent Operations							
	Herd Size (Number of Cows)							
	Small (Fewer than 100)		Medium (100-499)		Large (500 or More)		All Operations	
Personnel	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Owner/operator	74.8	(3.3)	33.7	(3.9)	0.0	(--)	59.8	(2.5)
Family member(s) of operator	17.4	(3.0)	14.3	(3.1)	0.0	(--)	15.6	(2.2)
Hired worker(s)	7.8	(1.8)	52.0	(3.9)	100.0	(0.0)	24.6	(1.7)
Total	100.0		100.0		100.0		100.0	

Hired workers milked the majority of cows on the highest percentage of operations in the West region (82.7 percent), while owners/operators milked the majority of cows on the highest percentage of operations in the East region (64.1 percent). A higher percentage of operations in the East region had family members milk the majority of cows compared with operations in the West region (16.9 and 1.2 percent, respectively).

b. Percentage of operations by personnel who milked the majority of cows, and by region:

	Percent Operations			
	Region			
	West		East	
Personnel	Percent	Std. Error	Percent	Std. Error
Owner/operator	16.1	(3.4)	64.1	(2.7)
Family member(s) of operator	1.2	(0.8)	16.9	(2.4)
Hired worker(s)	82.7	(3.5)	19.0	(1.8)
Total	100.0		100.0	

Although owners/operators milked the majority of cows on the most operations (reflecting the practice of small operations), the highest percentage of cows were milked by hired workers (68.2 percent) [reflecting the practice of large operations]. Almost one-quarter of cows (24.4 percent) were milked by owners/operators, while 7.4 percent were milked by family members.

c. Percentage of cows on operations in which the majority of cows were milked by the specified personnel:

Personnel	Percent Cows	Standard Error
Owner/operator	24.4	(1.5)
Family member(s) of operator	7.4	(1.1)
Hired worker(s)	68.2	(1.6)
Total	100.0	

Training milking personnel in the proper procedures used to milk cows and providing reasons for the procedures are usually ongoing processes, as milking protocols are often modified or updated. Milker training increased as herd size increased, with 42.3 percent of small operations training milking personnel compared with 75.3 percent of medium operations and 97.8 percent of large operations. Approximately one of three operations (35.6 percent) trained new employees only, while almost half of operations (46.0 percent) provided no milker training. However, approximately one of three operations that reported no milker training also reported they had no employees. A lower percentage of small operations (2.9 percent) performed training one to two times/year for all milkers compared with medium and large operations (14.1 and 27.0 percent, respectively).

d. Percentage of operations by how frequently milking personnel were trained, and by herd size:

Percent Operations

Herd Size (Number of Cows)

	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Frequency	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
As new employees only	31.2	(3.6)	46.4	(4.1)	41.5	(5.6)	35.6	(2.7)
1 to 2 times/year for all milkers	2.9	(1.0)	14.1	(2.8)	27.0	(5.5)	7.2	(1.0)
3 to 4 times/year for all milkers	2.3	(1.3)	4.1	(1.3)	13.7	(3.8)	3.5	(1.0)
5 times/year or more for all milkers	1.0	(0.9)	6.6	(2.4)	10.5	(3.4)	3.0	(0.9)
Other	4.9	(1.6)	4.1	(1.8)	5.1	(2.5)	4.7	(1.2)
No milker training	57.7	(3.8)	24.7	(3.7)	2.2	(2.1)	46.0	(2.8)
Total	100.0		100.0		100.0		100.0	

Photo courtesy of Keith Weller, Agricultural Research Service

A higher percentage of operations in the West region provided milker training to new employees only or provided training one to two times/year for all milkers, compared with operations in the East region.

e. Percentage of operations by how frequently milking personnel were trained, and by region:

	Percent Operations			
	Region			
	West		East	
Frequency	**Percent**	**Std. Error**	**Percent**	**Std. Error**
As new employees only	53.5	(5.6)	33.9	(2.9)
1 to 2 times/year for all milkers	20.7	(4.0)	5.9	(1.1)
3 to 4 times/year for all milkers	6.7	(2.8)	3.2	(1.0)
5 times/year or more for all milkers	1.5	(0.9)	3.1	(1.0)
Other	2.0	(1.4)	5.0	(1.3)
No milker training	15.6	(3.9)	48.9	(3.0)
Total	100.0		100.0	

Almost all operations that trained milkers (97.1 percent) used on-the-job training. Almost one-third (31.9 percent) used discussion and lecture, while less than 1 of 10 (6.9 percent) used video training.

f. For operations that trained milking personnel, percentage of operations by training method used:

Training Method	Percent Operations	Standard Error
Video training	6.9	(1.1)
Discussion/lecture	31.9	(3.2)
On-the-job training	97.1	(0.9)
Other	3.9	(1.0)

3. Milking frequency

Milk production can be negatively affected by intramammary pressure. Frequent milking during peak production can decrease periods of increased intramammary pressure. Although increased milking frequency opens the teat canal more times, the risk for intramammary infection does not appear to be increased. Evidence suggests that increasing the times per day that fresh cows (cows less than 30 days in milk) are milked increases milk production, which persists throughout lactation. More than 9 of 10 operations (91.8 percent) milked fresh cows twice daily, while less than 1 of 10 (6.2 percent) milked fresh cows 3 times daily. Few operations milked fresh cows one time per day or more than three times per day (0.6 and 1.4 percent, respectively). The percentage of operations that milked fresh cows three times per day increased as herd size increased.

a. Percentage of operations by number of times per day the majority of ***fresh*** cows were milked, and by herd size:

Percent Operations

Herd Size (Number of Cows)

	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Times per Day	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
1	0.6	(0.6)	0.5	(0.5)	0.0	(--)	0.6	(0.4)
2	98.4	(0.9)	81.8	(2.8)	58.9	(4.7)	91.8	(1.0)
3	1.0	(0.6)	13.3	(2.4)	35.1	(4.4)	6.2	(0.8)
More than 3	0.0	(--)	4.4	(1.7)	6.0	(2.7)	1.4	(0.5)
Total	100.0		100.0		100.0		100.0	

A lower percentage of operations in the West region (82.2 percent) milked fresh cows twice daily compared with operations in the East region (92.7 percent). A higher percentage of operations in the West region (17.8 percent) milked fresh cows three or more times daily compared with operations in the East region (6.7 percent).

b. Percentage of operations by number of times per day the majority of ***fresh*** cows were milked, and by region:

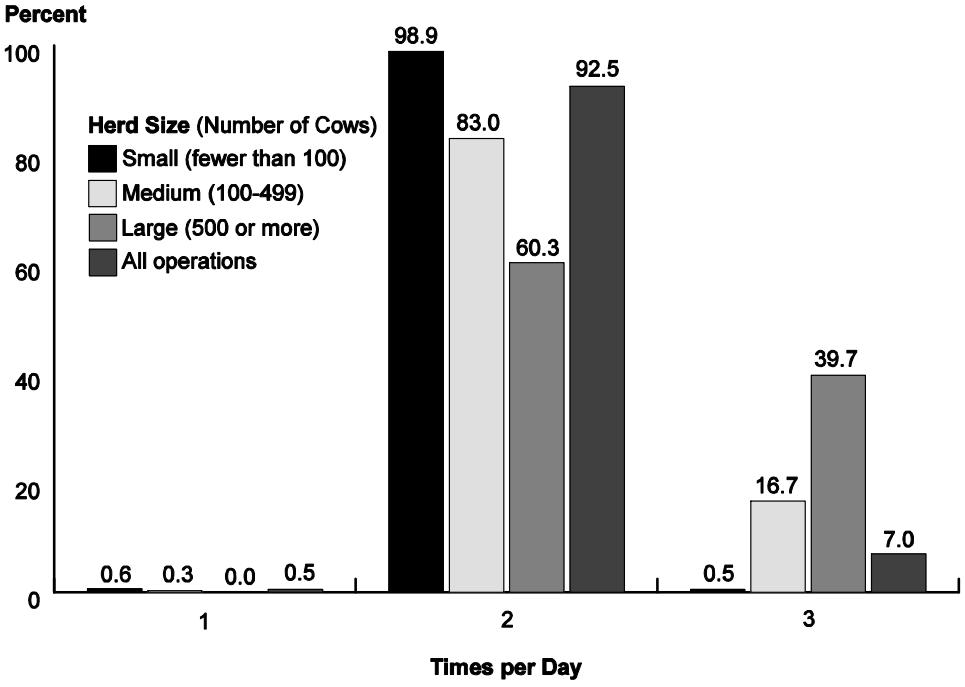
	Percent Operations			
	Region			
	West		East	
Times per Day	**Percent**	**Std. Error**	**Percent**	**Std. Error**
1	0.0	(--)	0.6	(0.5)
2	82.2	(3.4)	92.7	(1.0)
3	13.7	(3.1)	5.5	(0.8)
More than 3	4.1	(2.0)	1.2	(0.5)
Total	100.0		100.0	

The majority of operations (92.5 percent) milked cows (other than fresh cows) twice daily. As was observed with the frequency of milking fresh cows, the percentage of operations that milked cows three times per day increased as herd size increased. No operations milked the majority of their cows more than three times per day.

c. Percentage of operations by number of times per day the majority of cows (other than fresh cows) were milked, and by herd size:

	Percent Operations							
	Herd Size (Number of Cows)							
	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Times per Day	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
1	0.6	(0.6)	0.3	(0.3)	0.0	(--)	0.5	(0.4)
2	98.9	(0.7)	83.0	(2.8)	60.3	(5.2)	92.5	(0.9)
3	0.5	(0.4)	16.7	(2.8)	39.7	(5.2)	7.0	(0.8)
Total	100.0		100.0		100.0		100.0	

Percentage of Operations by Number of Times per Day the Majority of Cows (Other than Fresh Cows) Were Milked, and by Herd Size



A higher percentage of operations in the West region (14.9 percent) milked cows three times daily compared with operations in the East region (6.2 percent). No operations milked the majority of their cows more than three times per day.

d. Percentage of operations by the number of times per day the majority of cows, other than fresh cows, were milked, and by region:

Percent Operations

Region

	West		**East**	
Times per Day	**Percent**	**Std. Error**	**Percent**	**Std. Error**
1	0.0	(--)	0.6	(0.5)
2	85.1	(3.0)	93.2	(1.0)
3	14.9	(3.0)	6.2	(0.8)
Total	100.0		100.0	

The percentage of operations that milked fresh cows more frequently than nonfresh cows increased as herd size increased. Only 0.5 percent of small operations milked fresh cows more often than nonfresh cows, compared with 5.7 percent of medium operations and 12.3 percent of large operations.

e. Percentage of operations that milked fresh cows more often than nonfresh cows:

Percent Operations

Herd Size (Number of Cows)

Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Pct.	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
0.5	(0.5)	5.7	(1.8)	12.3	(4.4)	2.5	(0.6)

4. Premilking procedures

Forestripping is the manual removal of a small amount of milk from each teat prior to the attachment of the milking machine. Forestripping cows stimulates milk secretion from mammary tissue, allows the milker to observe any abnormalities in the milk, and removes milk with concentrated somatic cells, thereby improving milk quality. A higher percentage of large operations (83.5 percent) forestripped all cows compared with medium and small operations (66.9 and 53.7 percent, respectively). A higher percentage of small and medium operations forestripped some cows (37.3 and 30.3 percent, respectively), compared with 8.3 percent of large operations. Less than 10 percent of operations across all herd sizes did not forestrip any cows.

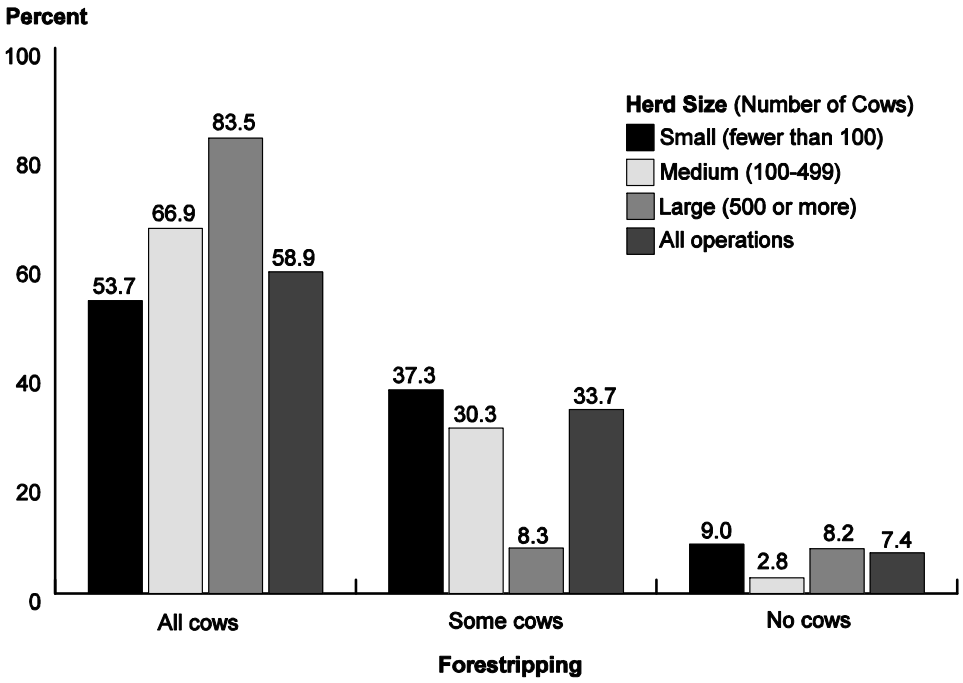
a. Percentage of operations by use of forestripping and by herd size:

Percent Operations

Herd Size (Number of Cows)

	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Forestripping	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
All cows	53.7	(3.9)	66.9	(3.9)	83.5	(4.2)	58.9	(2.9)
Some cows	37.3	(3.8)	30.3	(3.9)	8.3	(2.4)	33.7	(2.8)
No cows	9.0	(2.3)	2.8	(1.1)	8.2	(3.6)	7.4	(1.6)
Total	100.0		100.0		100.0		100.0	

Percentage of Operations by Use of Forestripping and by Herd Size



If forestripping is performed before teat disinfection or while disinfectant is still on the teat, it may reduce the transfer of organisms from the milker to the teat. Teats may become recontaminated with bacteria if forestripping is performed after drying. Approximately one of four operations (27.4 percent) forestripped cows prior to teat disinfection. A lower percentage of small operations forestripped cows after disinfection but prior to drying compared to large operations (26.8 and 46.7 percent, respectively), while a higher percentage of small operations (47.0 percent) forestripped cows after disinfection and drying compared with large operations (22.4 percent).

b. For operations that forestripped any cows, percentage of operations by order of forestripping and by herd size:

Percent Operations

Herd Size (Number of Cows)

Order	**Small** (Fewer than 100) Pct.	Std. Error	**Medium** (100-499) Pct.	Std. Error	**Large** (500 or More) Pct.	Std. Error	**All Operations** Pct.	Std. Error
Prior to teat disinfection	26.2	(3.4)	29.7	(3.9)	30.9	(5.7)	27.4	(2.6)
After teat disinfection but prior to drying teats	26.8	(3.5)	31.6	(3.6)	46.7	(6.2)	29.3	(2.6)
After disinfection and/or drying	47.0	(4.0)	38.7	(4.1)	22.4	(5.0)	43.3	(2.9)
Total	100.0		100.0		100.0		100.0	

A lower percentage of operations in the West region (22.8 percent) forestripped after disinfection and/or drying compared with operations in the East region (45.2 percent).

c. For operations that forestripped any cows, percentage of operations by order of forestripping and by region:

Percent Operations

Region

Order	**West** Percent	Std. Error	**East** Percent	Std. Error
Prior to teat disinfection	37.4	(5.6)	26.4	(2.7)
After teat disinfection but prior to drying teats	39.8	(5.6)	28.4	(2.7)
After disinfection and/or drying	22.8	(4.3)	45.2	(3.1)
Total	100.0		100.0	

Disinfecting teats before milking reduces environmental bacteria on the teat surface, bacterial counts in milk, and the incidence of new intramammary infections. Scientific studies evaluating the efficacy of premilking and postmilking teat disinfectants have been evaluated and are summarized each year in the proceedings from the NMC annual meeting. Using a new paper or cloth towel on each cow also reduces the risk of transmitting organisms from one cow to another. More than 4 of 10 large operations (41.5 percent) used a wash pen prior to milking, compared with less than 3 percent of small and medium operations. There were no differences by herd size in the percentage of operations that used water hoses; 2.8 percent of operations used water hoses with disinfectant and 4.2 percent used water hoses without disinfectant. A single-use paper towel dry wipe was used on 7.0 percent of operations. A single-use towel with labeled disinfectant was the predominant wet wipe used on 8.5 percent of operations. A higher percentage of small operations used this wet wipe method (10.3 percent) compared with large operations (1.5 percent). Almost half of all operations (49.0 percent) applied a labeled disinfectant in a predip via a predip cup. Predip (using a labeled disinfectant) applied via a sprayer was reported on 18.1 percent of operations, with a higher percentage of large operations using this method of teat disinfection than small operations.

d. Percentage of operations by teat preparation and by herd size:

Teat Preparation		Percent Operations Herd Size (Number of Cows) Small (Fewer than 100)		Medium (100-499)		Large (500 or More)		All Operations	
General Method	Specific Procedure	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Wash pen	Wash animals in pen prior to entering parlor	1.2	(1.0)	2.4	(1.0)	41.5	(5.1)	4.1	(0.8)
Water hose	With disinfectant	2.6	(1.4)	2.3	(0.9)	6.7	(2.8)	2.8	(1.0)
	Without disinfectant	4.7	(1.3)	2.3	(0.9)	5.9	(2.8)	4.2	(1.0)
Dry wipe	Single-use cloth towel	2.7	(1.3)	4.7	(2.0)	3.8	(2.1)	3.3	(1.0)
	Multiple-use cloth towel	1.3	(0.7)	3.3	(1.2)	6.0	(2.9)	2.1	(0.6)
	Single-use paper towel	7.9	(1.9)	5.4	(2.1)	3.5	(2.4)	7.0	(1.4)
	Multiple-use paper towel	0.0	(--)	0.4	(0.3)	0.0	(--)	0.1	(0.1)
Wet wipe	Commercial teat wipes, single use	4.0	(1.4)	5.8	(2.3)	0.9	(0.8)	4.2	(1.1)
	Commercial teat wipes, multiple use	0.9	(0.9)	0.4	(0.4)	0.0	(--)	0.7	(0.6)
	Towel using labeled disinfectant, single use	10.3	(2.4)	5.1	(1.8)	1.5	(0.9)	8.5	(1.7)
	Towel using labeled disinfectant, multiple use	6.1	(1.9)	2.0	(0.9)	3.5	(2.4)	4.9	(1.4)
	Towel using nonlabeled/homemade disinfectant, single use	3.2	(1.7)	2.1	(1.3)	0.0	(--)	2.7	(1.2)
	Towel using nonlabeled/homemade disinfectant, multiple use	0.5	(0.5)	0.6	(0.5)	0.0	(--)	0.5	(0.3)
	Multiple use sponge with disinfectant	1.8	(0.9)	0.2	(0.2)	0.0	(--)	1.3	(0.6)
Predip applied via ...	Sprayer, labeled disinfectant	13.6	(2.5)	25.4	(3.5)	38.2	(5.6)	18.1	(2.0)
	Sprayer, nonlabeled/ homemade disinfectant	0.0	(--)	2.0	(1.4)	1.7	(1.6)	0.6	(0.4)
	Predip cup, labeled disinfectant	49.8	(3.9)	51.0	(4.2)	32.3	(5.3)	49.0	(2.9)
	Predip cup, nonlabeled/homemade disinfectant	2.8	(1.5)	0.7	(0.7)	1.9	(1.3)	2.2	(1.0)
	Foam, labeled disinfectant	1.4	(0.8)	8.2	(2.1)	6.1	(2.5)	3.4	(0.8)
	Foam, nonlabeled/ homemade disinfectant	0.0	(--)	0.7	(0.7)	0.0	(--)	0.2	(0.2)
Other		6.5	(1.9)	3.7	(1.4)	1.4	(0.7)	5.5	(1.3)

Few regional differences were observed in the implementation of premilking teat preparation practices. A higher percentage of operations in the West used a wash pen, a water hose without disinfectant, or applied a labeled disinfectant in a predip via a sprayer compared with operations in the East region. A higher percentage of operations in the East region used a predip cup to apply a labeled disinfectant to teats compared with operations in the West.

e. Percentage of operations by teat preparation and by region:

		Percent Operations			
		Region			
Teat Preparation		West		East	
General Method	Specific Procedure	Percent	Std. Error	Percent	Std. Error
Wash pen	Wash animals in pen prior to entering parlor	36.8	(4.6)	0.9	(0.8)
Water hose	With disinfectant	9.3	(2.9)	2.2	(1.0)
	Without disinfectant	13.9	(3.7)	3.3	(1.0)
Dry wipe	Single-use cloth towel	4.2	(2.4)	3.2	(1.1)
	Multiple-use cloth towel	4.7	(2.4)	1.8	(0.6)
	Single-use paper towel	12.3	(4.6)	6.5	(1.5)
	Multiple-use paper towel	0.4	(0.4)	0.1	(0.1)
Wet wipe	Commercial teat wipes, single use	3.5	(2.2)	4.3	(1.2)
	Commercial teat wipes, multiple use	0.0	(--)	0.8	(0.7)
	Towel using labeled disinfectant, single use	2.2	(1.6)	9.1	(1.9)
	Towel using labeled disinfectant, multiple use	7.1	(3.6)	4.7	(1.5)
	Towel using nonlabeled/homemade disinfectant, single use	3.0	(3.0)	2.7	(1.3)
	Towel using nonlabeled/homemade disinfectant, multiple use	0.4	(0.4)	0.5	(0.4)
	Multiple use sponge with disinfectant	0.8	(0.8)	1.4	(0.7)
Predip applied via . . .	Sprayer, labeled disinfectant	36.5	(4.7)	16.3	(2.1)
	Sprayer, nonlabeled/ homemade disinfectant	1.1	(1.1)	0.5	(0.4)
	Predip cup, labeled disinfectant	27.4	(4.6)	51.1	(3.1)
	Predip cup, nonlabeled/homemade disinfectant	0.9	(0.9)	2.4	(1.1)
	Foam, labeled disinfectant	0.0	(--)	3.7	(0.9)
	Foam, nonlabeled/ homemade disinfectant	0.0	(--)	0.2	(0.2)
Other		0.0	(--)	6.0	(1.5)

The majority of operations (about 60 percent) used iodophor compounds as predips in both summer and winter. Chlorhexidine was the next most common predip used by about 1 of 10 operations. There were no differences in summer or winter in the percentage of operations by compound used.

f. Percentage of operations by primary ***predip*** compounds used as disinfectants, and by season:

	Percent Operations			
	Season			
	Summer		Winter	
Compound	**Percent**	**Std. Error**	**Percent**	**Std. Error**
Iodophor (iodine containing)	59.6	(2.9)	59.7	(2.9)
Chlorhexidine	11.7	(2.1)	11.8	(2.1)
Fatty acid based	2.5	(0.7)	2.5	(0.7)
Quaternary ammonium	0.3	(0.2)	0.3	(0.2)
Phenols	0.1	(0.1)	0.1	(0.1)
Chlorine product	7.2	(1.5)	7.1	(1.5)
Other	7.9	(1.6)	8.0	(1.6)
None	10.7	(1.8)	10.5	(1.8)
Total	100.0		100.0	

Wet teats can cause liner slips and rapid air movement inside the milking claw, which may result in the injection of bacteria into teat canals, potentially resulting in mastitis. If teats become wet during premilking teat preparation, they should be dried using a single-use towel to decrease the risk of new infections. There were no seasonal differences in teat drying methods. Single-use paper or cloth towels were used on the majority of operations during summer and winter.

g. Percentage of operations by the method used to dry teats ***prior*** to milking, and by season:

	Percent Operations			
	Summer		Winter	
Drying Method	**Percent**	**Std. Error**	**Percent**	**Std. Error**
Air dry	12.4	(2.1)	12.3	(2.1)
Single-use cloth towel	21.5	(2.1)	21.6	(2.1)
Single-use paper towel	54.8	(2.8)	54.6	(2.8)
Multiple-use cloth towel	7.1	(1.3)	7.1	(1.3)
Multiple-use paper towel	0.6	(0.4)	0.6	(0.4)
Other	0.4	(0.3)	0.6	(0.3)
Not applicable–teats not wet prior to milking	3.2	(1.1)	3.2	(1.1)
Total	100.0		100.0	

Photo courtesy of Judy Rodriguez

5. Postmilking procedures

The use of postmilking teat disinfectant reduces the incidence of contagious mastitis. Less than 2 percent of operations did not use a postmilking teat disinfectant during summer and/or winter (1.4 and 1.2 percent, respectively). More than three of four operations dipped teats with a labeled postdip product in each season. Approximately one of eight operations applied labeled disinfectant with a sprayer during the summer and winter (12.6 and 12.8 percent, respectively).

a. Percentage of operations by postmilking teat disinfection method and by season:

	Percent Operations			
	Summer		Winter	
Teat Disinfection Method	**Percent**	**Std. Error**	**Percent**	**Std. Error**
Teats dipped with labeled postdip product	79.7	(2.4)	77.0	(2.5)
Teats dipped with nonlabeled/homemade solution	0.5	(0.4)	0.5	(0.4)
Teats sprayed with commercial postdip product	12.6	(1.8)	12.8	(1.9)
Teats foamed with commercial postdip product	0.5	(0.3)	0.5	(0.3)
Teats covered in commercial powder product	0.1	(0.1)	2.7	(0.9)
Other	1.4	(0.9)	1.2	(0.6)
None	5.2	(1.6)	5.3	(1.6)
Total	100.0		100.0	

The percentages of operations by postdip compound were similar to the percentages of operations by predip compound. The majority of operations (approximately 70 percent) used an iodophor compound. Chlorhexidine was used by about 13 percent of operations.

b. Percentage of operations by primary ***postdip*** compounds used as disinfectants, and by season:

	Percent Operations			
	Season			
	Summer		Winter	
Compound	**Percent**	**Std. Error**	**Percent**	**Std. Error**
Iodophor (iodine containing)	69.8	(2.9)	67.8	(2.9)
Chlorhexidine	12.1	(2.1)	13.4	(2.2)
Fatty acid based	6.4	(1.4)	7.2	(1.5)
Quaternary ammonium	0.3	(0.2)	0.8	(0.5)
Phenols	0.0	(--)	0.0	(0.0)
Chlorine product	2.3	(1.1)	1.7	(0.8)
Other	3.9	(1.1)	3.8	(1.1)
None	5.2	(1.6)	5.3	(1.6)
Total	100.0		100.0	

Barrier teat dip applied after milking provides germicidal protection, improves teat condition, and reduces the number of new cases of mastitis. Approximately one of four operations (24.5 percent) used a barrier teat dip on all cows all the time, with no differences across herd sizes. A higher percentage of large and medium operations used a barrier teat dip on all cows during winter or adverse weather compared with small operations. Overall, two of three operations (66.7 percent) did not use a barrier dip, with a higher percentage of small operations (70.9 percent) not using a barrier dip compared with large operations (44.7 percent).

c. Percentage of operations by use of barrier teat dip* and by herd size:

Percent Operations

	Herd Size (Number of Cows)							
	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Use of Barrier Teat Dip	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
All cows all the time	22.2	(2.9)	29.8	(3.8)	29.3	(5.7)	24.5	(2.2)
All cows during winter or adverse weather	0.0	(--)	5.6	(1.8)	14.4	(4.8)	2.3	(0.6)
Other	6.9	(2.1)	4.2	(1.8)	11.6	(3.9)	6.5	(1.6)
None	70.9	(3.3)	60.4	(4.1)	44.7	(5.7)	66.7	(2.5)
Total	100.0		100.0		100.0		100.0	

*e.g., Blockade®, UDDERgold® 5-star.

A higher percentage of operations in the East region (68.4 percent) did not use a barrier teat dip compared with operations in the West region (49.0 percent). A higher percentage of operations in the West region (9.5 percent) used a barrier teat dip on all cows during winter or adverse weather compared with operations in the East region (1.6 percent).

d. Percentage of operations by use of barrier teat dip* and by region:

	Percent Operations			
	Region			
	West		East	
Use of Barrier Teat Dip	Percent	Std. Error	Percent	Std. Error
All cows all the time	37.8	(5.3)	23.2	(2.4)
All cows during winter or adverse weather	9.5	(3.4)	1.6	(0.5)
Other	3.7	(1.7)	6.8	(1.7)
None	49.0	(5.4)	68.4	(2.7)
Total	100.0		100.0	

*e.g., Blockade® Uddergold® 5-star.

6. Milking equipment

A backflush system is used between cows to wash the milking claw or cluster, thereby helping to reduce the spread of contagious mastitis pathogens. There were no differences in the percentage of operations that used a backflush system across herd sizes.

a. Percentage of operations that used a backflush system in milking units, by herd size:

Percent Operations							
Herd Size (Number of Cows)							
Small (Fewer than 100)		Medium (100-499)		Large (500 or More)		All Operations	
Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
5.9	(1.8)	8.6	(2.1)	9.3	(2.6)	6.8	(1.3)

A higher percentage of operations in the West region (20.9 percent) used a backflush system compared with operations in the East region (5.4 percent).

b. Percentage of operations that used a backflush system in milking units, by region:

Percent Operations

Region			
West		**East**	
Percent	**Standard Error**	**Percent**	**Standard Error**
20.9	(4.0)	5.4	(1.4)

The majority of operations that used a backflush system (91.4 percent) used the system for every milking.

c. For operations that used a backflush system, percentage of operations that used the system for every milking:

Percent Operations	**Standard Error**
91.4	(4.1)

Automatic takeoffs may improve teat-end condition by promptly removing the milking claw at a predetermined flow rate. A higher percentage of medium and large operations (76.9 and 89.5 percent, respectively) used automatic takeoffs compared with small operations (30.2 percent).

d. Percentage of operations that used automatic takeoffs, by herd size:

Percent Operations

Herd Size (Number of Cows)							
Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Pct.	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
30.2	(3.3)	76.9	(3.8)	89.5	(3.4)	45.4	(2.6)

About 7 of 10 operations in the West region (69.6 percent) used automatic takeoffs compared with approximately 4 of 10 operations in the East region (43.1 percent).

e. Percentage of operations that used automatic takeoffs, by region:

Percent Operations			
Region			
West		East	
Percent	Standard Error	Percent	Standard Error
69.6	(4.1)	43.1	(2.8)

7. Milking practices

Approximately half of operations (55.2 percent) reported that milkers wore latex or nitrile gloves to milk all cows. However, more than three of four cows (76.8 percent) were on operations in which gloves were used, suggesting that the practice is more common on large operations.

a. Percentage of operations (and percentage of cows on these operations) in which milkers wore latex or nitrile gloves to milk all cows:

Percent Operations	Standard Error	Percent Cows	Standard Error
55.2	(2.8)	76.8	(2.5)

Milking cows with clinical mastitis at the end of milking, with a separate milking unit, or in a separate string can reduce the exposure of noninfected cows to mastitis organisms. Approximately one of three operations (34.9 percent) used a separate milking unit to milk mastitic cows; no differences were observed across herd sizes. A higher percentage of large operations (83.4 percent) milked mastitic cows in a separate string from healthy cows compared with medium and small operations (33.4 and 29.8 percent, respectively).

b. Percentage of operations by method used for milking cows with clinical mastitis, and by herd size:

Percent Operations

	Herd Size (Number of Cows)							
	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Method	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Separate milking unit from healthy cows	38.5	(3.7)	25.7	(3.6)	31.5	(5.3)	34.9	(2.7)
Separate string from healthy cows	29.8	(3.5)	33.4	(3.8)	83.4	(4.7)	34.1	(2.6)

About 6 of 10 operations in the West region (59.9 percent) milked mastitis cows in a separate string from healthy cows compared with approximately 3 of 10 operations in the East region (31.6 percent).

c. Percentage of operations by method used to milk cows with clinical mastitis, and by region:

Percent Operations

	Region			
	West		**East**	
Method	**Percent**	**Std. Error**	**Percent**	**Std. Error**
Separate milking unit from healthy cows	27.5	(4.9)	35.6	(2.9)
Separate string from healthy cows	59.9	(5.0)	31.6	(2.8)

8. Vaccination

Although the efficacy of certain mastitis vaccines has been questioned, coliform vaccines have generally provided good protection. Coliform vaccines were used on at least some cows on 37.6 percent of operations, compared with vaccines for *Salmonella* (13.4 percent), siderophore receptors (4.1 percent), *Mycoplasma* (1.8 percent), and *Staphylococcus aureus* (7.3 percent).

a. Percentage of operations by type of vaccination used during the previous 12 months, and by proportion of cows vaccinated:

	Percent Operations						
	Proportion of Cows						
	All		Some		None		
Vaccination Type	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Total
Coliform mastitis	32.6	(2.4)	5.0	(1.1)	62.4	(2.6)	100.0
Salmonella	11.1	(1.5)	2.3	(0.7)	86.6	(1.6)	100.0
Siderophore receptors and porins (SRPs) vaccine	3.3	(0.7)	0.8	(0.4)	95.9	(0.8)	100.0
Mycoplasma	1.4	(0.5)	0.4	(0.2)	98.2	(0.6)	100.0
Staphylococcus aureus	5.7	(1.1)	1.6	(0.6)	92.7	(1.2)	100.0

Regional differences in vaccine use were observed for coliform mastitis and *Salmonella* vaccines. More operations in the West region vaccinated their cows than operations in the East region.

b. Percentage of operations that vaccinated at least some cows during the previous 12 months, by vaccination type and by region:

	Percent Operations			
	Region			
	West		East	
Vaccination Type	**Percent**	**Std. Error**	**Percent**	**Std. Error**
Coliform mastitis	65.1	(4.7)	35.0	(2.8)
Salmonella	36.4	(4.8)	11.1	(1.7)
Siderophore receptors and porins (SRPs) vaccine	9.2	(2.9)	3.6	(0.8)
Mycoplasma	4.1	(2.5)	1.6	(0.6)
Staphylococcus aureus	13.2	(3.5)	6.7	(1.3)

Less than 4 percent of operations administered an autogenous vaccine.

c. Percentage of operations that administered autogenous vaccines for any disease, by proportion of cows receiving vaccine:

Proportion of Cows	**Percent Operations**	**Standard Error**
All	2.2	(0.6)
Some	1.4	(0.9)
None	96.4	(1.1)
Total	100.0	

9. Milk cultures

Culturing milk has many benefits, including the identification of the most prevalent cause of clinical mastitis, helping direct mastitis therapy, and screening purchased herds or milking strings for contagious mastitis pathogens. A lower percentage of small operations performed individual cow, bulk-tank milk, string sample, or any cultures compared with medium and large operations. A higher percentage of large operations performed bulk-tank milk or string-sample cultures compared with medium and small operations. More than half of all operations (52.9 percent) performed milk cultures during the previous 12 months. More than 8 of 10 large operations (82.6 percent) performed any culture, compared with about 7 of 10 medium operations (68.4 percent) and 4 of 10 small operations (44.5 percent).

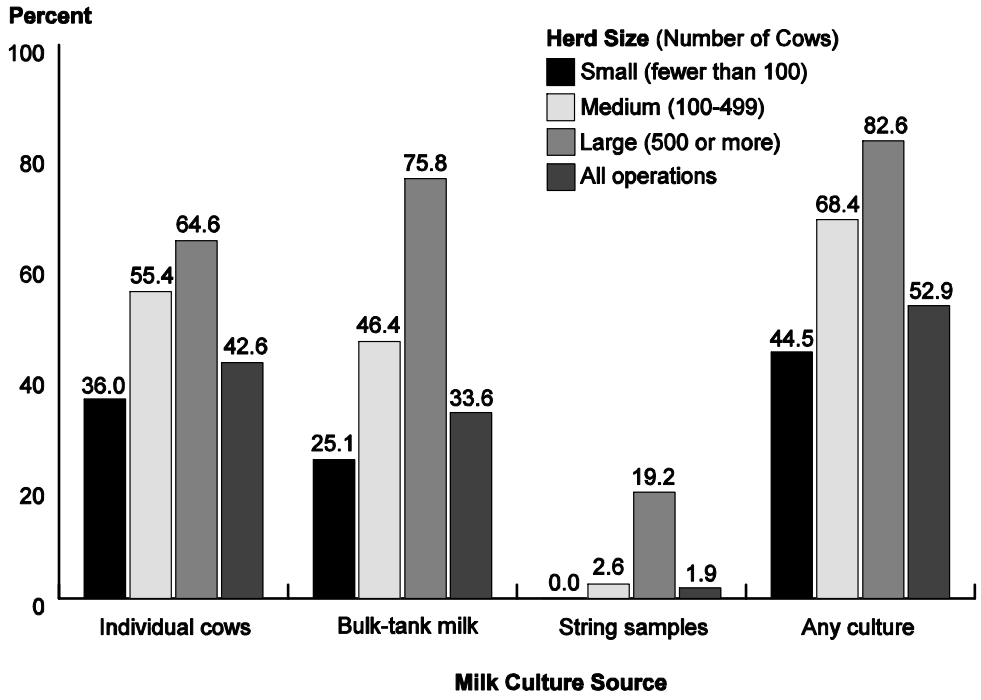
a. Percentage of operations by source of milk cultures performed during the previous 12 months, and by herd size:

Percent Operations

Herd Size (Number of Cows)

Milk Culture Source	Small (Fewer than 100)		Medium (100-499)		Large (500 or More)		All Operations	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Individual cows	36.0	(3.6)	55.4	(4.2)	64.6	(5.3)	42.6	(2.7)
Bulk-tank milk	25.1	(3.3)	46.4	(4.1)	75.8	(5.1)	33.6	(2.5)
String samples	0.0	(--)	2.6	(0.8)	19.2	(3.9)	1.9	(0.3)
Any culture	44.5	(3.8)	68.4	(3.9)	82.6	(4.6)	52.9	(2.8)

Percentage of Operations by Source of Milk Cultures Performed During the Previous 12 Months, and by Herd Size



A higher percentage of operations in the West region performed bulk-tank milk or string-sample cultures compared with operations in the East region.

b. Percentage of operations by source of milk cultures performed during the previous 12 months, and by region:

	Percent Operations			
	Region			
	West		East	
Milk Culture Source	Percent	Std. Error	Percent	Std. Error
Individual cows	43.4	(5.3)	42.6	(2.9)
Bulk-tank milk	60.6	(5.1)	31.0	(2.7)
String samples	11.0	(3.0)	1.0	(0.2)
Any culture	65.1	(5.0)	51.7	(3.1)

For operations that performed milk cultures during the previous 12 months, a higher percentage of large operations (20.8 percent) performed on-farm cultures compared with small operations (4.2 percent). A higher percentage of medium operations (45.5 percent) had cultures performed at a State or university diagnostic laboratory compared with small operations (24.1 percent). There were no differences across herd sizes in the percentage of operations that used a commercial laboratory, with approximately 4 of 10 operations (41.5 percent) using this facility type to culture milk. Almost 50 percent of operations performing milk cultures (49.2 percent) used a private veterinary laboratory or clinic, with no differences across herd sizes.

c. For operations that performed milk cultures during the previous 12 months, percentage of operations by facility used to perform cultures, and by herd size:

Percent Operations

Herd Size (Number of Cows)

	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Facility	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
On-farm, by farm personnel	4.2	(2.0)	14.0	(3.8)	20.8	(4.8)	9.0	(1.8)
State or university diagnostic laboratory	24.1	(4.9)	45.5	(5.0)	31.2	(4.4)	31.8	(3.3)
Commercial laboratory	38.9	(5.6)	45.3	(5.0)	43.8	(6.0)	41.5	(3.6)
Private veterinary laboratory (veterinary clinic)	50.5	(5.7)	43.2	(5.1)	60.8	(6.3)	49.2	(3.7)

The only regional difference in the percentage of operations that used a specific facility to perform milk cultures was observed for State or university diagnostic laboratory, which was used by 13.0 percent of operations in the West region compared with 34.0 percent of operations in the East region.

d. For operations that performed milk cultures during the previous 12 months, percentage of operations by facility used to perform cultures, and by region:

	Percent Operations			
	Region			
	West		East	
Facility	**Percent**	**Std. Error**	**Percent**	**Std. Error**
On-farm, by farm personnel	13.0	(4.6)	8.5	(1.9)
State or university diagnostic laboratory	13.0	(4.2)	34.0	(3.7)
Commercial laboratory	59.2	(6.4)	39.4	(4.0)
Private veterinary laboratory (veterinary clinic)	52.5	(6.6)	48.8	(4.1)

Milk was cultured most commonly from cows with chronic clinical disease and from clinical cases that did not respond to treatment (59.1 and 54.0 percent of operations, respectively). A higher percentage of large operations performed cultures on milk from individual fresh cows and from all clinical cases compared with medium and small operations.

e. For operations that performed cultures on milk from individual cows during the previous 12 months, percentage of operations by cow type and by herd size:

Percent Operations

Herd Size (Number of Cows)

	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Cow Type	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Fresh cows	8.0	(3.5)	14.9	(3.8)	47.2	(6.6)	13.9	(2.5)
All clinical cases	22.2	(5.4)	35.4	(5.5)	65.4	(6.4)	30.5	(3.7)
Chronic clinical cases	54.8	(6.4)	64.5	(5.3)	67.0	(7.6)	59.1	(4.2)
Clinical cases that did not respond to treatment	50.1	(6.5)	61.1	(5.6)	53.5	(7.9)	54.0	(4.3)
High somatic cell count cows	37.9	(5.7)	49.6	(5.8)	31.5	(6.2)	41.1	(3.9)
Other	11.0	(4.8)	7.0	(2.5)	8.6	(4.4)	9.5	(3.0)

A higher percentage of operations in the West region performed cultures on milk from individual fresh cows and all clinical cases (49.8 and 60.7 percent, respectively) compared with operations in the East region (10.5 and 27.7 percent, respectively).

f. For operations that performed milk cultures on individual cows during the previous 12 months, percentage of operations by cow type and by region:

	Percent Operations			
	Region			
	West		East	
Cow Type	**Percent**	**Std. Error**	**Percent**	**Std. Error**
Fresh cows	49.8	(7.9)	10.5	(2.6)
All clinical cases	60.7	(8.3)	27.7	(4.0)
Chronic clinical cases	55.4	(8.5)	59.4	(4.5)
Clinical cases that did not respond to treatment	43.9	(8.1)	54.9	(4.7)
High somatic cell count cows	46.6	(8.2)	40.6	(4.1)
Other	4.8	(2.6)	9.9	(3.2)

Similar percentages of operations that performed milk cultures during the previous 12 months detected *Staphylococcus aureus*, *E. coli/Klebsiella/*other gram negative, or environmental strep (*Strep.* spp.) (52.3, 53.3, and 60.1 percent of operations, respectively). A higher percentage of large operations (21.4 percent) identified *Mycoplasma* compared with medium and small operations (3.8 and 4.0 percent, respectively). A lower percentage of small operations identified *E. coli/Klebsiella/*other gram negative or coagulase negative staph (*Staph.* spp. non-*aureus*) organisms compared with large operations.

g. For operations that performed milk cultures on individual cows during the previous 12 months, percentage of operations by organism identified and by herd size:

Percent Operations

Herd Size (Number of Cows)

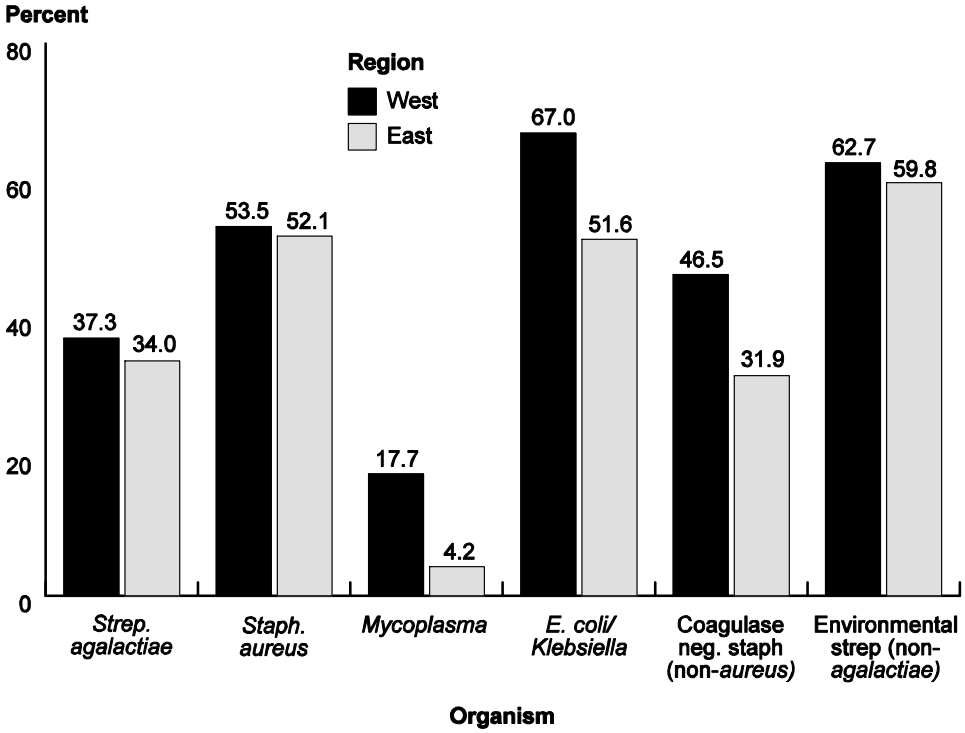
	Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Organism	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Strep. agalactiae	29.4	(5.4)	42.2	(5.0)	35.6	(5.7)	34.4	(3.6)
Staph. aureus	50.5	(6.1)	51.4	(5.1)	64.4	(6.1)	52.3	(3.9)
Mycoplasma	4.0	(3.2)	3.8	(1.9)	21.4	(4.7)	5.7	(1.9)
*E. coli/ Klebsiella/*other gram negative	41.8	(5.9)	64.3	(4.8)	78.9	(5.4)	53.3	(3.8)
Coagulase negative staph (*Staph.* spp. non-*aureus*)	25.3	(5.5)	37.6	(4.8)	63.4	(6.0)	33.5	(3.5)
Environmental strep (*Strep.* spp. non-*agalactiae*)	52.4	(6.1)	67.0	(4.8)	78.3	(5.1)	60.1	(3.8)

Mycoplasma was isolated from a higher percentage of operations in the West region (17.7 percent) than operations in the East region (4.2 percent).

h. For operations that performed milk cultures on individual cows during the previous 12 months, percentage of operations by organism identified and by region:

	Percent Operations			
	Region			
	West		East	
Organism	**Percent**	**Std. Error**	**Percent**	**Std. Error**
Strep. agalactiae	37.3	(6.2)	34.0	(3.9)
Staph. aureus	53.5	(6.4)	52.1	(4.3)
Mycoplasma	17.7	(4.5)	4.2	(2.1)
E. coli/Klebsiella/ other gram negative	67.0	(6.3)	51.6	(4.2)
Coagulase negative staph (*Staph.* spp. non-*aureus*)	46.5	(6.5)	31.9	(3.9)
Environmental strep (*Strep.* spp. non-*agalactiae*)	62.7	(6.5)	59.8	(4.2)

For Operations that Performed Milk Cultures on Individual Cows During the Previous 12 months, Percentage of Operations by Organism Identified and by Region



10. Residue testing

Every tanker load of milk in the United States is tested at the milk plant prior to processing for the presence of specific antibiotics. Consequences of a positive test include discarding the entire truckload of milk and the possible suspension of the producer's permit to sell milk. Milk from cows treated with antibiotics should be discarded on the operation for a specified withdrawal period, as directed by the drug manufacturer via the product label. Manufacturers are required to go through an exhaustive drug approval process that determines the withdrawal period. If approved drugs are used in the manner prescribed by the label, producers can use the withdrawal period stated on the label to ensure that the milk does not contain violative drug residues. However, producers may use on-farm drug residue testing to be confident that the milk is free from violative drug residues. One caveat of on-farm drug testing is that the residue testing kits are approved for bulk milk and not for individual cows. Using residue tests on individual cows may result in milk being discarded even though it is below the violative level.

Almost half of operations (49.8 percent) performed residue testing of milk (either bulk-tank milk or individual cows), with a higher percentage of medium operations (64.5 percent) performing testing compared with small operations (44.2 percent).

a. Percentage of operations that performed on-farm antibiotic residue testing of milk, by herd size:

Percent Operations

Herd Size (Number of Cows)

Small (Fewer than 100)		**Medium** (100-499)		**Large** (500 or More)		**All Operations**	
Pct.	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
44.2	(3.8)	64.5	(4.0)	53.2	(5.4)	49.8	(2.9)

Numerous tests can be used to screen milk for antibiotic residues. An excellent reference is the “Milk and Dairy Beef Residue Prevention Protocol,” produced by the Milk and Dairy Beef Quality Assurance Center. The most commonly reported residue screening test was the Delvotest®, which was used by 62.9 percent of operations that tested for residues.

b. For operations that performed on-farm antibiotic residue testing of milk, percentage of operations by test most commonly used:

Test	Percent Operations	Standard Error
Snap® test (beta-lactam or tetracycline)	22.8	(2.9)
Delvotest®	62.9	(3.6)
CITE Probe®	0.0	(--)
Charm Farm	10.8	(2.7)
Penzyme® Milk Test	1.7	(0.6)
Other	1.8	(0.8)
Total	100.0	

The majority of operations that screened for antibiotic residues tested individual cows recently treated for mastitis (90.0 percent of operations), followed by fresh cows (57.8 percent of operations).

c. For operations that performed on-farm antibiotic residue testing of milk, percentage of operations by source of sample tested:

Sample Source	Percent Operations	Standard Error
Fresh cows	57.8	(3.7)
Individual cows recently treated for mastitis	90.9	(1.6)
Bulk tank prior to processor pickup	29.1	(3.3)
Other	8.3	(1.9)

11. Dry-off procedures/antibiotic treatment

Research suggests that about half of new intramammary infections occur during the dry period. Reasons for the increased susceptibility during this period include increased gland pressure, leading to easier entrance of bacteria through the teat canal; decreased local immune response; and because milk and bacteria are not being removed, as would occur during lactation. Internal teat sealants were developed to reduce the potential of bacteria entering the teat canal and causing infection at dry-off. A higher percentage of large and medium operations used an internal teat sealant on all cows at dry-off (49.0 and 45.7 percent, respectively) compared with small operations (22.7 percent). Approximately 3 of 10 operations (30.1 percent) used an internal teat sealant on all cows at dry-off, with an additional 6.2 percent of operations using the sealant on cows with chronic mastitis, on all cows at dry-off during winter or adverse weather, or at other times. Approximately 7 of 10 small operations (71.0 percent) did not use an internal teat sealant, compared with about 5 of 10 medium and large operations (48.2 and 45.2 percent, respectively).

a. Percentage of operations by use of ***internal*** teat sealant* at dry-off and by herd size:

Percent Operations

Herd Size (Number of Cows)

Use of Internal Teat Sealant	**Small** (Fewer than 100) Pct.	Std. Error	**Medium** (100-499) Pct.	Std. Error	**Large** (500 or More) Pct.	Std. Error	**All Operations** Pct.	Std. Error
All cows at dry-off	22.7	(3.2)	45.7	(4.2)	49.0	(5.4)	30.1	(2.5)
Cows with chronic mastitis	2.3	(1.1)	2.4	(1.2)	1.2	(1.2)	2.2	(0.8)
All cows at dry-off but only during winter or adverse weather	2.2	(1.4)	0.8	(0.8)	4.3	(2.5)	2.0	(1.0)
Other	1.8	(1.0)	2.9	(1.6)	0.3	(0.2)	2.0	(0.8)
No internal teat sealant used on this operation	71.0	(3.5)	48.2	(4.2)	45.2	(5.4)	63.7	(2.7)
Total	100.0		100.0		100.0		100.0	

*e.g., Orbeseal®.

The only regional difference in the use of internal teat sealant was that no operations in the West region used the sealant only on cows with chronic mastitis, while 2.5 percent of operations in the East region did use sealant only on chronic mastitis cows.

b. Percentage of operations by use of ***internal*** teat sealant* at dry-off and by region:

	Percent Operations			
	Region			
	West		East	
Use of Internal Teat Sealant	**Percent**	**Std. Error**	**Percent**	**Std. Error**
All cows at dry-off	20.5	(4.2)	31.0	(2.8)
Cows with chronic mastitis	0.0	(--)	2.5	(0.9)
All cows at dry-off but only during winter or adverse weather	3.1	(1.8)	1.8	(1.0)
Other	0.2	(0.1)	2.2	(0.9)
No internal teat sealant used on this operation	76.2	(4.4)	62.5	(2.9)
Total	100.0		100.0	

*e.g., Orbeseal®.

Coating the exterior of the teat with a sealant that remains in place for an extended period (4 to 5 days) is another method used to prevent bacterial entrance into the mammary gland at dry-off. The majority of all operations (82.8 percent) did not use an external teat sealant. Over 1 of 10 operations (14.0 percent) used a sealant on all cows at dry-off, with no differences across herd sizes.

c. Percentage of operations by use of ***external*** teat sealant* at dry-off and by herd size:

Percent Operations

Herd Size (Number of Cows)

Use of External Teat Sealant	Small (Fewer than 100) Pct.	Std. Error	Medium (100-499) Pct.	Std. Error	Large (500 or More) Pct.	Std. Error	All Operations Pct.	Std. Error
All cows at dry-off	12.5	(2.6)	15.1	(2.9)	26.1	(5.7)	14.0	(2.0)
Cows with chronic mastitis	1.1	(0.8)	1.7	(1.3)	0.0	(--)	1.2	(0.6)
All cows at dry-off but only during winter or adverse weather	1.1	(0.7)	0.1	(0.1)	0.0	(--)	0.8	(0.5)
Other	0.8	(0.8)	2.2	(1.4)	2.0	(1.5)	1.2	(0.7)
No external teat sealant used on the operation	84.5	(2.9)	80.9	(3.3)	71.9	(5.7)	82.8	(2.2)
Total	100.0		100.0		100.0		100.0	

*e.g., Stronghold™.

There were no regional differences in the use of external teat sealants.

d. Percentage of operations by use of ***external*** teat sealant* at dry-off and by region:

Percent Operations

Region

Use of External Teat Sealant	West Percent	West Std. Error	East Percent	East Std. Error
All cows at dry-off	19.6	(4.3)	13.5	(2.1)
Cows with chronic mastitis	0.0	(--)	1.3	(0.7)
All cows at dry-off but only during winter or adverse weather	0.0	(--)	0.8	(0.5)
Other	1.1	(1.1)	1.3	(0.7)
No external teat sealant used on the operation	79.3	(4.3)	83.1	(2.3)
Total	100.0		100.0	

*e.g., Stronghold™.

Administering intramammary antibiotics at the time of dry-off cures many existing infections and reduces the incidence of new infections. Almost 1 of 10 operations (9.9 percent) did not use any dry-cow treatment, and a percentage of these were organic operations in which the use of antibiotics is not allowed. Some, but not all, cows were treated on 17.8 percent of operations, and all cows were treated on 72.3 percent of operations. More than four of five cows (81.7 percent) were treated at dry-off, while 5.9 percent were not treated.

e. Percentage of operations (and percentage of cows on these operations) by percentage of cows treated with dry-cow intramammary antibiotics at dry-off during the previous 12 months:

Percent of Dry Cows Treated	Percent Operations	Standard Error	Percent Cows	Standard Error
0.0	9.9	(1.7)	5.9	(1.5)
1.0 to 33.0	5.6	(1.4)	2.7	(0.9)
33.1 to 66.0	3.0	(0.8)	2.4	(0.8)
66.1 to 99.9	9.2	(1.8)	7.3	(1.3)
100.0	72.3	(2.7)	81.7	(2.3)
Total	100.0		100.0	

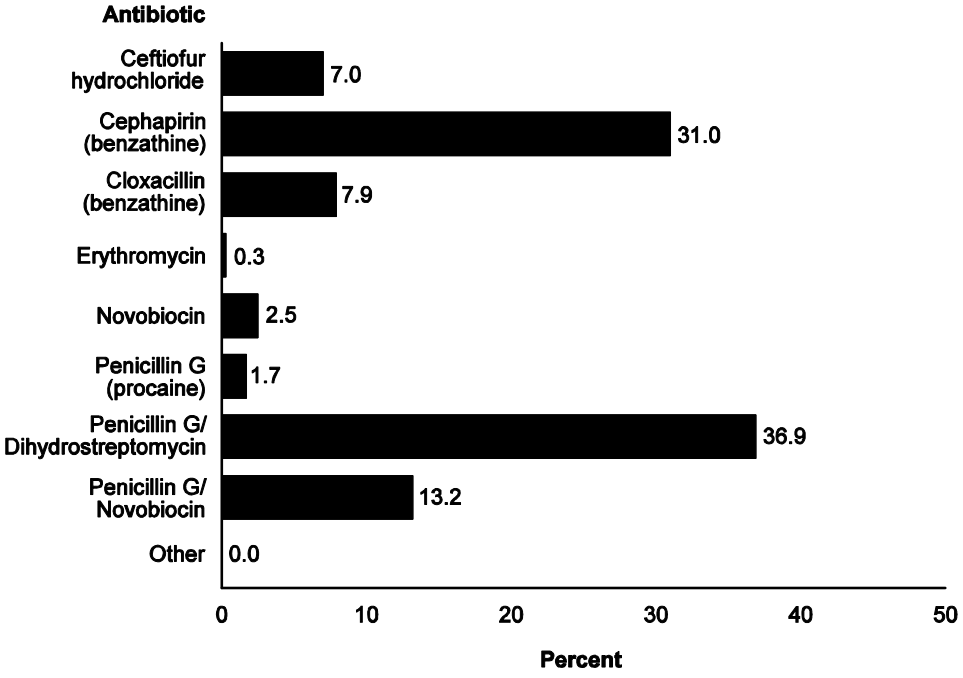
The most commonly used dry-cow antibiotics were cephapirin (31.0 percent of cows) and penicillin G (procaine)/dihydrostreptomycin (36.9 percent of cows).

f. For cows treated with dry-cow intramammary antibiotics during the previous 12 months, percentage of cows treated, by type of antibiotic:

Antibiotic	Percent Cows*	Standard Error
Ceftiofur hydrochloride	7.0	(2.0)
Cephapirin (benzathine)	31.0	(2.3)
Cloxacillin (benzathine)	7.9	(1.8)
Erythromycin	0.3	(0.1)
Novobiocin	2.5	(1.9)
Penicillin G (procaine)	1.7	(0.5)
Penicillin G (procaine)/ Dihydrostreptomycin	36.9	(3.2)
Penicillin G (procaine)/ Novobiocin	13.2	(2.4)
Other	0.0	(--)

*As a percentage of cows dry treated during the previous 12 months. Some cows were treated with more than one antibiotic.

For Cows Treated with Dry-Cow Intramammary Antibiotics During the Previous 12 Months, Percentage of Cows Treated, by Type of Antibiotic



F. Antibiotic Use

NOTE: In this section antibiotic and antimicrobial are used synonymously (see Terms Used in This Report, p 3).

1. Unweaned heifers

Almost one of four unweaned heifers had diarrhea (23.9 percent) during the previous 12 months, and 17.9 percent of all unweaned heifers were treated for diarrhea. A lower percentage of unweaned heifers had respiratory disease (12.4 percent), and 11.4 percent of heifers were treated for respiratory disease.

a. Percentage of unweaned heifers affected and treated with antibiotics for a disease or disorder during the previous 12 months:

	Percent Unweaned Heifers*			
	Affected		Treated	
Disease or Disorder	Percent	Std. Error	Percent	Std. Error
Respiratory	12.4	(1.3)	11.4	(1.3)
Diarrhea or other digestive problem	23.9	(1.9)	17.9	(1.7)
Navel infection	1.6	(0.2)	1.5	(0.2)
Other	0.6	(0.2)	0.6	(0.2)

*As a percentage of dairy heifer calves born alive in 2006.

More than 9 of 10 of calves affected with respiratory disease or navel infection were treated with an antibiotic (93.4 and 92.3 percent, respectively). Almost three-fourths of unweaned calves affected with diarrhea (74.5 percent) were treated with an antibiotic.

b. For unweaned heifers affected with a disease or disorder during the previous 12 months, percentage of unweaned heifers treated with an antibiotic:

Disease or Disorder	Percent Affected Unweaned Heifers Treated	Standard Error
Respiratory	93.4	(2.3)
Diarrhea or other digestive problem	74.5	(4.8)
Navel infection	92.3	(2.4)
Other	97.2	(1.9)

Two-thirds of all operations (66.7 percent) used an antibiotic to treat respiratory disease in unweaned heifers. The primary antibiotics used to treat respiratory disease were florfenicol, macrolide, and beta-lactam (18.3, 15.2, and 11.6 percent of all operations, respectively). More than 6 of 10 operations (62.1 percent) treated unweaned heifers with diarrhea with antibiotics, while 17.4 percent of operations with unweaned heifers that had diarrhea did not treat these animals with antibiotics. The most commonly used primary antibiotics used for diarrhea were tetracycline, “other,” beta-lactam, and sulfonamide (16.2, 10.5, 9.4, and 9.2 percent, of all operations, respectively). The primary antibiotics from the “other” category included trimethoprim sulfamethoxazole, amprolium, and lincomycin/spectinomycin. Navel infection was treated on 28.7 percent of operations, and the primary antibiotics used were beta-lactam (21.2 percent of all operations). Less than 5 percent of all operations (4.5 percent) treated for other diseases.

c. Percentage of operations (including those not reporting diseases or disorders) by primary antibiotic used to treat unweaned heifers during the previous 12 months, and by disease or disorder treated:

Percent Operations

	Disease/Disorder							
	Respiratory		Diarrhea*		Navel Infection		Other	
Primary Antibiotic Used	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Aminocyclitol	0.0	(0.0)	1.7	(0.7)	0.0	(--)	0.0	(--)
Aminoglycoside	0.6	(0.4)	4.0	(1.1)	0.0	(0.0)	0.4	(0.4)
Beta-lactam	11.6	(2.0)	9.4	(1.8)	21.2	(2.5)	1.4	(0.7)
Cephalosporin	8.2	(1.5)	5.6	(1.1)	2.2	(0.6)	0.5	(0.4)
Florfenicol	18.3	(2.2)	4.0	(1.1)	1.1	(0.5)	0.0	(0.0)
Macrolide	15.2	(2.1)	1.5	(0.5)	0.8	(0.4)	0.3	(0.2)
Sulfonamide	1.9	(0.7)	9.2	(1.5)	0.9	(0.9)	0.2	(0.1)
Tetracycline	8.9	(1.7)	16.2	(2.3)	1.4	(0.4)	1.0	(0.6)
Other/unknown	2.0	(0.7)	10.5	(1.8)	1.1	(0.6)	0.7	(0.5)
Any antibiotic	66.7	(2.8)	62.1	(2.8)	28.7	(2.6)	4.5	(1.1)
No treatment but disease	1.4	(0.6)	17.4	(2.2)	2.5	(0.7)	0.2	(0.2)
No disease or disorder	31.9	(2.8)	20.5	(2.4)	68.8	(2.7)	95.3	(1.2)
Total	100.0		100.0		100.0		100.0	

*Or other digestive problem.

The majority of unweaned heifers treated for respiratory disease were on operations that used florfenicol, cephalosporin, macrolide, or tetracycline (25.4, 24.6, 19.8, and 13.2 percent of unweaned heifers, respectively). To treat diarrhea, sulfonamide, tetracycline, and “other” were the antibiotics used on operations for the highest percentage of unweaned heifers.

d. Of unweaned heifers treated with antibiotics during the previous 12 months, percentage of unweaned heifers by primary antibiotic used on the operation for the following diseases/disorders:

Percent Treated Unweaned Heifers

Disease/Disorder

Primary Antibiotic Used	Respiratory Pct.	Respiratory Std. Error	Diarrhea* Pct.	Diarrhea* Std. Error	Navel Infection Pct.	Navel Infection Std. Error	Other Pct.	Other Std. Error
Aminocyclitol	0.1	(0.1)	5.1	(2.0)	0.0	(--)	0.0	(--)
Aminoglycoside	2.4	(1.7)	11.5	(3.9)	0.3	(0.2)	0.9	(0.9)
Beta-lactam	7.9	(2.1)	11.0	(2.8)	69.6	(7.9)	12.9	(6.4)
Cephalosporin	24.6	(8.5)	9.5	(2.3)	5.0	(1.7)	4.0	(3.4)
Florfenicol	25.4	(5.5)	5.2	(1.8)	3.7	(2.0)	0.2	(0.2)
Macrolide	19.8	(3.7)	2.8	(1.6)	11.6	(8.9)	15.2	(10.3)
Sulfonamide	3.3	(1.8)	23.3	(6.2)	1.8	(1.8)	10.2	(9.1)
Tetracycline	13.2	(3.3)	16.5	(2.9)	6.7	(3.2)	24.8	(16.5)
Other	3.3	(1.5)	15.1	(3.0)	1.3	(0.6)	31.8	(18.6)
Total	100.0		100.0		100.0		100.0	

*Or other digestive problem.

2. Weaned heifers

More than half of operations (50.9 percent) used antibiotics in rations for weaned heifers, including 32.7 percent that used only ionophores.

a. Percentage of operations by use of antibiotics in weaned-heifer rations during the previous 12 months to prevent disease or promote growth:

Usage	Percent Operations	Standard Error
Antibiotics in heifer ration	18.2	(2.0)
Ionophores only in heifer rations	32.7	(2.6)
Did not know if antibiotics were in heifer ration	2.3	(0.9)
No antibiotics in heifer ration	44.2	(2.8)
No weaned heifers on operation	2.6	(0.8)
Total	100.0	

The majority of operations that used antibiotics in weaned heifer rations used ionophores (84.9 percent) followed by chlortetracycline (14.4 percent) and oxytetracycline compounds (10.9 percent).

b. For operations that used antibiotics in rations for weaned dairy heifers during the previous 12 months, percentage of operations by antibiotic used:

Antibiotic Used	Percent Operations	Standard Error
Bacitracin methylene disalicylate	0.0	(--)
Bambermycin	0.5	(0.5)
Chlortetracycline compounds	14.4	(2.3)
Neomycin sulfate	4.1	(1.8)
Ionophores	84.9	(2.8)
Neomycin-oxytetracycline	5.4	(1.9)
Oxytetracycline compounds	10.9	(2.2)
Sulfamethazine	5.7	(1.5)
Tylosin phosphate	0.0	(--)
Virginiamycin	0.2	(0.2)
Other antibiotics	2.0	(1.4)

Few weaned heifers were affected by or treated for disease. Only 5.9 percent of weaned heifers were affected with respiratory disease, and 5.5 percent of all weaned heifers were treated with antibiotics. Diarrhea was reported in 1.9 percent of weaned heifers, and 1.6 percent of all weaned heifers were treated. Less than 2 percent of weaned heifers had other diseases or disorders.

c. Percentage of weaned heifers affected and treated with antibiotics for a disease or disorder during the previous 12 months:

	Percent Weaned Heifers*			
	Affected		Treated	
Disease or Disorder	Percent	Std. Error	Percent	Std. Error
Respiratory	5.9	(0.5)	5.5	(0.5)
Diarrhea or other digestive problem	1.9	(0.7)	1.6	(0.7)
Other	1.7	(0.6)	1.4	(0.6)

*As a percentage of weaned heifer inventory on January 1, 2007.

More than 9 of 10 weaned heifers affected with respiratory disease (93.3 percent) were treated with antibiotics. About 8 of 10 weaned heifers with diarrhea or other digestive problems (85.4 percent) were treated.

d. For weaned heifers affected with a disease or disorder during the previous 12 months, percentage of weaned heifers treated with an antibiotic:

Disease or Disorder	Percent Affected Weaned Heifers Treated	Standard Error
Respiratory	93.3	(1.8)
Diarrhea or other digestive problem	85.4	(7.8)
Other	81.3	(8.9)

Almost half of operations (49.2 percent) treated some weaned heifers for respiratory disease, while only 7.4 percent treated for diarrhea and 6.2 percent treated for other diseases. The primary antibiotics used on operations for respiratory disease in weaned heifers were florfenicol and tetracycline (12.4 and 11.0 percent of operations, respectively). Antibiotics used to treat diarrhea in weaned calves included “other” (primarily amprolium), beta-lactam, and tetracycline. Other diseases were treated with beta-lactam and tetracycline on 3.3 and 1.9 percent of operations, respectively.

e. Percentage of operations (including those not reporting diseases or disorders) by primary antibiotic used to treat weaned heifers during the previous 12 months, and by disease or disorder:

	Percent Operations					
	Disease/Disorder					
	Respiratory		Diarrhea*		Other	
Primary Antibiotic Used	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Aminocyclitol	0.4	(0.2)	0.0	(--)	0.0	(--)
Aminoglycoside	0.0	(--)	0.2	(0.1)	0.0	(--)
Beta-lactam	7.8	(1.6)	1.6	(0.8)	3.3	(1.1)
Cephalosporin	4.5	(1.3)	0.7	(0.2)	0.2	(0.2)
Florfenicol	12.4	(1.7)	0.4	(0.2)	0.0	(--)
Macrolide	8.0	(1.2)	0.2	(0.2)	0.2	(0.2)
Sulfonamide	1.5	(0.5)	0.4	(0.1)	0.2	(0.1)
Tetracycline	11.0	(1.7)	1.4	(0.5)	1.9	(0.6)
Other	3.6	(1.1)	2.5	(0.7)	0.4	(0.2)
Any antibiotic	49.2	(2.9)	7.4	(1.3)	6.2	(1.3)
No treatment but disease	5.1	(1.4)	4.2	(1.1)	4.7	(1.5)
No disease	45.7	(2.9)	88.4	(1.6)	89.1	(1.9)
Total	100.0		100.0		100.0	

*Or other digestive problem.

The majority of weaned heifers treated for respiratory disease were on operations that primarily treated with florfenicol, tetracycline, and macrolide. Tetracycline was the primary antibiotic used on operations to treat more than 50 percent of weaned heifers with diarrhea or “other” diseases (55.1 and 67.0 percent, respectively).

f. Of weaned heifers treated with antibiotics during the previous 12 months, percentage of weaned heifers by primary antibiotic used on the operation for the following diseases/disorders:

	Percent Treated Weaned Heifers					
	Disease/Disorder					
	Respiratory		Diarrhea*		Other	
Primary Antibiotic Used	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Aminocyclitol	2.8	(2.5)	0.0	(--)	0.0	(--)
Aminoglycoside	0.0	(--)	0.0	(--)	0.0	(--)
Beta-lactam	3.4	(0.8)	3.9	(2.8)	24.1	(14.2)
Cephalosporin	9.8	(2.8)	3.2	(2.3)	0.9	(0.9)
Florfenicol	30.3	(4.9)	10.0	(8.3)	0.0	(--)
Macrolide	15.6	(3.2)	0.2	(0.2)	0.5	(0.4)
Sulfonamide	4.1	(1.7)	2.0	(1.2)	1.7	(1.4)
Tetracycline	25.0	(4.7)	55.1	(22.2)	67.0	(16.2)
Other	9.0	(3.5)	25.6	(15.1)	5.8	(4.1)
Total	100.0		100.0		100.0	

*Or other digestive problem.

3. Cows

Mastitis was the disease that affected the highest percentage of cows (18.2 percent), and, not surprisingly, the highest percentage of cows were treated for mastitis (16.4 percent). Lameness and reproductive diseases affected 12.5 and 10.0 percent of cows, respectively, and 7.1 and 7.4 percent of all cows were treated for lameness and reproductive diseases, respectively.

a. Percentage of cows affected and treated with antibiotics for a disease or disorder during the previous 12 months:

	Percent Cows*			
	Affected		Treated	
Disease or Disorder	Percent	Std. Error	Percent	Std. Error
Respiratory	2.9	(0.2)	2.8	(0.2)
Diarrhea or other digestive problem	6.0	(0.6)	1.9	(0.2)
Reproductive	10.0	(0.7)	7.4	(0.7)
Mastitis	18.2	(0.9)	16.4	(0.8)
Lameness	12.5	(0.9)	7.1	(0.7)
Other	0.7	(0.2)	0.5	(0.1)

*As a percentage of cow inventory on January 1, 2007.

More than 95 percent of cows with respiratory disease (96.4 percent) were treated with antibiotics, while 89.9 percent of cows with mastitis were treated. Less than one-third of cows with diarrhea or digestive disease (32.3 percent) were treated with antibiotics.

b. For cows affected with a disease or disorder during the previous 12 months, percentage of cows treated with an antibiotic:

Disease or Disorder	Percent Affected Cows Treated	Standard Error
Respiratory	96.4	(1.2)
Diarrhea or other digestive problem	32.3	(4.0)
Reproductive	74.7	(3.1)
Mastitis	89.9	(1.3)
Lameness	56.5	(4.1)
Other	66.2	(12.7)

More than 8 of 10 operations (85.4 percent) treated cows for mastitis. About half of operations treated cows for respiratory disease, reproductive disease, or lameness. One-quarter of operations treated cows for diarrhea. Third-generation cephalosporin was the primary antibiotic used to treat all diseases listed, with the exception of reproductive diseases. Cephalosporin was most likely used because some products require no milk withdrawal, and slaughter withdrawal is relatively short compared to other antibiotics. Beta-lactam was the primary antibiotic used to treat respiratory diseases on 10.5 percent of operations, reproductive diseases on 13.5 percent, mastitis on 16.9 percent, and lameness on 13.6 percent of operations. Lincosamide was the primary antibiotic used to treat mastitis on 15.8 percent of operations. Tetracycline was the primary antibiotic used for reproductive and lameness on 17.7 and 18.6 percent of operations, respectively.

c. Percentage of operations (including those not reporting diseases or disorders) by primary antibiotic used to treat cows during the previous 12 months, and by disease or disorder:

	Percent Operations											
	Disease or Disorder											
	Respiratory		Diarrhea*		Repro-ductive		Mastitis		Lameness		Other	
Primary Antibiotic Used	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Aminocyclitol	1.0	(0.5)	0.0	(--)	0.6	(0.6)	1.1	(0.6)	0.0	(--)	0.0	(--)
Aminoglycoside	0.3	(0.3)	0.6	(0.3)	0.0	(--)	0.5	(0.4)	0.0	(--)	0.0	(--)
Beta-lactam	10.5	(1.8)	8.8	(1.6)	13.5	(2.0)	16.9	(2.0)	13.6	(2.1)	3.0	(1.1)
Cephalosporin	33.0	(2.7)	11.3	(1.8)	17.2	(2.0)	44.5	(2.9)	23.0	(2.2)	1.8	(0.7)
Florfenicol	2.4	(0.9)	0.3	(0.2)	0.2	(0.2)	0.0	(--)	0.3	(0.2)	0.0	(--)
Lincosamide							15.8	(2.1)				
Macrolide	1.2	(0.6)	0.6	(0.4)	0.0	(--)	0.3	(0.2)	0.2	(0.1)	0.0	(--)
Sulfonamide	1.7	(0.8)	1.3	(0.4)	0.1	(0.1)	1.8	(0.9)	1.4	(0.4)	0.0	(--)
Tetracycline	4.7	(1.0)	1.1	(0.4)	17.7	(2.1)	2.5	(0.7)	18.6	(2.2)	0.6	(0.4)
Other	1.0	(0.5)	1.1	(0.6)	3.6	(1.3)	2.0	(1.0)	1.5	(0.6)	1.5	(0.8)
Any antibiotic	55.8	(2.9)	25.0	(2.4)	52.9	(2.8)	85.4	(2.2)	58.6	(2.9)	6.9	(1.5)
No treatment but disease	3.5	(1.2)	31.6	(2.7)	21.8	(2.5)	7.7	(1.5)	17.2	(2.4)	3.5	(1.2)
No disease	40.7	(2.9)	43.4	(2.9)	25.3	(2.5)	6.9	(1.7)	24.2	(2.6)	89.6	(1.8)
Total	100.0		100.0		100.0		100.0		100.0		100.0	

*Or other digestive problem.

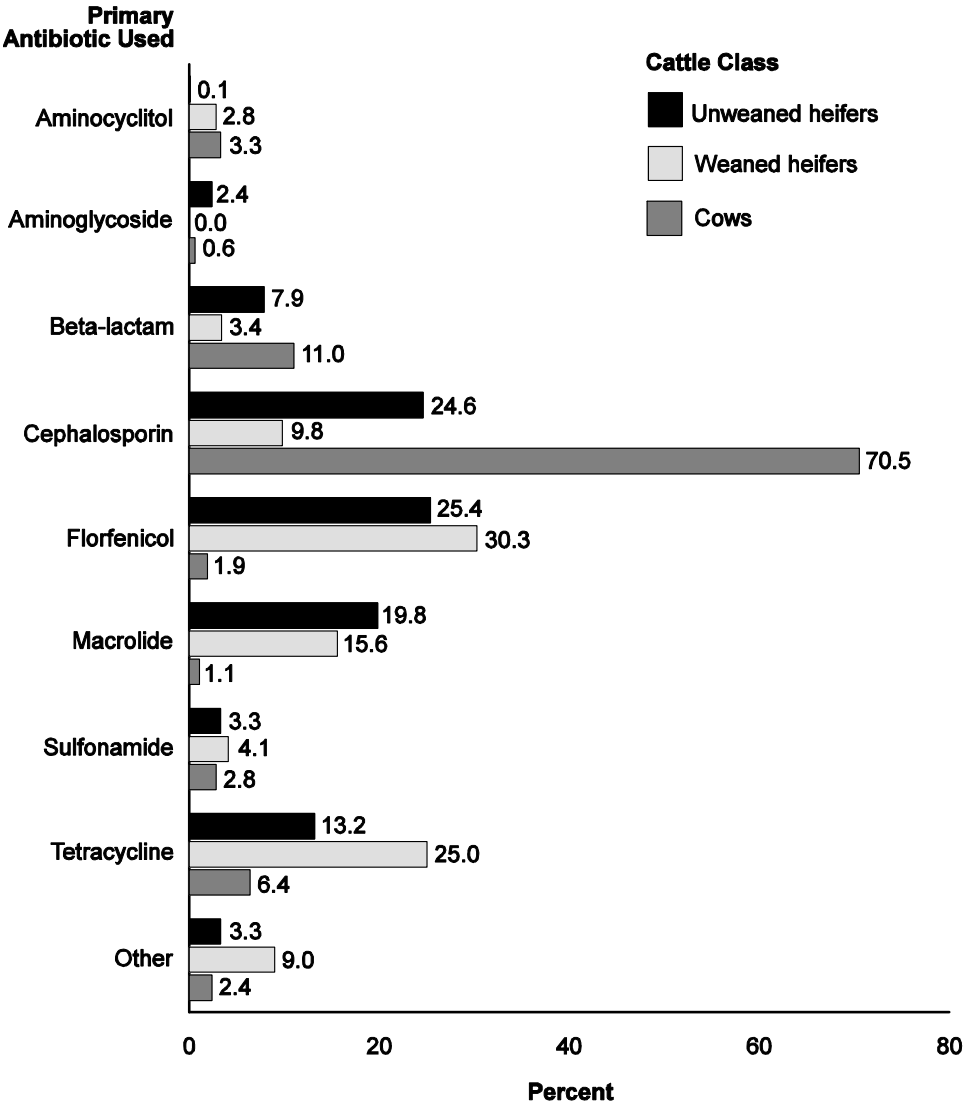
The primary antibiotics used to treat cows with specific diseases or disorders were similar to the primary antibiotics used at the operation level. Beta-lactam was the primary antibiotic used on operations for more than 19 percent of cows treated for diarrhea, reproductive disease, mastitis, and lameness. Cephalosporin was the primary antibiotic used on 70.5 percent of cows treated for respiratory disease, 53.2 percent treated for mastitis, 36.0 treated for diarrhea, and approximately 27 percent of cows treated for reproductive or lameness problems. Lincosamide was used on 19.4 percent of cows with mastitis. Sulfonamide was the primary antibiotic used on 15.6 percent of cows with diarrhea. Tetracycline was used to treat more than 4 of 10 cows with reproductive disease or lameness (44.4 and 42.1 percent, respectively).

d. Of cows treated with antibiotics during the previous 12 months, percentage of cows by primary antibiotic used on the operation for the following diseases/ disorders:

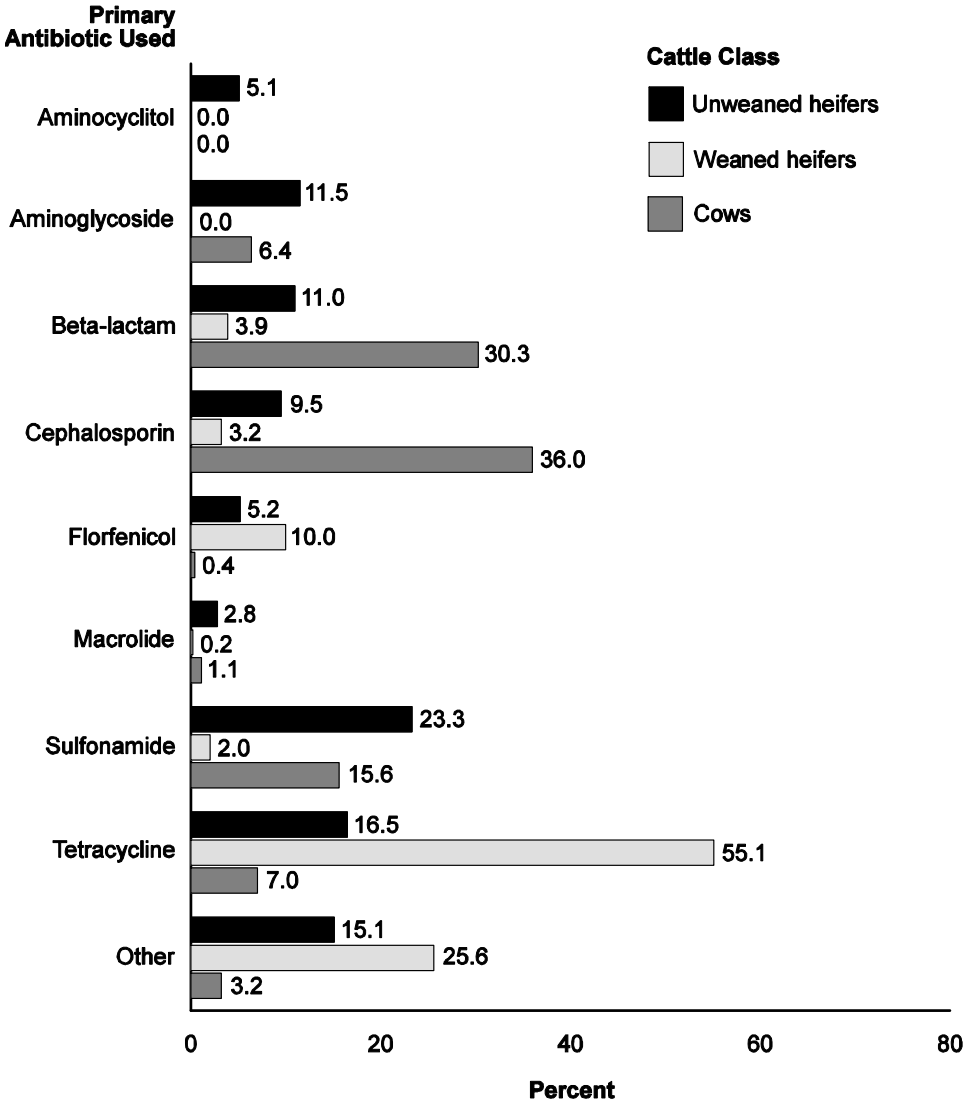
	Percent Treated Cows											
	Disease/Disorder											
	Respiratory		Diarrhea*		Repro-ductive		Mastitis		Lameness		Other	
Primary Antibiotic Used	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Aminocyclitol	3.3	(1.6)	0.0	(--)	0.2	(0.2)	2.9	(2.0)	0.0	(--)	0.0	(--)
Aminoglycoside	0.6	(0.5)	6.4	(4.4)	0.0	(--)	0.2	(0.2)	0.0	(--)	0.0	(--)
Beta-lactam	11.0	(2.5)	30.3	(5.7)	19.7	(3.8)	19.1	(3.0)	19.5	(5.4)	29.9	(11.6)
Cephalosporin	70.5	(3.9)	36.0	(5.9)	27.9	(4.7)	53.2	(4.1)	27.2	(3.8)	23.6	(11.5)
Florfenicol	1.9	(0.7)	0.4	(0.4)	0.2	(0.2)	0.0	(--)	0.5	(0.3)	0.0	(--)
Lincosamide							19.4	(3.1)				
Macrolide	1.1	(0.5)	1.1	(0.8)	0.0	(--)	0.2	(0.2)	0.5	(0.3)	0.0	(--)
Sulfonamide	2.8	(1.4)	15.6	(6.6)	0.2	(0.2)	1.2	(0.5)	4.2	(1.4)	0.0	(--)
Tetracycline	6.4	(1.6)	7.0	(2.9)	44.4	(6.0)	2.0	(0.7)	42.1	(5.4)	2.6	(1.9)
Other	2.4	(1.3)	3.2	(2.2)	7.4	(4.5)	1.8	(0.9)	6.0	(3.0)	43.9	(16.6)
Total	100.0		100.0		100.0		100.0		100.0		100.0	

*Or other digestive problem.

For Cattle Treated for Respiratory Disease During the Previous 12 Months, Percentage of Cattle by Class and by Primary Antibiotic Used for Treatment



For Cattle Treated for Diarrhea or Other Digestive Problems During the Previous 12 Months, Percentage of Cattle by Class and by Primary Antibiotic Used for Treatment



Historical effectiveness was the predominant criterion for mastitis treatment (86.4 percent of operations). Veterinary recommendation was reported as a criterion on 46.3 percent of operations.

e. For operations that treated lactating cows for mastitis with an intramammary antibiotic during the previous 12 months, percentage of operations by criterion for treatment:

Criterion	Percent Operations	Standard Error
Veterinary recommendation	46.3	(3.0)
Historical effectiveness	86.4	(2.1)
Historical culture and antimicrobial sensitivity results	20.9	(2.2)
Individual cow culture results prior to therapy	20.2	(2.3)
Other	4.0	(1.1)

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 2007 study was to collect information from U.S. dairy producers and other dairy 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 to receive as much input as possible from a variety of producers, industry experts and representatives, veterinarians, extension specialists, universities, and dairy organizations. Information was collected via focus groups and through a Needs Assessment Survey.

Focus group teleconferences and meetings were held to help determine the focus of the study.

Teleconference, March 30, 2006
National Johne's Working Group

Louisville, KY, April 2, 2006
National Johne's Working Group
National Institute for Animal Agriculture

Louisville, KY, April 3, 2006
National Milk Producers Federation
Animal Health Committee

Teleconference, December 15, 2006
Bovine Alliance on Management and Nutrition

The Needs Assessment Survey was designed to ascertain the top three management issues, diseases/disorders, and producer incentives from producers, veterinarians, extension personnel, university researchers, and allied industry groups. The survey, created in SurveyMonkey, was available online from early February through late April 2006. The survey was promoted via electronic newsletters, magazines, and Web sites. Organizations/magazines promoting the study included Vance Publishing's "Dairy Herd Management, Dairy Alert," "Dairy Today," "Hoard's Dairyman," NMC, "Journal of the American Veterinary Medical Association," and the American Association of Bovine Practitioners. E-mail messages asking for input were also sent to cooperative members of the National Milk Producers Federation as well as State and Federal personnel. A total of 313 people completed the questionnaire.

Universities/extension personnel accounted for 23 percent of respondents, while producers accounted for 22 percent, and veterinarians/consultants accounted for another 20 percent.

Fort Collins, CO, May 18, 2006
CEAH Focus Group meeting

Draft objectives for the Dairy 2007 study, using input from teleconferences, face-to-face meetings, and the online survey, were drafted prior to the CEAH focus group meeting. Attendees included producers, university/extension personnel, veterinarians, and government personnel. The day-long meeting culminated in the formulation of eight objectives for the study:

- Describe trends in dairy cattle health and management practices,
- Evaluate management factors related to cow comfort and removal rates,
- Describe dairy-calf health and nutrition from birth to weaning and evaluate heifer disease prevention practices,
- Estimate the prevalence of herds infected with bovine viral diarrhea virus (BVD),
- Describe current milking procedures and estimate the prevalence of contagious mastitis pathogens,
- Estimate the herd-level prevalence and associated costs of *Mycobacterium avium* subspecies *paratuberculosis* (Johne's disease),
- Describe current biosecurity practices and determine producer motivation for implementing or not implementing biosecurity practices, and
- Determine the prevalence of specific food-safety pathogens and describe antimicrobial resistance patterns.

B. Sampling and Estimation

1. State selection

The preliminary selection of States to be included in the study was done in February 2006, using the National Agricultural Statistics Service (NASS) January 27, 2006, "Cattle Report." A goal for NAHMS national studies is to include States that account for at least 70 percent of the animals and producer population in the United States. The initial review of States identified 16 major States representing 82.0 percent of the milk cow inventory and 79.3 percent of the operations with milk cows (dairy herds). The States were: California, Idaho, Indiana, Iowa, Kentucky, Michigan, Minnesota, Missouri, New Mexico, New York, Ohio, Pennsylvania, Texas, Vermont, Washington, and Wisconsin.

A memo identifying these 16 States was provided in March 2006 to the USDA-APHIS-VS CEAH Director and, in turn, the VS Regional Directors. Each Regional Director sought input from the respective States about being included or excluded from the study. Virginia expressed interest in participating and was included, bringing the total number of States to 17.

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 January 1 cattle estimates. The list sample from the January 2006 survey was used as the screening sample. Among producers reporting one or more milk cows on January 1, 2006, a total of 3,554 operations were selected in the sample for contact in January 2007 during Phase I.

Operations with 30 or more dairy cows that participated in Phase I were invited to participate in data collection for Phase II. A total of 1,077 operations agreed via written consent to be contacted by veterinary medical officers to determine whether to complete Phase II.

3. Population inferences

a. Phase I: General Dairy Management Report

Inferences cover the population of dairy producers with at least 1 milk cow in the 17 participating States. As of January 1, 2007, these States accounted for 82.5 percent (7,536,000 head) of milk cows and 79.5 percent (59,640) 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 it was 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.

b. Phase II: VS Initial Visit

Inferences cover the population of dairy producers with 30 or more milk cows in the 17 participating States. For operations eligible for Phase II data collection (those with 30 or more milk cows) weights were adjusted to account for operations that did not want to continue to Phase II. The 17-State target population of operations with 30 or more dairy cows represented 82.5 percent of dairy cows and 84.7 percent of U.S. dairy operations with 30 or more milk cows (see Appendix II).

C. Data Collection

1. Phase I: General Dairy Management Report

From January 1-31, 2007, NASS enumerators administered the General Dairy Management Report. The interview took slightly over 1 hour.

2. Phase II: VS Initial Visit

From February 26 to April 30, 2007, Federal and State veterinary medical officers (VMOs) and/or animal health technicians (AHTs) collected the data from producers during an interview that lasted approximately 2 hours.

D. Data Analysis

1. Validation

a. Phase I: Validation—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: Validation—VS Initial Visit Questionnaires

After completing the VS Initial Visit Questionnaires, data collectors sent them to their respective State NAHMS Coordinators who reviewed the questionnaire responses for accuracy. Data entry and validation were completed by CEAH staff using SAS.

E. Sample Evaluation

The purpose of this section is to provide various performance measurement parameters. Historically, the term “response rate” was used as a catch-all parameter, but there are many ways to define and calculate response rates. Therefore, the table below presents an evaluation based upon a number of measurement parameters, which are defined with an “x” in categories that contribute to the measurement.

1. Phase I: General Dairy Management Report

A total of 3,554 operations were selected for the survey. Of these operations, 3,304 (93.0 percent) were contacted. There were 2,519 operations that provided usable inventory information (70.9 percent of the total selected and 76.2 percent of those contacted). In addition, there were 2,194 operations (61.7 percent) that provided "complete" information for the questionnaire. Of operations that provided complete information and were eligible to participate in Phase II (VMO collection) of the study (2,067 operations), 1,077 (52.1 percent) consented to be contacted for consideration/discussion about further participation.

			Measurement Parameter		
Response Category	**Number Operations**	**Percent Operations**	**Contacts**	**Usable[1]**	**Complete[2]**
Survey complete and VMO consent	1,077	30.3	x	x	x
Survey complete, refused VMO consent	990	27.9	x	x	x
Survey complete, ineligible[3] for VMO	127	3.6	x	x	x
No dairy cows on January 1, 2007	214	6.0	x	x	
Out of business	111	3.1	x	x	
Out of scope	6	0.2			
Refusal of GDMR	785	22.1	x		
Office hold (NASS elected not to contact)	126	3.5			
Inaccessible	118	3.3			
Total	3,554	100.0	3,304	2,519	2,194
Percent of total operations			93.0	70.9	61.7
Percent of total operations weighted[4]			94.0	74.1	59.6

[1]Useable operation—respondent provided answers to inventory questions for the operation (either zero or positive number on hand).
[2]Survey complete operation—respondent provided answers to all or nearly all questions for at least one site.
[3]Ineligible—less than 30 head of milk cows on January 14, 2007.
[4]Weighted response—the rate was calculated using the initial selection weights.

2. Phase II: VS Initial Visit

There were 1,077 operations that provided consent during Phase I to be contacted by a veterinary medical officer for Phase II. Of these 1,077, 582 (54.0 percent) agreed to continue in Phase II of the study and completed the VMO Initial Visit Questionnaire; 380 (35.3 percent) refused to participate. Approximately 10 percent of the 1,077 operations were not contacted, and 0.4 percent were ineligible because they had no dairy cows at the time they were contacted by the VMO during Phase II.

			Measurement Parameter		
Response Category	**Number Operations**	**Percent Operations**	**Contacts**	**Usable[1]**	**Complete[2]**
Survey complete	582	54.0	x	x	x
Survey refused	380	35.3	x		
Not contacted	111	10.3			
Ineligible[3]	4	0.4	x	x	
Total	1,077	100.0	966	586	582
Percent of total operations			89.7	54.4	54.0
Percent of total operations weighted[4]			87.5	50.8	50.4

[1]Useable operation—respondent provided answers to inventory questions for the operation (either zero or positive number on hand).
[2]Survey complete operation—respondent provided answers to all or nearly all questions.
[3]Ineligible—no dairy cows at time of interview, which occurred from February 26 through April 30, 2007.
[4]Weighted response—the rate was calculated using the turnover weights.

Appendix I: Sample Profile

A. Responding Operations

1. Number of responding operations, by herd size

	Phase I: General Dairy Management Report	Phase II: VS Initial Visit
Herd Size (Number of Cows)	**Number of Responding Operations**	
Fewer than 100	1,028	233
100 to 499	691	215
500 or more	475	134
Total	2,194	582

2. Number of responding operations, by region

	Phase I: General Dairy Management Report	Phase II: VS Initial Visit
Region	**Number of Responding Operations**	
West	426	108
East	1,768	474
Total	2,194	582

Appendix II: Antibiotic/Antimicrobial Class

Antibiotic/ Antimicrobial Class	Product Name	Active Ingredient
Aminocyclitol	Adspec®	Spectinomycin
Aminoglycoside	AmTech Neomycin Oral Solution	Neomycin
	Biosol® Liquid	Neomycin sulfate
	Gentamicin	Gentamicin
	Neomix Ag® 325 Soluble Powder	Neomycin sulfate
	Neomix® 325 Soluble Powder	Neomycin sulfate
	Neomycin 325 Soluble Powder	Neomycin sulfate
	Neomycin Oral Solution	Neomycin sulfate
	Neo-Sol 50	Neomycin sulfate
	Strep Sol 25%	Streptomycin sulfate
	Streptomycin Oral Solution	Streptomycin
Beta-lactam	Agri-Cillin™	Penicillin G procaine
	Amoxi-Bol®	Amoxicillin
	Amoxi-Inject ®	Amoxicillin
	Amoxi-Mast® Intramammary Infusion	Amoxicillin
	Aquacillin™	Penicillin G procaine
	Aqua-Mast Intramammary Infusion	Penicillin G (procaine)
	Combi-Pen™-48	Penicillin G (benzathine)
	Crysticillin 300 AS Vet.	Penicillin G procaine
	Dariclox® Intramammary Infusion	Cloxacillin (sodium)
	Duo-Pen®	Penicillin G benzathine; procaine
	Durapen™	Penicillin G benzathine; procaine
	Hanford's/US Vet Masti-Clear Intramammary Infusion	Penicillin G (procaine)
	Hanford's/US Vet/Han-Pen G/Ultrapen	Penicillin G Procaine
	Hanford's/US Vet/Han-Pen-B/Ultrapen B	Penicillin G (benzathine)
	Hetacin®K Intramammary Infusion	Hetacillin (potassium)
	Microcillin	Penicillin G procaine
	Pen-G Max™	Penicillin G (procaine)
	Penicillin G Procaine	Penicillin G procaine
	PFI-Pen G®	Penicillin G procaine
	Polyflex®	Ampicillin
	Princillin Bolus	Ampicillin trihydrate
	Pro-Pen-G™ Injection	Penicillin G procaine

Antibiotic/ Antimicrobial Class	Product Name	Active Ingredient
Cephalosporin	Cefa-Lak®/Today Intramammary Infusion	Cephapirin (sodium)
	Excede™ Sterile Suspension	Ceftiofur crystalline free acid
	Excenel® RTU	Ceftiofur hydrochloride
	Naxcel®	Ceftiofur sodium
	Spectramast™ LC Intramammary Infusion	Ceftiofur
	ToDAY® Intramammary Infusion	Cephapirin (sodium)
Florfenicol	Nuflor Injectable Solution	Florfenicol
Lincosamide	Pirsue® Intramammary Infusion	Pirlimycin
Macrolide	Draxxin™	Tulathromycin
	Gallimycin®-100 Injection	Erythromycin
	Gallimycin®-36 Intramammary Infusion	Erythromycin
	Micotil® 300 Injection	Tilmicosin phosphate
	Tylan Injection 50/200 Tylosin Injection	Tylosin
Other	AS700	Chlortetracycline/sulfamethazine
	CORID 20% Soluble Powder	Amprolium
	CORID 9.6% Oral Solution	Amprolium
	Deccox-M	Decoquinate
	Linco-Spectin® Sterile Solution	Lincomycin/Spectinomycin
	TMZ	Trimethoprim sulfamethoxazole
Sulfonamide	20% SQX Solution	Sulfaquinoxaline
	Albon® Bolus	Sulfadimethoxine
	Albon® Concentrated Sol.12.5%	Sulfadimethoxine
	Albon® Injection 40%	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
	Sulfadimethoxine 12.5% Oral Solution	Sulfadimethoxine
	Sulfadimethoxine Inj. 40%	Sulfadimethoxine
	Sulfadimethoxine Soluble Powder	Sulfadimethoxine
	Sulfa-Nox Concentrate	Sulfaquinoxaline
	Sulfa-Nox Liquid	Sulfaquinoxaline (sodium)
	Sulfaquinoxaline Sodium Solution 20%	Sulfaquinoxaline (sodium)
	SulfaSure™ SR Cattle/Calf Bolus	Sulfamethazine
	Sulmet® Drinking Water Solution 12.5%	Sulfamethazine (sodium)
	Sulmet® Oblets®	Sulfamethazine
	Sulmet® Soluble Powder	Sulfamethazine (sodium)
	Sustain III® Cattle Bolus	Sulfamethazine
	Vetisulid Injection	Sulfachlorpyridazine (sodium)
	Vetisulid Powder	Sulfachlorpyridazine (sodium)

Antibiotic/ Antimicrobial Class	Product Name	Active Ingredient
Tetracycline	Agrimycin™ 100	Oxytetracycline hydrochloride
	Agrimycin™ 200	Oxytetracycline hydrochloride
	AmTech Oxytetracycline HCL Solution Powder - 343	Oxytetracycline
	Aureomycin® Soluble Powder	Chlortetracycline hydrochloride
	Aureomycin® Soluble Powder Concentrate	Chlortetracycline hydrochloride
	Bio-Mycin® 200	Oxytetracycline
	Bio-Mycin® C	Oxytetracycline hydrochloride
	CLTC 100 MR	Chlortetracycline calcium
	Duramycin-100	Oxytetracycline hydrochloride
	Duramycin-200	Oxytetracycline hydrochloride
	Liquamycin® LA-200®	Oxytetracycline
	Maxim-200®	Oxytetracycline
	Maxim™-100	Oxytetracycline hydrochloride
	Oxy 500 and 1000 Calf Bolus	Oxytetracycline hydrochloride
	Oxybiotic™ 200	Oxytetracycline
	Oxycure™ 100	Oxytetracycline hydrochloride
	Oxy-Mycin™ 100	Oxytetracycline hydrochloride
	Oxy-Mycin™ 200	Oxytetracycline hydrochloride
	Oxytetracycline HCL Soluble Powder	Oxytetracycline hydrochloride
	Oxytetracycline HCL Soluble Powder 343	Oxytetracycline hydrochloride
	Panmycin® 500 Bolus	Tetracycline hydrochloride
	Pennchlor™ 64 Soluble Powder	Chlortetracycline hydrochloride
	Pennox™ 200 Injectable	Oxytetracycline
	Pennox™ 343 Soluble Powder	Oxytetracycline hydrochloride
	Polyotic® Soluble Powder	Tetracycline hydrochloride
	Promycin™ 100	Oxytetracycline hydrochloride
	Solu/Tet Soluble Powder	Tetracycline hydrochloride
	Terramycin® 343 Soluble Powder	Oxytetracycline hydrochloride
	Terramycin® Scours Tablets	Oxytetracycline hydrochloride
	Terramycin® Soluble Powder	Oxytetracycline hydrochloride
	Terra-Vet 100	Oxytetracycline hydrochloride
	Tet-324	Tetracycline hydrochloride
	Tetra-Bac 324	Tetracycline hydrochloride
	Tetracycline HCL Soluble Powder-324	Tetracycline hydrochloride
	Tetradure™ 300	Oxytetracycline
	Tetrasol Soluble Powder	Tetracycline hydrochloride
	Tet-Sol™ 324	Tetracycline hydrochloride

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

Region	State	Number of Milk Cows, January 1, 2007* (Thousand Head)		Number of Operations 2006*		Average Herd Size	
		Milk cows on operations with 1 or more head	Milk cows on operations with 30 or more head	Operations with 1 or more head	Operations with 30 or more head	Operations with 1 or more head	Operations with 30 or more head
West	California	1,790	1,788.2	2,200	1,920	813.6	931.4
	Idaho	502	501.0	800	620	627.5	808.1
	New Mexico	360	358.9	450	180	800.0	1,993.9
	Texas	347	344.2	1,300	660	266.9	521.5
	Washington	235	234.3	790	540	297.5	433.9
	Total	3,234	3,226.6	5,540	3,920	583.8	823.1
East	Indiana	166	154.4	2,100	1,150	79.0	134.3
	Iowa	210	203.7	2,400	1,870	87.5	108.9
	Kentucky	93	86.5	2,000	1,180	46.5	73.3
	Michigan	327	320.5	2,700	1,910	121.1	167.8
	Minnesota	455	441.3	5,400	4,800	84.3	91.9
	Missouri	114	108.3	2,600	1,400	43.8	77.4
	New York	628	612.3	6,400	5,100	98.1	120.1
	Ohio	274	252.1	4,300	2,400	63.7	105.0
	Pennsylvania	550	536.3	8,700	7,000	63.2	76.6
	Vermont	140	137.2	1,300	1,100	107.7	124.7
	Virginia	100	97.0	1,300	820	76.9	118.3
	Wisconsin	1,245	1,213.9	14,900	12,800	83.6	94.8
	Total	4,302	4,163.5	54,100	41,530	79.5	100.3
Total (17 States)		7,536	7,390.1	59,640	45,450	126.4	162.6
Percentage of U.S.		82.5	82.5	79.5	84.7		
Total U.S. (50 States)		9,132.0	8,958.5	74,980	53,680	121.8	166.9

*Source: NASS Cattle report, February 2, 2007, and NASS Farms, Land in Farms, and Livestock Operations 2006 Summary report, February 2007. An operation is any place having one or more head of milk cows, excluding cows used to nurse calves, on hand at any time during the year.

Updates: NASS Cattle report, February 1, 2008, and NASS Farms, Land in Farms, and Livestock Operations 2007 Summary report, February 1, 2008.

Appendix IV: Study Objectives and Related Outputs

1. Describe trends in dairy cattle health and management practices
• Part II: Changes in the U.S. Dairy Cattle Industry 1991-2007, March 2008
• Part V: Changes in Dairy Cattle Health and Management in the United States, 1991-2007, 2007, expected fall 2008

2. Evaluate management factors related to cow comfort and removal rates
• Dairy Facilities and Cow Comfort on U.S Dairy Operations, 2007, interpretive Report, expected fall 2008

3. Describe dairy calf health and nutrition from birth to weaning and evaluate heifer disease prevention practices
• Part I: Reference of Dairy Cattle Health and Management Practices in the United States, 2007, October 2007
• Off-Site Heifer Raising on U.S. Dairy Operations, 2007, info sheet, November 2007
• Colostrum Feeding and Management on U.S. dairy Operations, 1991-2007, info sheet, March 2008
• Part IV: Reference of Dairy Cattle Health and Management Practices in the United States, 2007, expected fall 2008
• Calf Health and Management Practices on U.S. Dairy Operations, 2007, interpretive report, expected fall 2008
• Calving Management on U.S. Dairy Operations, 2007, info sheet, expected fall 2008

4. Estimate the prevalence of herds infected with bovine viral diarrhea virus (BVD)
• Bovine Viral Diarrhea (BVD) Detection in Bulk Tank Milk and BVD Management Practices in the United States, 1996-2007, info sheet, expected September 2008

5. Describe current milking procedures and estimate the prevalence of contagious mastitis pathogens
• **Part III: Reference of Dairy Cattle Health and Management Practices in the United States, 2007, September 2008**
• Milking Procedures on U.S. Dairy Operations, 2007, info sheet, expected September 2008

6. Estimate the herd-level prevalence and associated costs of *Mycobacterium avium* subspecies *paratuberculosis*
• Johne’s Disease on U.S. Dairies, 1991-2007, info sheet, April 2008

7. Describe current biosecurity practices and determine producer motivation for implementing or not implementing biosecurity practices

- Part I: Reference of Dairy Cattle Health and Management Practices in the United States, 2007, October 2007
- **Part III: Reference of Dairy Cattle Health and Management Practices in the United States, 2007, September 2008**
- Biosecurity Practices on U.S. Dairy operations, 2002-2007, interpretive report, expected fall 2008

8. Determine the prevalence of specific food-safety pathogens and describe antimicrobial resistance patterns

- Antibiotic Use on U.S. Dairy Operations, 2002-2007, info sheet, expected September 2008
- Prevalence of *Salmonella and Listeria* in Bulk Tank Milk on U.S. Dairy Operations, 2007, info sheet, expected September 2008
- *Salmonella* and *Campylobacter* on U.S. Dairy Operations, 2002-2007, info sheet, expected fall 2008
- Food Safety Pathogens Isolated from U.S. Dairy Operations, 2007, interpretive report, expected winter 2008

Additional informational sheets

- Dairy Cattle Identification Practices in the United States, 2007, info sheet, November 2007
- Reproduction Practices on U.S. Dairy Operations, 2007, info sheet, expected fall 2008
- Bovine Leukosis Virus (BLV) on U.S. Dairy Operations, 2007, info sheet, expected September 2008
- Dairy Cattle Injection Practices in the United States, 2007, info sheet, expected fall 2008
- Methicillin-Resistant *Staphylococcus aureus* (MRSA) Isolation from Bulk Tank Milk in the United States, 2007, info sheet, expected fall 2008