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System

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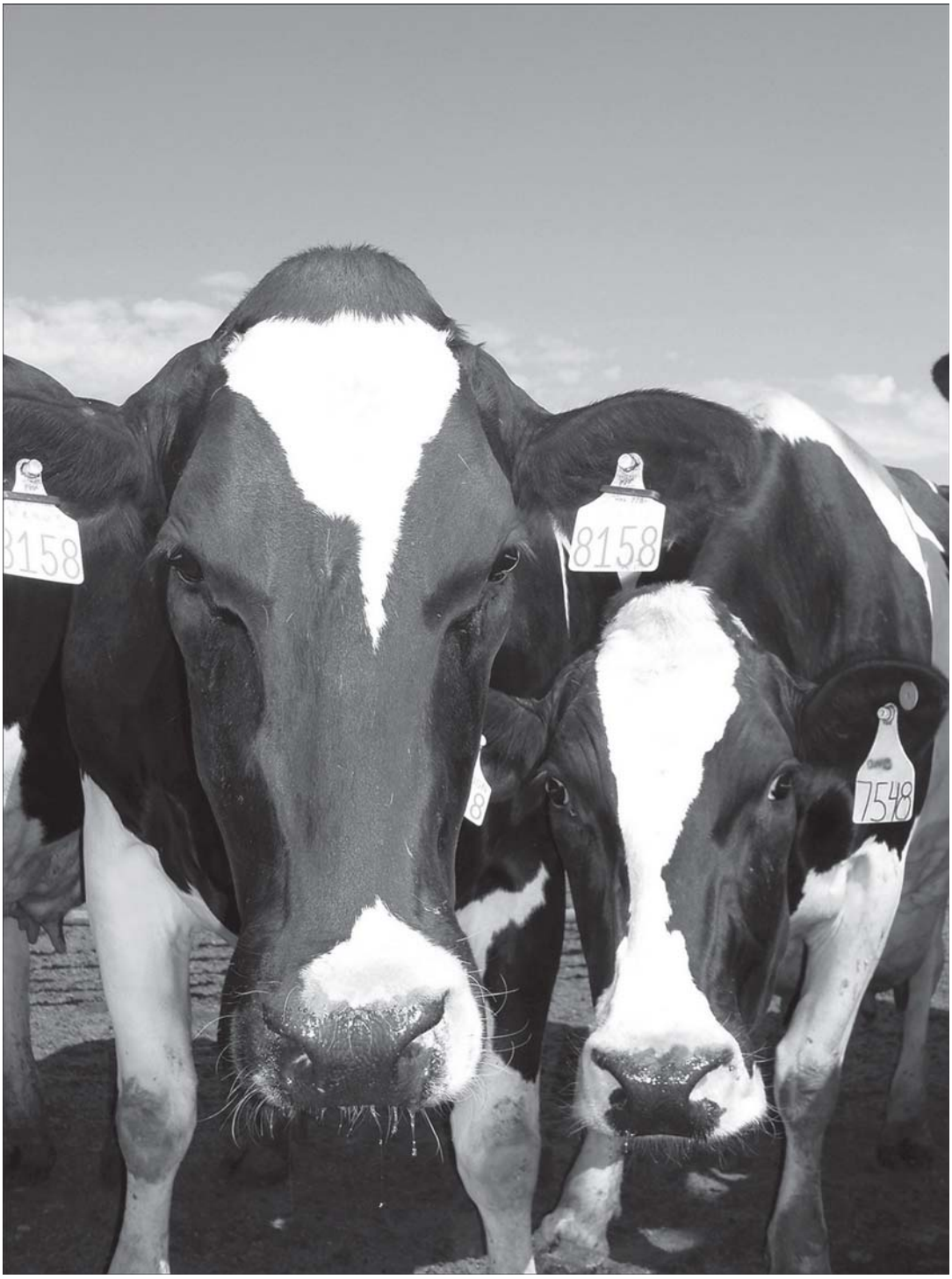
Dairy 2007

Part II: Changes in the U.S. Dairy Cattle Industry, 1991–2007



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- Quality Milk Production Services
- Tetracore, Inc
- University of Pennsylvania, New Bolton Center
- University of Wisconsin, Madison
- Wisconsin Veterinary Diagnostic Laboratory

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Introduction

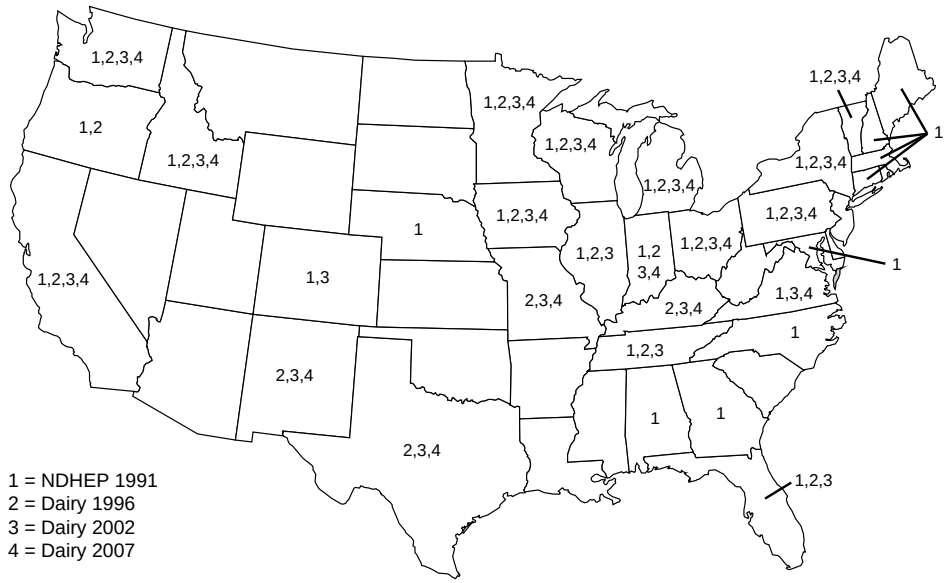
In 1983, promoters of the concept that would become the USDA's National Animal Health Monitoring System (NAHMS) envisioned a program that would monitor changes and trends in national animal health and management. They hoped to provide periodic snapshots of U.S. food animal industries. With these industry overviews, members could identify opportunities for improvement, provide changing foundations for research and special studies, and detect emerging problems.

Section I of this report shows demographic changes of the U.S. dairy industry from a historical perspective using data provided by the USDA's National Agricultural Statistics Service (NASS) and Agricultural Marketing Service (AMS). Section II shows demographic changes of the world dairy industry using data provided by USDA's Foreign Agricultural Service (FAS). Results of four NAHMS national studies in Section III complete the overview of change in the U.S. dairy industry during the 16-year period of 1991 to 2007.

NAHMS' first national study of the U.S. dairy industry, the 1991 National Dairy Heifer Evaluation Project (NDHEP), provided the snapshot of animal health and management that would serve as a baseline from which to measure industry changes in animal health and management. NAHMS' Dairy 1996, Dairy 2002, and Dairy 2007 studies have fulfilled the vision of the program's founding objective, monitoring the trends in national animal health and management practices.

The NDHEP 1991 included herds of 30 or more milk cows and heifer-rearing operations in 28 States representing 83 percent of U.S. milk cows. Dairy 1996 described dairy production for operations with one or more milk cows in 20 States representing 83 percent of the Nation's milk cows. Dairy 2002 described dairy production for operations with one or more milk cows in 21 States representing 85 percent of the Nation's dairy cows. Dairy 2007 was conducted in 17 of the Nation's major dairy States and provides information representing 80 percent of U.S. dairy operations and 83 percent of U.S. dairy cows. This report, Part II: Changes in the United States Dairy Industry, 1991-2007, provides national estimates of animal health management practices for comparable populations from all four studies. Reports from all four NAHMS dairy studies—including the studies' methodologies—are available at http://www.aphis.usda.gov/nahms.

States Participating in NAHMS Dairy Studies, 1991, 1996, 2002, 2007



Further information on NAHMS studies and reports is available at:
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Terms Used In This Report

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

Cow average: The average value for all cows; the reported value for each operation multiplied by the number of cows on that operation is summed over all operations and divided by the number of cows on all operations. This way, the result is adjusted for the number of cows on each operation. For instance, on p 41 the cow average age at first calving is multiplied by the number of cows for each operation. This product is then summed over all operations and divided by the sum of cows over all operations. The result is the average age at first calving for all cows.

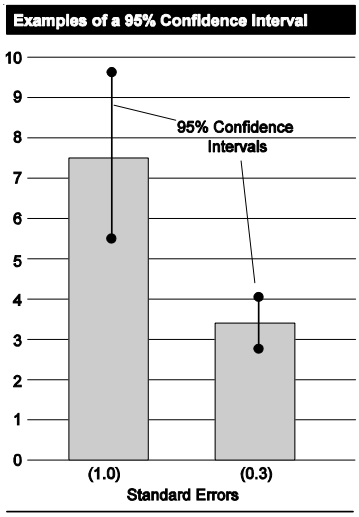
Dairy Herd Improvement Association (DHIA): An organization with programs and objectives intended to improve the production and profitability of dairy farming. DHIA also aids farmers in keeping milk production and management records.

Heifer: Female dairy bovine that has not yet calved.

Herd size: Herd size is based on January 1 respective inventories. 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.

NA: Not available.

Operation average: A single value for each operation is summed over all operations reporting divided by the number of operations reporting. For instance, operation average age at first calving (shown on p 41) is calculated by summing reported average age over all operations divided by the 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. If there were no reports of the event, no standard error was reported.

Rolling Herd Average (RHA): Average milk production per cow (lb/cow) in the herd during the previous 12 months.

Section I: Historical Changes in the U.S. Dairy Industry

A. General Trends

Note: Unless otherwise noted, tables in this section are comprised from data collected by USDA's National Agricultural Statistics Service (NASS).

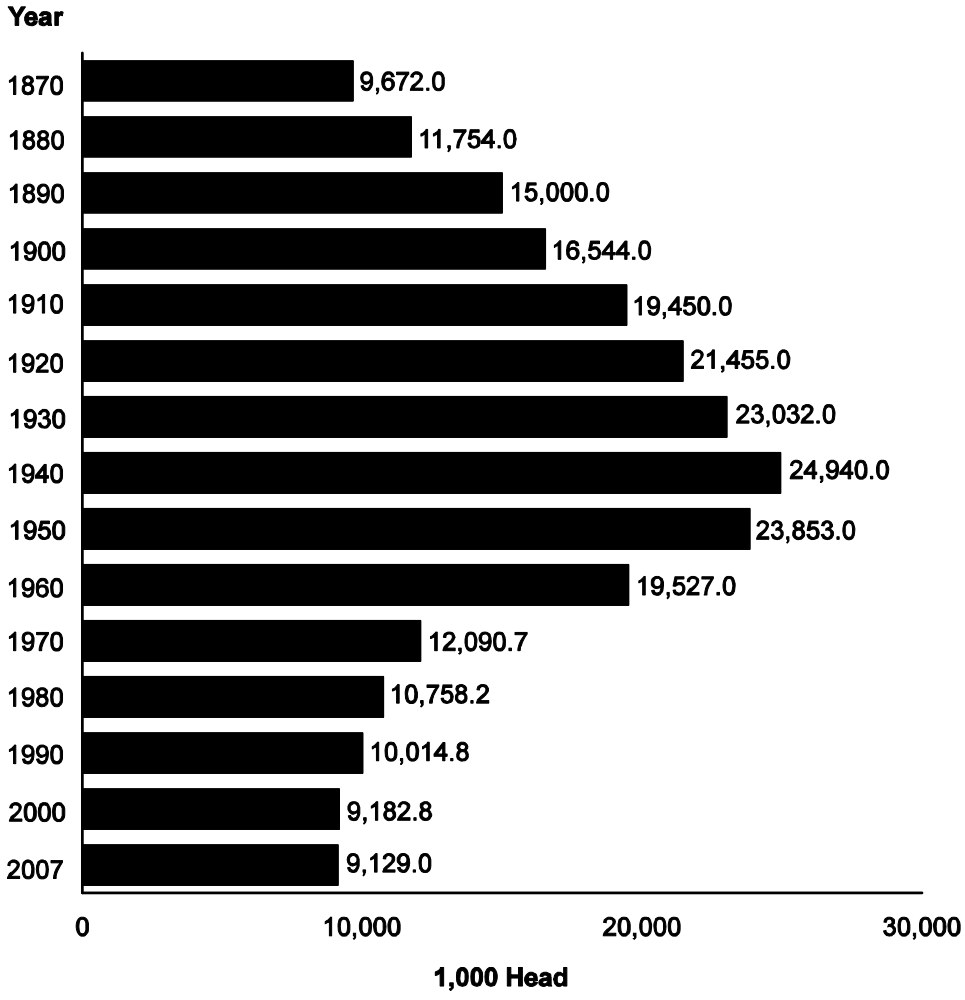
1. Milk cow inventory

On January 1, 2007, U.S. milk cows numbered 9,129,000 head, 94.4 percent of the 9,672,000 milk cows in 1870. All U.S. cattle and calves numbered 97,002,900 head in 2007, about three times the number of cattle and calves in 1870 (31,082,000 head).

a. Long-term changes in U.S. milk cow January 1 inventory, 1870-2007:

	Milk Cows			All Cattle and Calves
Year	1,000 Head	Percent of 1870	Percent of All Cattle and Calves	1,000 Head
1870	9,672.0	100.0	31.1	31,082.0
1880	11,754.0	121.5	27.1	43,347.0
1890	15,000.0	155.1	25.0	60,014.0
1900	16,544.0	171.1	27.7	59,739.0
1910	19,450.0	201.1	33.0	58,993.0
1920	21,455.0	221.8	30.5	70,400.0
1930	23,032.0	238.1	37.8	61,003.0
1940	24,940.0	257.9	36.5	68,309.0
1950	23,853.0	246.6	30.6	77,963.0
1960	19,527.0	201.9	20.3	96,236.0
1970	12,090.7	125.0	10.8	112,368.7
1980	10,758.2	111.2	9.7	111,242.4
1990	10,014.8	103.5	10.5	95,816.2
2000	9,182.8	94.9	9.4	98,199.0
2007	9,129.0	94.4	9.4	97,002.9

Long-term Changes in U.S. Milk Cow January 1 Inventory, 1870-2007



The number of milk cows that calved each year decreased about 6 percent from 1992 to 2002 but remained stable from 2002 to 2007.

b. Recent changes in U.S. milk cow January 1 inventory, 1992-2007:

Milk Cows					
Year	**1,000 Head**	**Percent Previous Year**	**Percent of 1992**	**Percent of 1996**	**Percent of 2002**
1992	9,728.2	97.6	100.0	--	--
1993	9,658.1	99.3	99.3	--	--
1994	9,507.0	98.4	97.7	--	--
1995	9,481.8	99.7	97.5	--	--
1996	9,419.9	99.3	96.8	100.0	--
1997	9,317.9	98.9	95.8	98.9	--
1998	9,199.0	98.7	94.6	97.7	--
1999	9,128.0	99.2	93.8	96.9	--
2000	9,182.8	100.6	94.4	97.5	--
2001	9,171.7	99.9	94.3	97.4	--
2002	9,105.6	99.3	93.6	96.7	100.0
2003	9,141.7	100.4	94.0	97.0	100.4
2004	8,989.5	98.3	92.4	95.4	98.7
2005	9,005.0	100.2	92.6	95.6	98.9
2006	9,062.9	100.6	93.2	96.2	99.5
2007	9,129.0	100.7	93.8	96.9	100.3

The January 1, 2007, number of replacement heifers has increased 4.3 percent since 1992. Replacement heifers as a percentage of the milk cow inventory remains between 42.5 and 47.2 percent, with recent years showing the larger percentage.

c. Recent changes in U.S. replacement heifer January 1 inventory, 1992-2007:

Milk Cow Replacement Heifers

Year	1,000 Head	Percent Previous Year	Percent of 1992	Percent of 1996	Percent of 2002	Percent of Milk Cows
1992	4,131.4	100.9	100.0	--	--	42.5
1993	4,176.2	101.1	101.1	--	--	43.2
1994	4,124.5	98.8	99.8	--	--	43.4
1995	4,121.3	99.9	99.8	--	--	43.5
1996	4,090.3	99.2	99.0	100.0	--	43.4
1997	4,058.4	99.2	98.2	99.2	--	43.6
1998	3,985.7	98.2	96.5	97.4	--	43.3
1999	4,068.8	102.1	98.5	99.5	--	44.6
2000	3,999.8	98.3	96.8	97.8	--	43.6
2001	4,057.0	101.4	98.2	99.2	--	44.2
2002	4,054.8	99.9	98.1	99.1	100.0	44.5
2003	4,113.9	101.5	99.6	100.6	101.5	45.0
2004	4,020.0	97.7	97.3	98.3	99.1	44.7
2005	4,118.3	102.4	99.7	100.7	101.6	45.7
2006	4,275.0	103.8	103.5	104.5	105.4	47.2
2007	4,309.9	100.8	104.3	105.4	106.3	47.2

2. Number and size of dairy operations

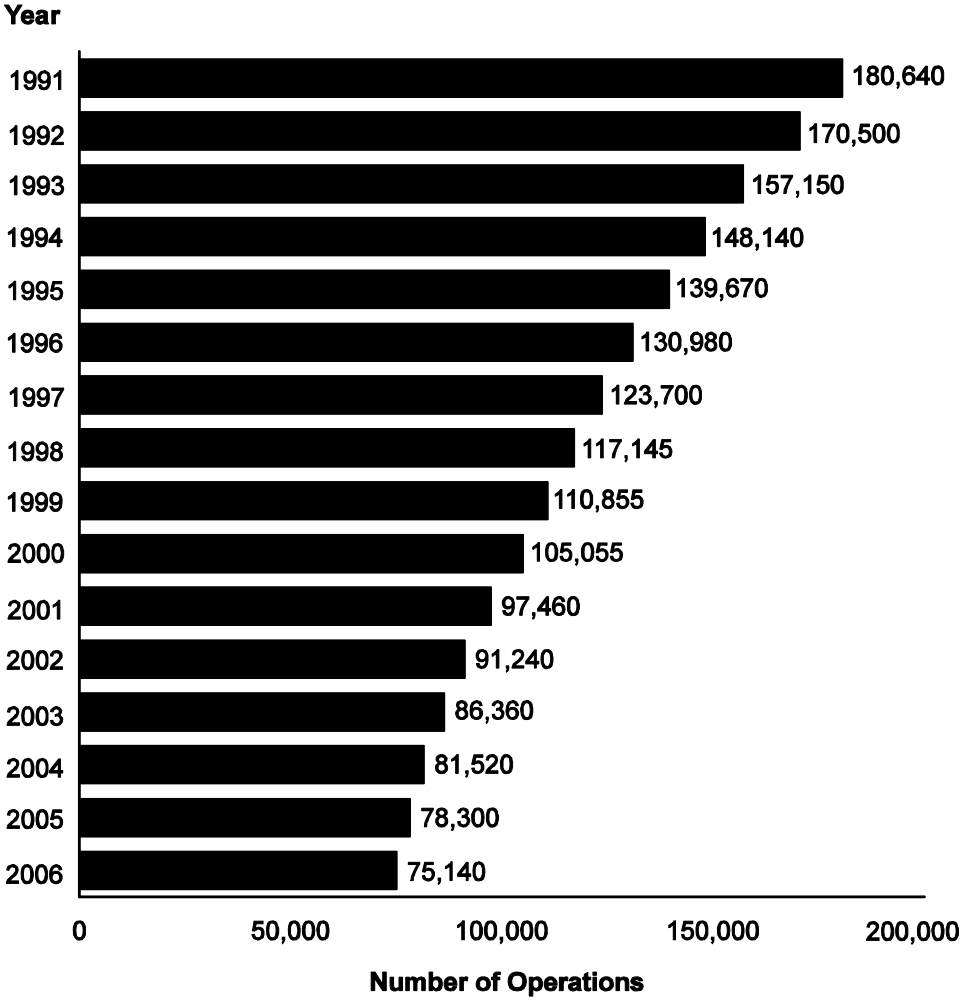
Approximately 4 to 7 percent of dairy operations have gone out of business each year since 1991. Since 1991, the number of dairy operations decreased by 58.4 percent, while milk cow numbers in 2007 were at 93.8 percent of 1992 numbers. In this time frame, milk per cow increased by 32.7 percent and total milk production increased by 23.1 percent.

a. Recent changes in the number of U.S. dairy operations*, 1991-2006:

Year	Number of Operations	Percent Previous Year	Percent of 1991	Percent of 1995	Percent of 2001
1991	180,640	93.8	100.0	--	--
1992	170,500	94.4	94.4	--	--
1993	157,150	92.2	87.0	--	--
1994	148,140	94.3	82.0	--	--
1995	139,670	94.3	77.3	100.0	--
1996	130,980	93.8	72.5	93.8	--
1997	123,700	94.4	68.5	88.6	--
1998	117,145	94.7	64.8	83.9	--
1999	110,855	94.6	61.4	79.4	--
2000	105,055	94.8	58.2	75.2	--
2001	97,460	92.8	54.0	69.8	100.0
2002	91,240	93.6	50.5	65.3	93.6
2003	86,360	94.7	47.8	61.8	88.6
2004	81,520	94.4	45.1	58.4	83.6
2005	78,300	96.1	43.3	56.1	80.3
2006	75,140	96.0	41.6	53.8	77.1

* An operation is any place having one or more milk cows—excluding cows used to nurse calves—on hand any time during the year.

Recent Changes in the Number of U.S. Dairy Operations*, 1991-2006



*An operation is any place having one or more milk cows-excluding cows used to nurse calves-on hand any time during the year.

The percentage of operations with fewer than 50 cows has decreased since 1991, while the percentage of operations with more than 100 head has increased every year since 1991. More than 1 in 10 operations (11.5 percent) had more than 100 cows in 1991 compared to about 2 in 10 (23.3 percent) in 2006.

b. Percentage of U.S. dairy operations by herd size, 1991-2006:

	Percent Operations					
	Herd Size (Number of Cows)					
Year	**1-29**	**30-49**	**50-99**	**100-199**	**200-499**	**500+**
1991	39.8	22.8	25.9	11.5[1]		
1992	38.9	22.1	26.0	13.0[1]		
1993	37.3	22.2	26.8	9.3	4.4[2]	
1994	36.1	22.0	27.4	9.8	4.7[2]	
1995	34.5	22.2	28.1	10.2	5.0[2]	
1996	32.9	22.3	28.7	10.7	5.4[2]	
1997	31.6	22.1	29.0	11.3	4.1	1.9
1998	30.8	21.8	29.1	11.9	4.4	2.0
1999	29.7	21.7	29.6	11.9	4.8	2.3
2000	29.3	21.2	29.7	12.2	5.1	2.5
2001	29.0	20.4	29.8	12.6	5.3	2.9
2002	28.9	19.8	30.0	12.6	5.5	3.2
2003	29.0	19.5	29.9	12.7	5.5	3.4
2004	29.2	19.0	29.5	12.8	5.8	3.7
2005	28.7	19.0	29.6	12.8	6.0	3.9
2006	28.3	18.8	29.6	13.0	6.1	4.2

[1]These estimates include herds of 100 or more head.
[2]These estimates include herds of 200 or more head.

Operations with more than 200 cows accounted for 61.7 percent of cows in 2006 compared to 31.8 percent in 1993.

c. Percentage of U.S. milk cow inventory by herd size, 1991-2006:

	Percent Inventory					
	Herd Size (Number of Cows)					
Year	**1-29**	**30-49**	**50-99**	**100-199**	**200-499**	**500+**
1991	6.3	16.6	31.7	45.4[1]		
1992	5.5	15.2	30.0	49.3[1]		
1993	5.0	14.8	29.2	19.2	31.8[2]	
1994	4.6	14.0	28.7	19.3	33.4[2]	
1995	4.0	13.0	28.0	20.0	35.0[2]	
1996	4.0	12.0	27.0	20.0	37.0[2]	
1997	3.5	11.5	26.0	20.0	14.6	24.4
1998	3.6	10.5	24.3	19.3	15.5	26.8
1999	3.2	10.2	23.3	18.4	16.3	28.6
2000	2.9	9.1	22.0	18.1	16.6	31.3
2001	2.7	8.0	20.8	17.2	16.3	35.0
2002	2.4	7.4	19.6	16.4	15.9	38.3
2003	2.3	6.9	18.8	15.7	15.4	40.9
2004	2.1	6.6	17.8	15.1	15.5	42.9
2005	2.0	6.4	17.1	14.6	15.4	44.5
2006	1.9	6.0	16.3	14.1	15.0	46.7

[1]These estimates include herds of 100 or more head.
[2]These estimates include herds of 200 or more head.

3. Milk production

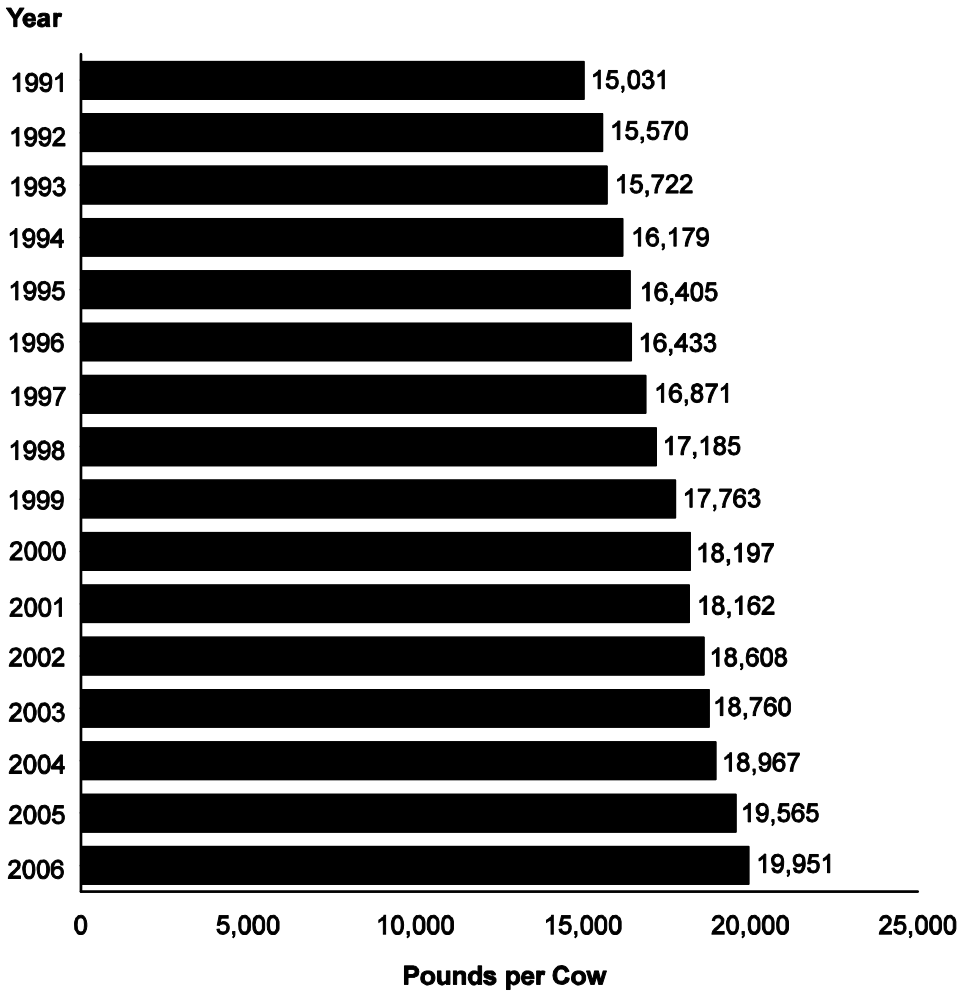
Milk production per cow has increased as much as 1 to 3 percent annually since 1991, with the exception of 2001. Milk production per cow was 19,951 pounds in 2006 compared to 15,031 pounds in 1991—a 32.7-percent increase.

a. Recent changes in U.S. milk production per cow, 1991-2006:

		Milk per Cow				
Year	**Average Number of Milk Cows*** (1,000 Head)	**Pounds per Cow**	**Percent Previous Year**	**Percent of 1991**	**Percent of 1995**	**Percent of 2001**
1991	9,826	15,031	101.7	100.0	--	--
1992	9,688	15,570	103.6	103.6	--	--
1993	9,581	15,722	101.0	104.6	--	--
1994	9,494	16,179	102.9	107.6	--	--
1995	9,466	16,405	101.4	109.1	100.0	--
1996	9,372	16,433	100.2	109.3	100.2	--
1997	9,252	16,871	102.7	112.2	102.8	--
1998	9,151	17,185	101.9	114.3	104.8	--
1999	9,153	17,763	103.4	118.2	108.3	--
2000	9,199	18,197	102.4	121.1	110.9	--
2001	9,103	18,162	99.8	120.8	110.7	100.0
2002	9,139	18,608	102.5	123.8	113.4	102.5
2003	9,083	18,760	100.8	124.8	114.4	103.3
2004	9,012	18,967	101.1	126.2	115.6	104.4
2005	9,043	19,565	103.2	130.2	119.3	107.7
2006	9,112	19,951	102.0	132.7	121.6	109.9

*Average number during the year, excluding heifers not yet fresh.

Recent Changes in U.S. Milk Production per Cow, 1991-2006



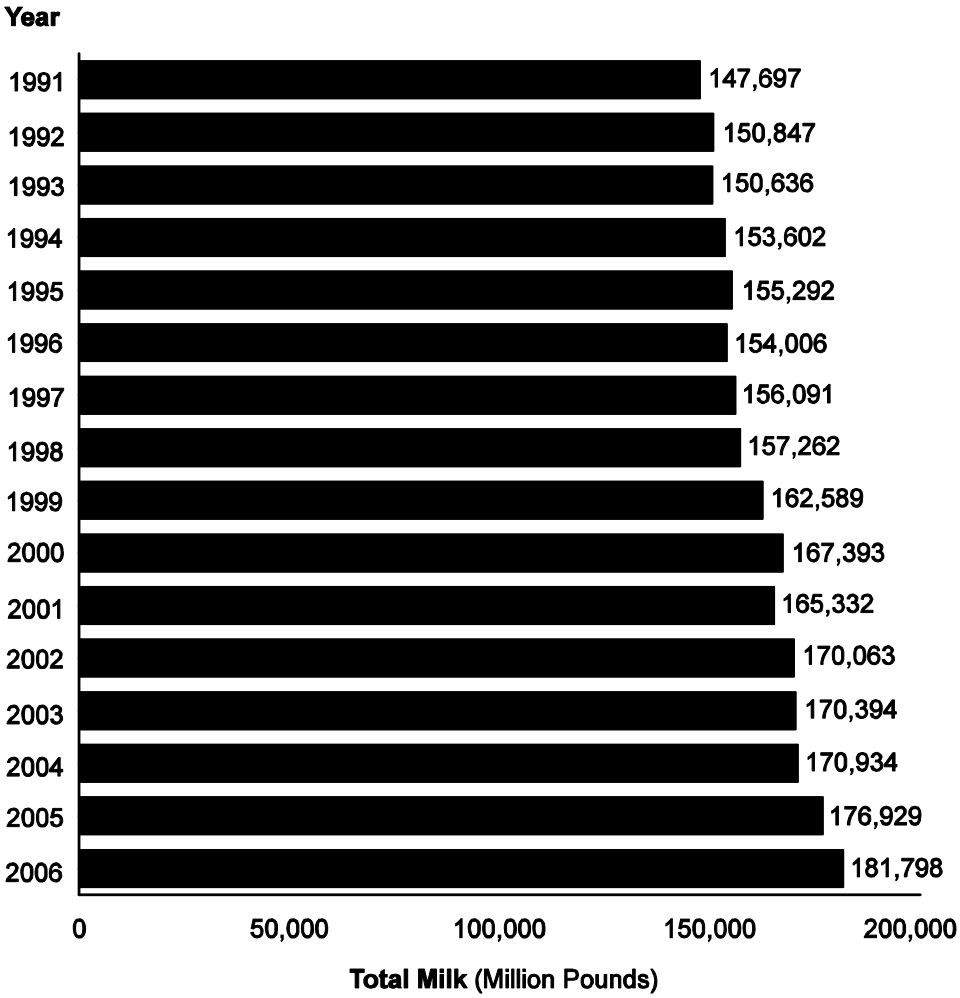
Total milk production in the United States has increased more than 20 percent since 1991, despite an approximate 6-percent drop in the number of cows. In 2006, total milk production was 181,798 million pounds compared to 147,697 million pounds in 1991.

b. Recent changes in U.S. total milk production, 1991-2006:

Total Milk Production					
Year	**Total Milk*** (Million Pounds)	**Percent Previous Year**	**Percent of 1991**	**Percent of 1995**	**Percent of 2001**
1991	147,697	100.0	100.0	--	--
1992	150,847	102.1	102.2	--	--
1993	150,636	99.8	102.0	--	--
1994	153,602	102.0	104.0	--	--
1995	155,292	101.1	105.1	100.0	--
1996	154,006	99.2	104.3	99.2	--
1997	156,091	101.4	105.7	100.5	--
1998	157,262	100.8	106.5	101.3	--
1999	162,589	103.4	110.1	104.7	--
2000	167,393	103.0	113.3	107.8	--
2001	165,332	98.8	111.9	106.5	100.0
2002	170,063	102.9	115.1	109.5	102.9
2003	170,394	100.2	115.4	109.7	103.1
2004	170,934	100.3	115.7	110.1	103.4
2005	176,929	103.5	119.8	113.9	107.0
2006	181,798	102.8	123.1	117.1	110.0

*Excluding milk nursed by calves.

Recent Changes in U.S. Total Milk Production*, 1991-2006



*Excluding milk nursed by calves

4. Bulk-tank somatic cell counts

Bulk tank somatic cell counts (BTSCCs) from 4 of the 10 U.S. Federal Milk Marketing Orders were analyzed from 1995 to 2006. Monthly BTSCCs were weighted based on the pounds of milk shipped, and, subsequently, a geometric mean of all milk-weighted somatic cell counts was calculated. BTSCCs from the four Federal Milk Marketing Orders have decreased over the last 12 years. Typically, BTSCCs spike during summer months and decline quickly during fall. BTSCCs have ranged from a high of 384,100 in August 1995 to a low of 234,200 in March 2006. Beginning in 2004, BTSCCs have decreased in January through July for each subsequent year.

a. Milk-weighted bulk tank somatic cell counts from Federal Milk Marketing Orders, 1995–2006* (January through June):

Bulk Tank Somatic Cell Counts (x1,000 cells/ml), 1995–2006

Month (January–June)

Year	January	February	March	April	May	June
1995	298.8	293.2	297.0	289.3	286.1	308.6
1996	275.5	283.5	283.3	277.0	280.4	309.2
1997	288.2	294.9	295.9	291.3	293.4	299.9
1998	284.4	280.2	282.4	282.6	284.2	298.6
1999	278.5	288.8	282.8	283.9	286.4	315.3
2000	258.0	279.9	283.7	282.5	292.6	311.9
2001	286.5	280.2	281.7	284.5	291.6	305.9
2002	283.4	281.8	279.1	279.5	270.9	284.9
2003	274.4	279.9	281.0	271.5	277.6	292.2
2004	250.0	257.6	266.3	264.4	260.5	274.7
2005	246.7	248.2	243.8	244.9	245.5	264.3
2006	240.8	234.7	234.2	236.4	234.7	249.1

*Agricultural Marketing Service data summarized by NAHMS.

b. Milk-weighted bulk tank somatic cell counts from Federal Milk Marketing Orders, 1995–2006* (July through December):

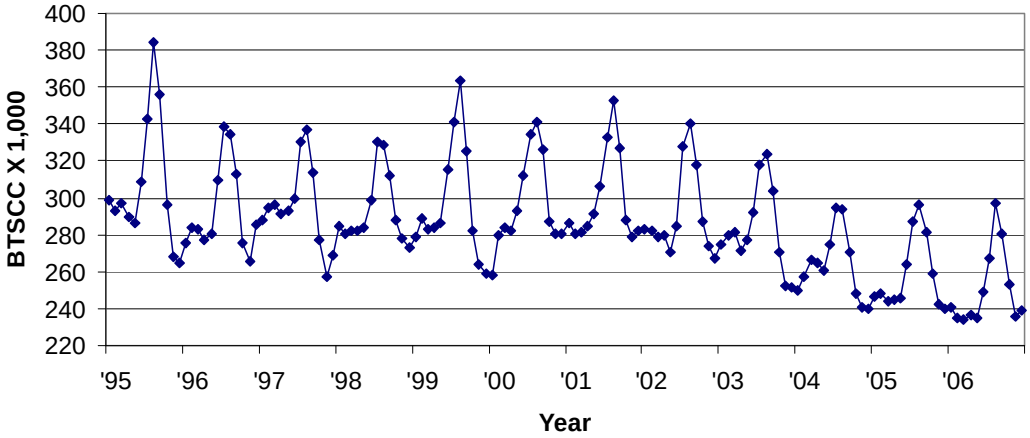
Bulk Tank Somatic Cell Counts (x1,000 cells/ml), 1995–2006

Month (July–December)

Year	July	August	September	October	November	December
1995	342.8	384.1	356.4	296.6	267.7	265.2
1996	338.7	334.1	313.0	275.6	265.3	285.4
1997	330.3	336.7	314.1	276.9	257.0	269.3
1998	330.2	328.4	312.3	288.2	278.2	272.7
1999	341.4	363.7	325.5	282.4	263.6	259.3
2000	334.2	341.4	326.4	287.4	280.4	280.5
2001	332.5	352.5	327.3	288.1	278.7	282.6
2002	328.0	340.1	318.0	287.0	273.6	267.2
2003	317.8	323.7	304.1	270.3	252.0	251.2
2004	294.5	293.6	270.4	247.9	240.9	239.5
2005	286.8	296.1	281.7	258.9	242.5	240.1
2006	267.1	296.9	280.3	253.0	235.4	239.4

*Agricultural Marketing Service data summarized by NAHMS.

Monthly milk-weighted bulk tank somatic cell counts from Federal Milk Marketing Orders, 1995–2006



5. Milk prices

From 1991 through 2006, milk prices paid to producers ranged from a low of $11.00 per hundred pounds of milk from March through June 2003 to a high of $19.30 in May of 2004. On average, milk prices during this time were between $13.00 and $14.00. In general, milk prices rise during late summer and early fall, decrease in mid-winter, and remain stable through the summer.

a. Monthly milk prices received by farmers, all milk 1991–2006 (January through June):

Milk Prices* 1991–2006 (Dollars)

Month (January–June)

Year	January	February	March	April	May	June
1991	11.70	11.60	11.40	11.30	11.30	11.40
1992	13.40	12.90	12.50	12.60	12.80	13.20
1993	12.50	12.20	12.20	12.60	12.90	13.00
1994	13.60	13.40	13.50	13.40	12.80	12.60
1995	12.60	12.50	12.60	12.30	12.30	12.10
1996	14.10	13.90	13.80	13.90	14.30	14.80
1997	13.50	13.40	13.60	13.20	12.70	12.20
1998	14.70	14.90	14.50	14.00	13.30	14.20
1999	17.40	15.20	15.20	12.60	12.80	13.10
2000	12.00	11.80	11.80	11.90	12.00	12.30
2001	13.00	13.10	13.90	14.60	15.50	16.20
2002	13.60	13.10	12.60	12.50	12.10	11.50
2003	11.80	11.30	11.00	11.00	11.00	11.00
2004	13.20	13.60	15.50	18.10	19.30	18.20
2005	16.10	15.40	15.50	15.20	14.70	14.40
2006	14.40	13.50	12.60	12.10	11.90	11.90

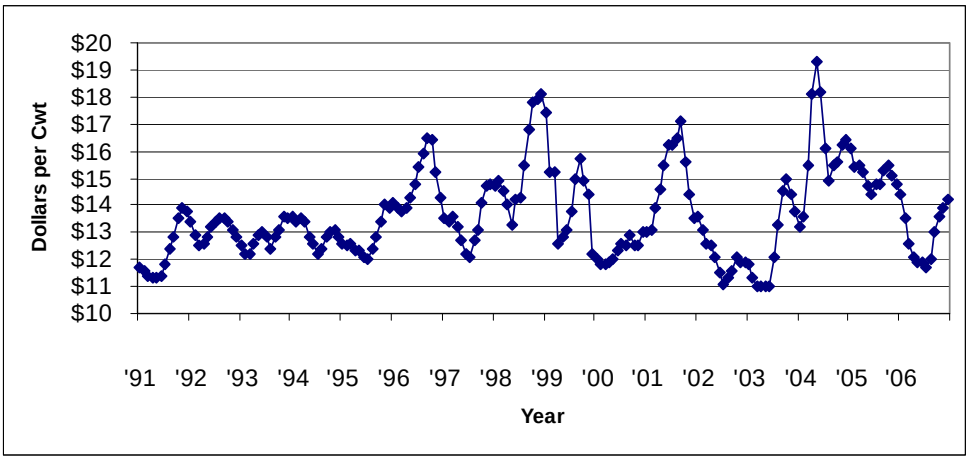
*Per 100 pounds of milk.

b. Monthly milk prices received by farmers, all milk 1991–2006 (July through December):

	Milk Prices* 1991–2006 (Dollars)					
	Month (July–December)					
Year	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
1991	11.80	12.40	12.80	13.50	13.90	13.80
1992	13.40	13.50	13.50	13.40	13.10	12.80
1993	12.80	12.40	12.80	13.10	13.60	13.50
1994	12.20	12.40	12.80	13.00	13.10	12.80
1995	12.00	12.40	12.80	13.40	14.00	13.90
1996	15.40	15.90	16.50	16.40	15.20	14.30
1997	12.10	12.70	13.10	14.10	14.70	14.80
1998	14.30	15.50	16.80	17.80	17.90	18.10
1999	13.80	15.00	15.70	14.90	14.40	12.20
2000	12.60	12.50	12.90	12.50	12.50	13.00
2001	16.20	16.50	17.10	15.60	14.40	13.50
2002	11.10	11.30	11.60	12.10	11.90	11.90
2003	12.10	13.30	14.50	15.00	14.40	13.80
2004	16.10	14.90	15.50	15.60	16.20	16.40
2005	14.80	14.80	15.30	15.50	15.10	14.80
2006	11.70	12.00	13.00	13.60	13.90	14.20

*Per 100 pounds of milk.

Monthly Milk Prices Received by Farmers, All Milk 1991–2006



c. Annual milk prices received by farmers, all milk 1991–2006:

	Annual Milk Prices[1] 1991–2006 (Dollars)	
	Nominal Dollars[2]	**2000 Dollars[3]**
1991	12.27	14.53
1992	13.15	15.22
1993	12.84	14.52
1994	13.01	14.41
1995	12.78	13.87
1996	14.75	15.71
1997	13.36	14.00
1998	15.46	16.02
1999	14.38	14.69
2000	12.40	12.40
2001	15.05	14.70
2002	12.18	11.69
2003	12.55	11.80
2004	16.13	14.78
2005	15.19	13.48
2006	12.97	11.16

[1]Per 100 pounds of milk.
[2]Prices producers received.
[3]Nominal prices adjusted for inflation.

6. Milk cow prices

Cow prices were stable from 1991 through 1998, with prices averaging between $1,000 and $1,200 per cow. Since 1998, cow prices have varied more, with a low of $1,240 per cow in 1999 and a high of $1,870 in 2005.

Milk-cow prices received by producers, 1991–2006:

Milk–Cow Prices[1] (Dollars)						
Year	**January**	**April**	**July**	**October**	**Annual Nominal Dollars[2]**	**2002 Dollars[3]**
1991	1,100	1,090	1,090	1,100	1,100	1,303
1992	1,100	1,120	1,150	1,150	1,130	1,308
1993	1,140	1,160	1,170	1,170	1,160	1,312
1994	1,170	1,190	1,160	1,160	1,170	1,296
1995	1,150	1,140	1,130	1,090	1,130	1,227
1996	1,060	1,070	1,090	1,130	1,090	1,161
1997	1,090	1,110	1,100	1,090	1,100	1,153
1998	1,070	1,110	1,120	1,180	1,120	1,161
1999	1,250	1,240	1,280	1,380	1,280	1,308
2000	1,330	1,340	1,350	1,350	1,340	1,340
2001	1,320	1,400	1,590	1,700	1,500	1,465
2002	1,610	1,710	1,670	1,430	1,600	1,536
2003	1,380	1,300	1,310	1,380	1,340	1,259
2004	1,390	1,580	1,720	1,640	1,580	1,444
2005	1,620	1,770	1,830	1,870	1,770	1,570
2006	1,840	1,770	1,680	1,650	1,730	1,488

[1]Cows that calved.
[2]Prices producers received.
[3]Nominal prices adjusted for inflation.

7. Dairy cow slaughter

Approximately 2 to 3 million dairy cows have been slaughtered annually since 1991. The number of cows slaughtered as a percentage of January 1 inventory ranged from 25.0 to 32.2 percent.

Recent changes in dairy-cow slaughter, 1991-2006:

	Dairy-Cow Slaughter		
Year	**1,000 Head**	**Percent of January 1 Cow Inventory**	**Percent Previous Year**
1991	2,840.0	28.5	106.3
1992	2,892.0	29.7	101.8
1993	2,994.8	31.0	103.6
1994	2,857.8	30.1	95.4
1995	2,861.7	30.2	100.1
1996	3,036.9	32.2	106.1
1997	2,926.2	31.4	96.4
1998	2,619.6	28.5	89.5
1999	2,573.3	28.2	98.2
2000	2,631.5	28.7	102.3
2001	2,581.9	28.2	98.1
2002	2,606.9	28.6	101.0
2003	2,859.9	31.3	109.7
2004	2,362.7	26.3	82.6
2005	2,252.1	25.0	95.3
2006	2,353.5	26.0	104.5

8. Value of production

In 2006, milk sales accounted for 23.6 percent of the value of selected U.S. commodities (cattle, milk, poultry, swine, sheep and wool, catfish and trout, and honey). Since dairy cows, bulls, and steers are also marketed for beef (cattle), the percentage of value assigned to the entire dairy industry totals more than one-quarter of the selected U.S. commodity value.

Value of production for selected U.S. commodities, 2002-2006:

	Year									
	2002		**2003**		**2004**		**2005**		**2006**	
Commodity	**Value** ($1,000)	**Pct.**	**Value** ($1,000)	**Pct.**	**Value** ($1,000)	**Pct.**	**Value** ($1,000)	**Pct.**	**Value** ($1,000)	**Pct.**
Cattle	27,097,532	34.7	32,112,931	36.7	34,830,872	33.0	36,628,658	34.4	35,740,774	35.7
Milk	20,720,482	26.6	21,381,324	24.4	27,567,726	26.1	26,873,946	25.2	23,573,744	23.6
Poultry[1]	20,501,173	26.3	23,295,445	26.6	28,857,215	27.4	28,174,715	26.5	26,842,833	26.8
Swine	8,690,923	11.1	9,663,024	11.0	13,072,025	12.4	13,606,780	12.8	12,703,842	12.7
Sheep and wool	335,635	0.4	419,891	0.5	441,199	0.4	479,397	0.4	392,598	0.4
Catfish and trout[2]	476,902	0.6	484,894	0.5	546,390	0.5	551,483	0.5	555,675	0.6
Honey	228,338	0.3	253,106	0.3	196,259	0.2	160,428	0.2	161,314	0.2
Total	78,050,985	100.0	87,610,615	100.0	105,511,686	100.0	106,475,407	100.0	99,970,780	100.0

[1]Includes boilers, eggs, turkeys, and chickens (value of sales).
[2]Total of sales for trout (excluding eggs), and catfish foodsize, broodfish, stocker, and fingerling sales.

B. Dairy Industry Changes by State

Note: The following tables describe U.S. dairy industry changes by State between 1991 and 2007, based on USDA–NASS data. The tables also identify which States were in the four NAHMS national dairy studies: the National Dairy Heifer Evaluation Project (NDHEP) 1991, Dairy 1996, Dairy 2002, and Dairy 2007.

1. Milk cow inventory

States in the Western United States have shown the largest growth in the number of milk cows since 1992. Arizona, California, Colorado, Idaho, Kansas, Nevada, New Mexico, Oregon, and Utah have all increased cow numbers since 1992. States in the Southeast, including Alabama, Arkansas, Louisiana, and Mississippi, had the largest percentage decline in dairy cows, but these States represented less than 5 percent of the overall dairy population. In 2007, California had the largest number of dairy cows (1.79 million) followed by Wisconsin (1.245 million), and New York (628,000).

Changes in U.S. milk cow inventories by State:

	Number of Milk Cows that Calved (1,000 Head) January						
State	**1992**	**1996**	**2002**	**2007**	**2007 as Percent of 1992**	**2007 as Percent of 1996**	**2007 as Percent of 2002**
Alabama	43*	32	20	13	30.2	40.6	65.0
Alaska	0.8	0.8	1.2	0.6	75.0	75.0	50.0
Arizona	96	118	140	175	182.3	148.3	125.0
Arkansas	69	58	33	19	27.5	32.8	57.6
California	1,160*	1,320*	1,620*	1,790*	154.3	135.6	110.5
Colorado	77*	82	93*	115	149.4	140.2	123.7
Connecticut	33*	31	24	19	57.6	61.3	79.2
Delaware	9	10	9	7	77.8	70.0	77.8
Florida	179*	155*	152*	130	72.6	83.9	85.5
Georgia	105*	98	86	75	71.4	76.5	87.2
Hawaii	10	10	7	3.8	38.0	38.0	54.3
Idaho	178*	245*	377*	502*	282.0	204.9	133.2
Illinois	170*	145*	115*	103	60.6	71.0	89.6
Indiana	145*	140*	154*	166*	114.5	118.6	107.8
Iowa	270*	245*	205*	210*	77.8	85.7	102.4
Kansas	95	83	96	110	115.8	132.5	114.6
Kentucky	185	160*	125*	93*	50.3	58.1	74.4
Louisiana	79	72	54	30	38.0	41.7	55.6
Maine	41*	40	38	32	78.0	80.0	84.2
Maryland	95*	91	81	60	63.2	65.9	74.1
Massachusetts	31*	27	21	15.5	50.0	57.4	73.8
Michigan	332*	326*	299*	324*	97.6	99.4	108.4
Minnesota	660*	585*	500*	455*	68.9	77.8	91.0
Mississippi	60	53	34	22	36.7	41.5	64.7
Missouri	210	185*	140*	114*	54.3	61.6	81.4
Montana	24	20	19	18	75.0	90.0	94.7
Nebraska	90*	70	68	60	66.7	85.7	88.2
Nevada	20	23	25	27	135.0	117.4	108.0
New Hampshire	21*	20	18	14.5	69.0	72.5	80.6
New Jersey	24	23	13	10.5	43.8	45.7	80.8
New Mexico	101	195*	290*	360*	356.4	184.6	124.1
New York	740*	700*	675*	628*	84.9	89.7	93.0
North Carolina	99*	84	66	48	48.5	57.1	72.7
North Dakota	80	63	42	31	38.8	49.2	73.8
Ohio	320*	285*	260*	274*	85.6	96.1	105.4
Oklahoma	97	94	84	70	72.2	74.5	83.3
Oregon	100*	95*	105	115	115.0	121.1	109.5
Pennsylvania	663*	636*	588*	550*	83.0	86.5	93.5
Rhode Island	2.4*	2.1	1.4	1.1	45.8	52.4	78.6
South Carolina	33	26	20	17	51.5	65.4	85.0
South Dakota	132	115	87	81	61.4	70.4	93.1
Tennessee	165*	120*	90*	67	40.6	55.8	74.4
Texas	385	400*	315*	347*	90.1	86.8	110.2
Utah	76	90	93	86	113.2	95.6	92.5
Vermont	163*	157*	154*	140*	85.9	89.2	90.9
Virginia	140*	128	120*	100*	71.4	78.1	83.3
Washington	238*	260*	247*	235*	98.7	90.4	95.1
West Virginia	23	21	16	13	56.5	61.9	81.3
Wisconsin	1,650*	1,475*	1,280*	1,245*	75.5	84.4	97.3
Wyoming	9	6	5	7	77.8	116.7	140.0
U.S.	9,728.2	9,419.9	9,105.6	9,129	93.8	96.9	100.3
NAHMS total	7,910.4	7,829	7,799	7,533	95.2	96.2	96.6

*NAHMS participating States.

Photo by Dr. Jason Lombard

2. Number of U.S. dairy operations

With the exception of Alaska, the number of dairy operations in all States has decreased since 1991. In 2006, Wisconsin had the largest number of dairy operations (14,900) followed by Pennsylvania (8,700) and New York (6,400). California reported 2,300 operations, but had the highest number of dairy cows, demonstrating a large number of cows per herd.

a. Changes in number of U.S. dairy operations, by State:

	Number of Operations[1] with Milk Cows						
State	**1991[2]**	**1995[3]**	**2001[4]**	**2006[5]**	**2006 as Percent of 1991**	**2006 as Percent of 1995**	**2006 as Percent of 2001**
Alabama	1,100*	510	250	170	15.5	33.3	68.0
Alaska	30	30	30	30	100.0	100.0	100.0
Arizona	500	300	250	200	40.0	66.7	80.0
Arkansas	2,000	1,700	700	280	14.0	16.5	40.0
California	4,200*	3,300*	2,500*	2,300*	54.8	69.7	92.0
Colorado	1,400*	1,000	800*	630	45.0	63.0	78.8
Connecticut	500*	380	310	220	44.0	57.9	71.0
Delaware	160	150	110	90	56.3	60.0	81.8
Florida	1,000*	800*	510*	460	46.0	57.5	90.2
Georgia	1,400*	1,100	720	580	41.4	52.7	80.6
Hawaii	80	60	30	30	37.5	50.0	100.0
Idaho	1,900*	1,500*	1,000*	800*	42.1	53.3	80.0
Illinois	3,000*	2,600*	1,900*	1,300	43.3	50.0	68.4
Indiana	4,500*	3,900*	2,900*	2,100*	46.7	53.8	72.4
Iowa	7,000*	5,200*	3,500*	2,400*	34.3	46.2	68.6
Kansas	2,300	1,600	1,200	900	39.1	56.3	75.0
Kentucky	5,500	4,000*	2,900*	2,000*	36.4	50.0	69.0
Louisiana	1,800	1,100	610	350	19.4	31.8	57.4
Maine	1,100*	750	600	460	41.8	61.3	76.7
Maryland	1,600*	1,100	950	810	50.6	73.6	85.3
Massachusetts	800*	500	350	240	30.0	48.0	68.6
Michigan	6,000*	4,700*	3,300*	2,700*	45.0	57.4	81.8
Minnesota	15,000*	12,000*	7,800*	5,400*	36.0	45.0	69.2
Mississippi	1,300	800	480	330	25.4	41.3	68.8
Missouri	6,900	5,000*	3,700*	2,600*	37.7	52.0	70.3
Montana	1,600	900	650	600	37.5	66.7	92.3
Nebraska	2,700*	1,800	1,100	700	25.9	38.9	63.6
Nevada	260	200	150	100	38.5	50.0	66.7
New Hampshire	400*	400	260	200	50.0	50.0	76.9
New Jersey	450	400	230	150	33.3	37.5	65.2
New Mexico	1,300	900*	500*	450*	34.6	50.0	90.0
New York	12,200*	10,000*	7,300*	6,400*	52.5	64.0	87.7
North Carolina	1,800*	1,300	900	590	32.8	45.4	65.6
North Dakota	2,100	1,500	850	500	23.8	33.3	58.8
Ohio	8,900*	6,800*	5,200*	4,400*	49.4	64.7	84.6
Oklahoma	3,000	2,400	1,700	1,400	46.7	58.3	82.4
Oregon	1,900*	1,300*	820	720	37.9	55.4	87.8
Pennsylvania	14,500*	11,800*	10,300*	8,700*	60.0	73.7	84.5
Rhode Island	60*	40	30	30	50.0	75.0	100.0
South Carolina	800	350	240	200	25.0	57.1	83.3
South Dakota	3,300	2,400	1,400	750	22.7	31.3	53.6
Tennessee	3,500*	2,600*	1,500*	1,100	31.4	42.3	73.3
Texas	5,300	4,000*	2,100*	1,300*	24.5	32.5	61.9
Utah	1,500	1,000	760	560	37.3	56.0	73.7
Vermont	2,600*	2,100*	1,600*	1,200*	46.2	57.1	75.0
Virginia	2,800*	2,100	1,500*	1,300*	46.4	61.9	86.7
Washington	3,000*	1,800*	1,000*	790*	26.3	43.9	79.0
West Virginia	2,000	1,100	600	470	23.5	42.7	78.3
Wisconsin	33,000*	28,000*	19,100*	14,900*	45.2	53.2	78.0
Wyoming	600	400	270	250	41.7	62.5	92.6
U.S.	180,640	139,670	97,460	75,140	41.6	53.8	77.1
NAHMS total	137,860	112,300	80,910	59,740	43.3	53.2	73.8

[1]An operation is any place having one or more milk cows, excluding cows used to nurse calves, on hand any time during the year.
[2]NASS, Milk Final Estimates 1988-92.
[3]NASS, Milk Cows and Production Final Estimates 1993-97, January 1999.
[4]NASS, Livestock Operations, Final Estimates 1998-2002, April 2004.
[5]NASS, Farms, Land in Farms, and Livestock Operations, 2006 Summary, February 2007.
*NAHMS participating States.

Similar to the changes in the number of dairy operations, the number of licensed dairy operations (Grade A or B) decreased from 2002 to 2006 for every State except Alaska, which remained the same over the 5-year period. More than four of five U.S. dairy operations (82.5 percent) were licensed.

b. Changes in U.S. licensed dairy operations by State:

	Number of U.S. Licensed Dairy Operations (Grade A or B)						
	Year						
State	**2002**	**2003**	**2004**	**2005**	**2006**	**2006 as Percent of 2002**	**2006 as Percent of NASS Operations**
Alabama	120*	110	100	90	75	62.5	44.1
Alaska	10	10	10	10	10	100.0	33.3
Arizona	160	160	150	140	130	81.3	65.0
Arkansas	320	290	240	210	190	59.4	67.9
California	2,030*	2,060*	2,030*	1,970*	1,960	96.6	85.7
Colorado	180*	180	170*	170	170	94.4	27.0
Connecticut	210*	200	180	170	170	81.0	77.3
Delaware	95	90	90	90	60	63.2	66.7
Florida	210*	190*	190*	180	160	76.2	34.8
Georgia	380*	360	330	320	300	78.9	55.2
Hawaii	10	10	10	5	5	50.0	16.7
Idaho	815*	775*	755*	725*	690	84.7	86.3
Illinois	1,340*	1,295*	1,210*	1,155	1,105	82.5	85.0
Indiana	2,150*	2,010*	1,900*	1,830*	1,750	81.4	83.3
Iowa	2,760*	2,500*	2,420*	2,370*	2,230	80.8	92.9
Kansas	565	530	490	460	450	79.6	50.0
Kentucky	1,835	1,630*	1,435*	1,335*	1,240	67.6	62.0
Louisiana	380	340	310	280	250	65.8	71.4
Maine	430*	400	390	370	350	81.4	76.1
Maryland	735*	715	695	655	630	85.7	77.8
Massachusetts	250*	230	220	200	190	76.0	79.2
Michigan	3,040*	2,840*	2,680*	2,590*	2,530	83.2	93.7
Minnesota	6,775*	6,235*	5,810*	5,530*	5,295	78.2	98.1
Mississippi	300	270	250	230	190	63.3	57.8
Missouri	2,110	1,980*	1,840*	1,780*	1,710	81.0	65.8
Montana	120	110	120	120	110	91.7	18.3
Nebraska	540*	500	450	405	380	70.4	54.3
Nevada	35	30	30	30	30	85.7	30.0
New Hampshire	170*	150	140	140	130	76.5	65.0
New Jersey	140	130	130	120	120	85.7	80.0
New Mexico	160	170*	170*	170*	170	106.3	37.8
New York	6,930*	6,700*	6,600*	6,430*	5,970	86.1	93.3
North Carolina	420*	395	375	365	345	82.1	58.5
North Dakota	510	440	400	360	320	62.7	64.0
Ohio	4,100*	3,960*	3,780*	3,610*	3,530	86.1	80.2
Oklahoma	440	420	400	380	350	79.5	25.0
Oregon	350*	350*	350	330	320	91.4	44.4
Pennsylvania	9,240*	9,130*	8,720*	8,700*	8,610	93.2	99.0
Rhode Island	20*	20	20	20	15	75.0	50.0
South Carolina	120	120	110	95	95	79.2	47.5
South Dakota	860	780	700	650	600	69.8	80.0
Tennessee	860*	820*	760*	710	650	75.6	59.1
Texas	890	850*	810*	780*	740	83.1	56.9
Utah	405	365	360	345	320	79.0	57.1
Vermont	1,480*	1,390*	1,280*	1,230*	1,170	79.1	97.5
Virginia	940*	910	850*	815*	775	82.4	59.6
Washington	660*	640*	620*	610*	610	92.4	77.2
West Virginia	170	150	140	130	120	70.6	25.5
Wisconsin	17,300*	16,400*	15,570*	15,100*	14,640	84.6	98.3
Wyoming	40	35	35	30	30	75.0	12.0
U.S.	74,110	70,375	66,825	64,540	61,990	83.6	82.5
NAHMS total	64,435	61,925	59,600	55,575			

3. U.S. average dairy herd size

Average dairy herd sizes in 2006 ranged from 20 cows in Alaska to 875 in Arizona. The U.S. average dairy herd size in 2006 was 121.5 cows, more than double the average in 1991 (53.9 cows).

Changes in U.S. average dairy herd size by State:

	Average Herd Size[1] (Number of Milk Cows)						
State	**1991**	**1995**	**2001**	**2006**	**2006 as Percent of 1991**	**2006 as Percent of 1995**	**2006 as Percent of 2001**
Alabama	39.1*	62.7	80.0	76.5	195.7	121.9	95.6
Alaska	26.7	26.7	43.3	20.0	74.9	75.0	46.2
Arizona	192.0	403.3	588.0	875.0	455.7	216.9	148.8
Arkansas	34.5	32.9	45.7	67.9	196.8	206.0	148.4
California	276.2*	408.8*	659.2*	778.3*	281.8	190.4	118.1
Colorado	55.0*	84.0	125.0*	182.5	331.8	217.3	146.0
Connecticut	66.0*	78.9	77.4	86.4	130.9	109.4	111.6
Delaware	56.3	64.7	81.8	77.8	138.2	120.3	95.1
Florida	179.0*	195.0*	294.1*	282.6	157.9	144.9	96.1
Georgia	75.0*	88.2	118.1	129.3	172.4	146.6	109.5
Hawaii	125.0	156.7	220.0	126.7	101.4	80.9	57.6
Idaho	93.7*	170.7*	388.0*	627.5*	669.7	367.7	161.7
Illinois	56.7*	53.8*	60.5*	79.2	139.7	147.1	130.9
Indiana	32.2*	35.9*	52.1*	79.0*	245.3	220.2	151.8
Iowa	38.6*	46.3*	59.7*	87.5*	226.7	188.8	146.5
Kansas	41.3	51.3	89.2	122.2	295.9	238.5	137.1
Kentucky	33.6	38.3*	42.1*	46.5*	138.4	121.6	110.5
Louisiana	43.9	62.7	78.7	85.7	195.2	136.6	108.9
Maine	37.3*	54.7	61.7	69.6	186.6	127.3	112.8
Maryland	59.4*	79.1	85.3	74.1	124.7	93.7	86.9
Massachusetts	38.8*	54.0	60.0	64.6	166.5	119.6	107.6
Michigan	55.3*	68.1*	91.2*	120.0*	217.0	176.3	131.6
Minnesota	44.0*	48.6*	62.4*	84.3*	191.6	173.4	135.0
Mississippi	46.2	63.8	70.8	66.7	144.4	104.6	94.1
Missouri	30.4	36.4*	37.0*	43.8*	144.1	120.5	118.4
Montana	15.0	22.2	27.7	30.0	200.0	135.0	108.3
Nebraska	33.3*	38.3	60.9	85.7	257.4	223.6	140.7
Nevada	76.9	125.0	166.7	270.0	351.1	216.0	162.0
New Hampshire	52.5*	50.0	69.2	72.5	138.1	145.0	104.7
New Jersey	53.3	55.0	56.5	70.0	131.3	127.3	123.8
New Mexico	77.7	216.7*	602.0*	800.0*	1029.6	369.2	132.9
New York	60.7*	70.2*	92.5*	98.1*	161.6	139.8	106.1
North Carolina	55.0*	63.1	71.1	81.4	148.0	129.0	114.4
North Dakota	38.1	41.3	47.1	62.0	162.7	150.0	131.8
Ohio	36.0*	41.3*	50.4*	62.3*	173.1	150.7	123.6
Oklahoma	32.3	39.2	49.4	50.0	154.8	127.7	101.2
Oregon	52.6*	71.5*	139.0	159.7	303.6	223.3	114.9
Pennsylvania	45.7*	53.7*	56.8*	63.2*	138.3	117.7	111.3
Rhode Island	40.0*	50.0	46.7	36.7	91.8	73.3	78.6
South Carolina	41.3	74.3	83.3	85.0	205.8	114.4	102.0
South Dakota	40.0	46.7	61.4	108.0	270.0	231.4	175.8
Tennessee	47.1*	45.0*	58.7*	60.9	129.3	135.4	103.8
Texas	72.6	99.3*	151.0*	266.9*	367.6	268.9	176.8
Utah	50.7	91.0	122.4	153.6	303.0	168.8	125.5
Vermont	62.7*	74.3*	96.3*	116.7*	186.1	157.1	121.2
Virginia	50.0*	60.0	79.3*	76.9*	153.8	128.2	97.0
Washington	79.3*	142.8*	247.0*	297.5*	375.2	208.3	120.4
West Virginia	11.5	18.2	26.7	27.7	240.9	152.1	103.7
Wisconsin	50.0*	51.8*	66.5*	83.6*	167.2	161.5	125.6
Wyoming	15.0	16.5	16.3	28.0	186.7	169.7	171.8
U.S.	53.9	67.1	93.8	121.5	225.4	181.1	129.6
NAHMS total	57.4	69.7	96.4	126.1	219.7	181.4	130.4

[1]Average herd size = NASS published number of dairy operations/following-year January 1 milk cow inventory.
*NAHMS participating States.

Photo by Judy Rodriguez

4. Milk production per cow

Milk production per cow has increased in every State except Alaska since 1991. In 2006, Colorado had the highest milk production per cow at 23,155 pounds. In addition, Arizona (22,855), Idaho (22,326), Michigan (22,188), and Washington (23,055) all had milk production per cow higher than 22,000 pounds during 2006. The U.S. average milk per cow was 19,951 pounds in 2006, up 32.7 percent from 15,031 pounds in 1991.

Changes in milk per cow, by State:

	Milk per Cow Production (Pounds)						
State	**1991[1]**	**1995[2]**	**2001[3]**	**2006[4]**	**2006 as Percent of 1991**	**2006 as Percent of 1995**	**2006 as Percent of 2001**
Alabama	12,707*	14,176	14,286	14,500	114.1	102.3	101.5
Alaska	13,300	17,000	13,055	12,250	92.1	72.1	93.8
Arizona	18,032	19,735	22,036	22,855	126.7	115.8	103.7
Arkansas	11,687	12,150	12,343	13,250	113.4	109.1	107.3
California	18,534*	19,573*	20,904*	21,815*	117.7	111.5	104.4
Colorado	17,338*	18,687	21,413*	23,155	133.6	123.9	108.1
Connecticut	15,848*	16,438	18,240	19,316	121.9	117.5	105.9
Delaware	14,130	14,500	16,667	17,429	123.3	120.2	104.6
Florida	13,933*	14,698*	15,758*	16,417	117.8	111.7	104.2
Georgia	13,523*	15,550	16,663	18,234	134.8	117.3	109.4
Hawaii	13,056	13,654	14,107	13,256	101.5	97.1	94.0
Idaho	16,399*	18,147*	21,194*	22,326*	136.1	123.0	105.3
Illinois	14,936*	15,887*	17,414*	19,204	128.6	120.9	110.3
Indiana	15,439*	15,375*	16,778*	19,994*	129.5	130.0	119.2
Iowa	15,095*	16,124*	18,024*	20,146*	133.5	124.9	111.8
Kansas	12,680	14,390	17,312	20,920	165.0	145.4	120.8
Kentucky	11,231	12,469*	12,969*	13,276*	118.2	106.5	102.4
Louisiana	11,675	11,908	11,704	12,375	106.0	103.9	105.7
Maine	14,786*	16,025	17,211	17,938	121.3	111.9	104.2
Maryland	14,480*	14,725	15,780	17,078	117.9	116.0	108.2
Massachusetts	15,000*	16,000	17,000	17,375	115.8	108.6	102.2
Michigan	15,690*	17,071*	19,373*	22,188*	141.4	130.0	114.5
Minnesota	14,354*	15,894*	17,278*	18,587*	129.5	116.9	107.6
Mississippi	12,098	12,909	14,200	14,826	122.5	114.9	104.4
Missouri	13,451	14,158*	13,441*	16,000*	119.0	113.0	119.0
Montana	13,750	15,000	18,211	18,632	135.5	124.2	102.3
Nebraska	13,913*	14,797	16,194	18,328	131.7	123.9	113.2
Nevada	17,500	18,128	19,412	20,667	118.1	114.0	106.5
New Hampshire	15,143*	16,300	17,889	19,533	129.0	119.8	109.2
New Jersey	14,160	13,913	16,643	16,182	114.3	116.3	97.2
New Mexico	19,561	18,969*	20,750*	21,515*	110.0	113.4	103.7
New York	15,005*	16,501*	17,530*	18,879*	125.8	114.4	107.7
North Carolina	15,424*	16,314	17,224	18,510	120.0	113.5	107.5
North Dakota	12,622	13,094	14,000	14,688	116.4	112.2	104.9
Ohio	14,446*	15,917*	16,519*	17,737*	122.8	111.4	107.4
Oklahoma	12,354	13,611	15,407	16,630	134.6	122.2	107.9
Oregon	16,590*	17,289*	18,074	19,000	114.5	109.9	105.1
Pennsylvania	15,263*	16,492*	18,112*	19,390*	127.0	117.6	107.1
Rhode Island	14,333*	14,773	16,571	17,273	120.5	116.9	104.2
South Carolina	12,273	14,481	17,476	16,353	133.2	112.9	93.6
South Dakota	12,309	13,398	15,393	18,580	150.9	138.7	120.7
Tennessee	11,863*	13,740*	14,511*	15,657	132.0	114.0	107.9
Texas	14,036	15,244*	15,666*	21,328*	152.0	139.9	136.1
Utah	15,975	16,739	17,211	20,291	127.0	121.2	117.9
Vermont	14,683*	16,210*	17,444*	18,383*	125.2	113.4	105.4
Virginia	14,614*	15,116	15,975*	17,363*	118.8	114.9	108.7
Washington	18,814*	20,091*	22,324*	23,055*	122.5	114.8	103.3
West Virginia	11,739	12,667	15,563	15,385	131.1	121.5	98.9
Wisconsin	14,140*	15,397*	17,182*	18,824*	133.1	122.3	109.6
Wyoming	12,563	13,197	14,000	17,612	140.2	133.5	125.8
U.S.	15,031	16,405	18,162	19,951	132.7	121.6	109.9

[1]NASS, Milk Final Estimates 1988-92.
[2]NASS, Milk Cows and Production Final Estimates 1993-97, May 1999.
[3]NASS, Milk Cows and Production Final Estimates 1998-2002, May 2004.
[4]NASS, Milk Production, Disposition and Income 2006 Summary, April 2007.
*NAHMS participating States

Section II: Changes in World Dairy Production

General Trends

Note: Tables in this section are comprised from data collected by USDA's Foreign Agricultural Service (FAS).

1. Milk cow inventory

In 2006 India had 38 million milk cows, more than any other nation in the world. China showed the largest increase in number of milk cows from 1991 to 2006 (approximatley 1.5 to 7.9 million, respectively). The former Soviet Union had the largest decrease in number of milk cows from 1991 to 2006 (approximately 20.6 to 9.9 million, respectively). Total milk cow numbers for these selected countries decreased 5.9 percent since 1991 but remained steady from 2001 to 2006 at approximately 125.6 million.

Changes in milk cow inventories in selected countries:

		Number of Milk Cows (1,000 Head)						
Continent/Country		**1991**	**1995**	**2001**	**2006**	**2006 as Percent of 1991**	**2006 as Percent of 1995**	**2006 as Percent of 2001**
North America	Canada	1,410	1,244	1,091	1,019	72.3	81.9	93.4
	Mexico	6,440	6,440	6,800	6,875	106.8	106.8	101.1
	United States	9,826	9,466	9,103	9,112	92.7	96.3	100.1
	Subtotal	*17,676*	*17,150*	*16,994*	*17,006*	96.2	99.2	100.1
South America	Argentina	2,000	2,350	2,450	2,150	107.5	91.5	87.8
	Brazil	15,500	17,500	15,900	15,290	98.6	87.4	96.2
	Subtotal	*17,500*	*19,850*	*18,350*	*17,440*	99.7	87.9	95.0
European Union[1]	*Subtotal*	*25,392*[2]	*22,434*[2]	*25,747*[3]	*24,944*[4]	98.2	111.2	96.9
Eastern Europe	Poland	4,707	3,715	[3]	[4]	--	--	--
	Romania	1,600	1,778	1,564	[4]	--	--	--
	Subtotal	*6,307*	*5,493*	*1,564*	[4]	--	--	--
Former Soviet Union	Russia	20,557	18,400	12,500	9,900	48.2	53.8	79.2
	Ukraine	8,378	7,818	4,958	3,491	41.7	44.7	70.4
	Subtotal	*28,935*	*26,218*	*17,458*	*13,391*	46.3	51.1	76.7
South Asia	India	30,700	33,000	35,900	38,000	123.8	115.2	105.8
	Subtotal	*30,700*	*33,000*	*35,900*	*38,000*	123.8	115.2	105.8
Asia	China	1,459	2,252	2,848	7,900	541.5	350.8	277.4
	Japan	1,081	1,034	971	900	83.3	87.0	92.7
	Subtotal	*2,540*	*3,286*	*3,819*	*8,800*	346.5	267.8	230.4
Oceania	Australia[5]	1,629	1,786	2,281	1,870	114.8	104.7	82.0
	New Zealand[6]	2,723	2,994	3,557	4,100	150.6	136.9	115.3
	Subtotal	*4,352*	*4,780*	*5,838*	*5,970*	137.2	124.9	102.3
Total		133,402	132,211	125,670	125,551	94.1	95.0	99.9

[1]Based on deliveries.
[2]EU-15 includes Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, U.K.
[3]EU-25 includes Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, U.K.
[4]EU-27 includes Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, U.K.
[5]Year ending June 30 of year shown.
[6]Year ending May 31 of year shown.
Source: FAS Dairy: World Markets and Trade. Based upon counselor and attaché reports, official statistics, and results of office research.

2. Milk production

The European Union produced the most milk in 2006 at 132.2 million metric tons, a 7.5 percent increase from 1991. China showed the largest increase in production with a 687 percent increase from 1991 to 2006, which is not surprising considering the nation's large increase in cow numbers. Excluding China, milk production in 2006 as a percentage of 2001 increased no more than 15.5 percent and decreased no more than 6 percent in any country. Milk production over all selected countries was approximately 419 million metric tons in 2006, an increase of about 41 million metric tons since 1991.

Changes in milk production in selected countries:

		Milk Production (1,000 Metric Tons)						
Continent/Country		**1991**	**1995**	**2001**	**2006**	**2006 as Percent of 1991**	**2006 as Percent of 1995**	**2006 as Percent of 2001**
North America	Canada	7,790	7,920	8,106	8,041	103.2	101.5	99.2
	Mexico	10,200	7,399	9,501	10,051	98.5	135.8	105.8
	United States	66,994	70,440	74,994	82,462	123.1	117.1	110.0
	Subtotal	*84,984*	*85,759*	*92,601*	*100,554*	118.3	117.3	108.6
South America	Argentina	6,400	8,500	9,500	10,200	159.4	120.0	107.4
	Brazil	14,200	18,375	22,300	25,230	177.7	137.3	113.1
	Subtotal	*20,600*	*26,875*	*31,800*	*35,430*	172.0	131.8	111.4
European Union[1]	*Subtotal*	*122,961*[2]	*121,740*[2]	*130,069*[3]	*132,206*[4]	107.5	108.6	101.6
Eastern Europe	Poland	14,504	11,420	[3]	[4]	--	--	--
	Romania	4,391	5,885	5,188	[4]	--	--	--
	Subtotal	*18,895*	*17,305*	*5,188*	[4]	--	--	--
Former Soviet Union	Russia	51,971	39,300	33,000	31,100	59.8	79.1	94.2
	Ukraine	22,409	17,181	13,169	13,017	58.1	75.8	98.8
	Subtotal	*74,380*	*56,481*	*46,169*	*44,117*	59.3	78.1	95.6
South Asia	India	28,200	32,500	36,400	41,000	145.4	126.2	112.6
	Subtotal	*28,200*	*32,500*	*36,400*	*41,000*	145.4	126.2	112.6
Asia	China	4,646	5,764	10,255	31,934	687.3	554.0	311.4
	Japan	8,260	8,382	8,300	8,138	98.5	97.1	98.0
	Subtotal	*12,906*	*14,146*	*18,555*	*40,072*	310.5	283.3	216.0
Oceania	Australia[5]	6,578	8,433	10,864	10,395	158.0	123.3	95.7
	New Zealand[6]	8,122	9,684	13,162	15,200	187.1	157.0	115.5
	Subtotal	*14,700*	*18,117*	*24,026*	*25,595*	174.1	141.3	106.5
Total		377,626	372,923	384,808	418,974	110.9	112.3	108.9

[1]Based on deliveries.
[2]EU-15 includes Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, U.K.
[3]EU-25 includes Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, U.K.
[4]EU-27 includes Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, U.K.
[5]Year ending June 30 of year shown.
[6]Year ending May 31 of year shown.
Source: FAS Dairy: World Markets and Trade. Based upon counselor and attaché reports, official statistics, and results of office research.

Section III: Management, NAHMS Population Estimates

Note: The NDHEP 1991 study included only herds with 30 or more milk cows; the Dairy 1996, Dairy 2002, and Dairy 2007 studies included operations with one or more milk cows.

A. Dairy Herd Information

1. Record-keeping systems

The percentage of operations using hand-written records decreased from 88.3 percent in 1991 to 73.5 percent in 2007, while the percentage of operations using on-farm computers increased from 13.7 percent to 19.4 during the same time period. These changes in record-keeping systems are consistent with the need to quickly store and access information on larger operations.

a. Percentage of operations by…

	…type of record-keeping systems used for the dairy operation.		…type of individual animal record-keeping systems used.					
System	**NDHEP 1991**	**Std. Error**	**Dairy 1996**	**Std. Error**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Handwritten, such as a ledger or notebook	88.3	(1.0)	80.7	(1.0)	74.3	(1.1)	73.5	(1.2)
Dairy Herd Improvement Association	57.5	(1.8)	43.4	(1.2)	44.8	(1.3)	45.9	(1.4)
Computer located on the operation	13.7	(1.1)	15.1	(0.8)	19.4	(0.9)	19.4	(0.9)
Computer located off the operation	11.8	(1.2)	9.9	(0.8)	5.0	(0.5)	4.9	(0.5)
Other system	11.4	(1.1)	6.0	(0.7)	4.1	(0.5)	4.4	(0.6)
Any	99.9	(0.1)	100.0	(0.0)	95.2	(0.6)	95.1	(0.7)

For operations using on- or off-farm computer data records systems, the percentage of ***operations*** that used Dairy Comp 305 increased from 19.4 percent in 2002 to 34.9 percent in 2007. The percentage of ***cows*** whose records were kept using Dairy Comp 305 increased from 48.5 percent in 2002 to 60.3 percent in 2007.

b. For operations using on- or off-farm computer record systems, percentage of operations (and percentage of cows on these operations) by primary computerized record system used:

	Dairy 2002				**Dairy 2007**			
	Operations		**Cows**		**Operations**		**Cows**	
Primary Computer Record System	**Percent**	**Std. Error**	**Percent**	**Std. Error**	**Percent**	**Std. Error**	**Percent**	**Std. Error**
Dairy Comp 305	19.4	(1.7)	48.5	(1.9)	34.9	(2.3)	60.3	(2.0)
PC Dart	12.5	(1.4)	10.3	(0.8)	19.3	(1.9)	10.2	(0.9)
DHI Plus	13.3	(1.7)	13.7	(1.3)	15.0	(1.7)	15.9	(1.7)
Other	54.8	(2.5)	27.5	(1.6)	30.8	(2.4)	13.6	(1.3)
Total	100.0		100.0		100.0		100.0	

2. Identification

Identification methods for dairy cattle have changed little since 1996. The percentage of operations using ear tags or electronic identification (ID) increased slightly, while the percentage of operations using collars or photographs or sketches showed a slight decrease. These changes are expected, as herd sizes increase and housing systems change from individual animal stalls to freestalls and drylot housing.

a. Percentage of operations by type of ***individual*** animal ID used on at least some dairy cows:

	Percent Operations					
ID Type	**Dairy 1996**	**Std. Error**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Ear tags	81.2	(1.1)	85.8	(1.0)	86.5	(1.0)
Collars	22.3	(1.0)	16.8	(1.0)	12.7	(0.9)
Photographs or sketches	17.4	(1.0)	14.1	(0.9)	13.3	(1.0)
Branding (all methods)	4.9	(0.5)	4.9	(0.5)	4.4	(0.5)
Electronic ID	0.3	(0.1)	0.1	(0.1)	4.1	(0.5)
Tattoos (other than for brucellosis)	6.5	(0.6)	8.8	(0.7)	7.7	(0.6)
Other	10.1	(0.9)	10.8	(0.8)	10.5	(0.9)
Any	91.2	(0.9)	93.7	(0.8)	93.0	(0.8)

The percentage of operations that used ear tags as herd identification at the operation level increased from 29.1 percent in 2002 to 34.5 percent in 2007, but the percentage of cows that had ear tags as herd ID remained unchanged. The use of electronic ID increased, as only 0.4 percent of cows were equipped with electronic ID in 2002 as a method to indentify animals as part of a herd compared with 3.9 percent in 2007.

b. Percentage of operations (and percentage of cows) by type of ***herd*** identification used:

	Dairy 2002				Dairy 2007			
	Operations		Cows		Operations		Cows	
ID Type	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Ear tags	29.1	(1.1)	41.5	(1.2)	34.5	(1.3)	41.0	(1.5)
Collars	4.2	(0.5)	3.9	(0.5)	2.8	(0.4)	2.9	(0.5)
Branding (all methods)	3.7	(0.3)	18.0	(1.1)	3.1	(0.3)	18.7	(1.4)
Electronic ID	0.1	(0.0)	0.4	(0.2)	1.8	(0.3)	3.9	(0.6)
Tattoos (other than for brucellosis)	3.4	(0.4)	3.8	(0.5)	2.5	(0.4)	4.6	(0.8)
Other	2.7	(0.4)	2.9	(0.4)	2.0	(0.4)	1.7	(0.4)
Any	34.2	(1.1)	53.6	(1.1)	36.4	(1.3)	54.0	(1.5)

3. Breed of dairy cows

Holsteins remain the predominant breed in the United States, and the percentage of operations with specific breeds has not changed since 1991.

Percentage of operations by primary breed:

	Percent Operations							
Breed	**NDHEP 1991**	**Std. Error**	**Dairy 1996**	**Std. Error**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Holstein	94.9	(0.7)	93.0	(0.8)	92.4	(0.7)	92.2	(0.7)
Jersey	2.4	(0.4)	4.1	(0.6)	3.8	(0.5)	3.5	(0.4)
Ayrshire	0.6	(0.3)	0.3	(0.1)	0.3	(0.1)	0.3	(0.1)
Brown Swiss	1.0	(0.4)	0.4	(0.2)	0.9	(0.2)	0.9	(0.3)
Guernsey	0.9	(0.3)	1.7	(0.4)	1.1	(0.3)	0.9	(0.3)
Other	0.2	(0.2)	0.5	(0.2)	1.5	(0.4)	2.2	(0.5)
Total	100.0		100.0		100.0		100.0	

4. Cow registration

The percentage of operations with no registered cows increased from 59.6 in 1991 to 71.7 percent in 2007. Operations with 100 percent of cows registered remained similar from 1991 to 2007.

Percentage of operations by percentage of dairy cows registered with a breed association:

Percent Operations									
Percent Dairy Cows Registered	**NDHEP 1991**	**Std. Error**	**Percent Dairy Cows Registered**	**Dairy 1996**	**Std. Error**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
0	59.6	(1.7)	0	65.5	(1.2)	71.6	(1.2)	71.7	(1.3)
1 to 9	10.8	(1.1)	0.1 to 9.9	6.7	(0.6)	5.3	(0.6)	5.6	(0.6)
10 to 50	16.3	(1.3)	10.0 to 49.9	10.3	(0.7)	8.1	(0.7)	6.5	(0.7)
51 to 75	3.2	(0.6)	50.0 to 74.9	4.4	(0.6)	3.2	(0.4)	2.1	(0.4)
76 to 99	4.2	(0.6)	75.0 to 99.9	5.5	(0.6)	4.2	(0.5)	5.2	(0.6)
100	5.9	(0.7)	100	7.6	(0.7)	7.6	(0.7)	8.9	(0.8)
Total	100.0		Total	100.0		100.0		100.0	

5. Quality assurance programs

The percentage of operations participating in any milk quality assurance program increased from 40.6 percent in 2002 to 47.3 percent in 2007. Local milk-cooperative or processor-sponsored programs showed the largest increase in the percentage of operation participation from 2002 to 2007 (35.2 to 42.2 percent of operations, respectively).

Percentage of operations that participated in quality assurance programs, by type of program:

	Percent Operations			
Program Type	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
State sponsored	7.8	(0.6)	8.8	(0.7)
Local milk cooperative/ processor sponsored	35.2	(1.3)	42.2	(1.4)
National industry sponsored	2.8	(0.4)	3.1	(0.4)
Other	2.8	(0.4)	2.0	(0.3)
Any	40.6	(1.3)	47.3	(1.4)

B. Productivity

1. Rolling herd average milk production

Rolling herd average (RHA) milk production for all herds and for herds with primarily Holsteins has increased approximately 4,000 pounds (cow average) since 1991.

a. Operation average RHA milk production (lb/cow):

NDHEP 1991		Dairy 1996		Dairy 2002		Dairy 2007	
Op. Avg.	Std. Error	Op. Avg.	Std. Error	Op. Avg.	Std. Error	Op. Avg.	Std. Error
16,703	(96)	16,587	(100)	18,235	(103)	19,175	(112)
Primarily Holsteins*							
Op. Avg.	Std. Error	Op. Avg.	Std. Error	Op. Avg.	Std. Error	Op. Avg.	Std. Error
16,925	(96)	16,925	(99)	18,590	(102)	19,482	(115)

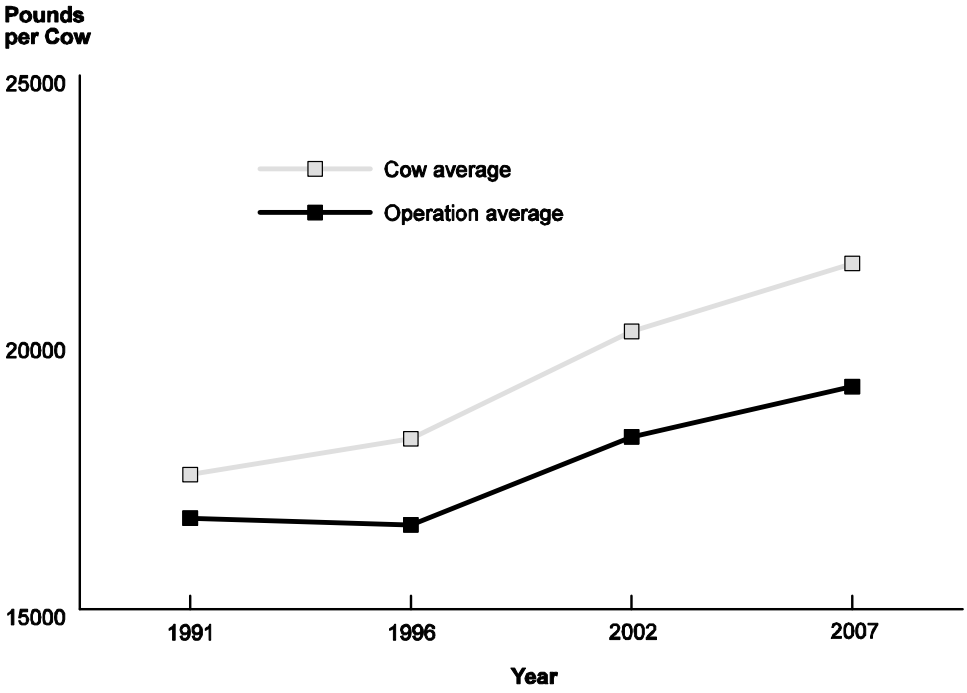
*Operations where Holsteins accounted for 50 percent or more of the January 1, 1998, January 1, 2002, or January 1, 2007, cow inventory or was the main breed of dairy herd (1991).

b. Cow average RHA milk production (lb/cow):

NDHEP 1991		Dairy 1996		Dairy 2002		Dairy 2007	
Cow Avg.	Std. Error	Cow Avg.	Std. Error	Cow Avg.	Std. Error	Cow Avg.	Std. Error
17,532	(81)	18,198	(79)	20,210	(80)	21,483	(115)
Primarily Holsteins*							
Cow Avg.	Std. Error	Cow Avg.	Std. Error	Cow Avg.	Std. Error	Cow Avg.	Std. Error
17,735	(80)	18,442	(78)	20,467	(79)	21,807	(114)

*Operations where Holsteins accounted for 50 percent or more of the January 1, 1998, January 1, 2002, or January 1, 2007, cow inventory or was the main breed of dairy herd (1991).

Operation Average (and Cow Average) RHA Milk Production



2. Age at first calving

The age at first calving at the operation level decreased from 25.9 months in 1991 to 25.2 in 2007. Similarly, the cow average age at first calving decreased from 25.8 to 24.5 months during the same time period.

a. Operation average age at first calving (months):

NDHEP 1991		Dairy 1996		Dairy 2002		Dairy 2007	
Op. Avg.	Std. Error	Op. Avg.	Std. Error	Op. Avg.	Std. Error	Op. Avg.	Std. Error
25.9	(0.1)	25.8	(0.1)	25.4	(0.1)	25.2	(0.1)

b. Cow average age at first calving (months):

NDHEP 1991		Dairy 1996		Dairy 2002		Dairy 2007	
Cow Avg.	Std. Error	Cow Avg.	Std. Error	Cow Avg.	Std. Error	Cow Avg.	Std. Error
25.8	(0.1)	25.5	(0.1)	25.0	(0.1)	24.5	(0.1)

3. Days dry

In 2007, the average days dry at the operation level and cow level was 57.8 and 58.5 days, respectively. These averages represent a decrease of about 3 days since 1991.

a. Operation average days dry:

NDHEP 1991		Dairy 1996		Dairy 2002		Dairy 2007	
Op. Avg.	Std. Error	Op. Avg.	Std. Error	Op. Avg.	Std. Error	Op. Avg.	Std. Error
61.1	(0.5)	60.5	(0.3)	60.6	(0.3)	57.8	(0.3)

b. Cow average days dry:

NDHEP 1991		Dairy 1996		Dairy 2002		Dairy 2007	
Cow Avg.	Std. Error	Cow Avg.	Std. Error	Cow Avg.	Std. Error	Cow Avg.	Std. Error
61.5	(0.3)	61.7	(0.4)	61.9	(0.2)	58.5	(0.3)

4. Calving interval

Although the operation average calving interval decreased slightly from 2002 to 2007 (13.3 and 13.2 months, respectively), the average increased from 12.8 months in 1991 to 13.2 in 2007.

a. Operation average calving interval for cows (months):

NDHEP 1991		Dairy 1996		Dairy 2002		Dairy 2007	
Op. Avg.	Std. Error	Op. Avg.	Std. Error	Op. Avg.	Std. Error	Op. Avg.	Std. Error
12.8	(0.0)	12.9	(0.0)	13.3	(0.0)	13.2	(0.0)

b. Cow average calving interval for cows (months):

NDHEP 1991		Dairy 1996		Dairy 2002		Dairy 2007	
Cow Avg.	Std. Error	Cow Avg.	Std. Error	Cow Avg.	Std. Error	Cow Avg.	Std. Error
12.9	(0.0)	13.0	(0.0)	13.4	(0.0)	13.3	(0.0)

Photo by Dr. Jason Lombard

C. Heifer Management

1. Source of heifers

In 2002 and 2007, the majority of heifers were born and raised on the same operation, and the majority of operations had heifers that were born and raised on the operation. A higher percentage of heifers were raised off the operation in 2007 compared to 2002 (11.5 and 7.2 percent, respectively).

Percentage of operations and percentage of dairy heifers*, by source of heifers:

	Dairy 2002				Dairy 2007			
	Operations		Heifers		Operations		Heifers	
Heifer Source	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Heifers born and raised on same operation	98.1	(0.3)	89.5	(1.0)	96.5	(0.4)	87.4	(1.2)
Heifers born on the operation but raised off the operation	3.6	(0.4)	7.2	(0.8)	4.7	(0.5)	11.5	(1.2)
Heifers were born off the operation	6.7	(0.7)	3.3	(0.8)	6.6	(0.8)	1.1	(0.2)
Total			100.0				100.0	

*As a percentage of January 1 heifer inventory

2. Separation from dam

The practice of separating newborn heifer calves from their dams immediately after birth doubled from 1991 to 2007 (28.0 and 55.9 percent of operations, respectively).

Percentage of operations by age at which newborn heifer calves were separated from their dams:

Percent Operations									
Age (Hours)	**NDHEP 1991**	**Std. Error**	**Age** (Hours)	**Dairy 1996**	**Std. Error**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
0 (before any nursing)	28.0	(1.7)	Immediately (no nursing)	47.9	(1.3)	52.9	(1.3)	55.9	(1.4)
Less than 12	39.6	(1.7)	After nursing, but less than 12 hours	20.8	(1.0)	22.5	(1.1)	22.2	(1.2)
12 to 24	22.0	(1.4)	12 to 24	17.4	(1.1)	15.9	(1.0)	14.6	(1.0)
More than 24	10.4	(1.0)	More than 24	13.9	(1.0)	8.7	(0.8)	7.3	(0.8)
Total	100.0		Total	100.0		100.0		100.0	

Photo by Judy Rodriguez

3. Colostrum

In 1991, 1996, and 2002, about 3 of 10 operations allowed heifer calves to get colostrum during first nursing compared to about 4 of 10 operations in 2007. A smaller percentage of operations hand-fed colostrum from a bucket or bottle in 2007 compared to operations in 1991, 1996, and 2002.

a. Percentage of operations by method normally used for heifer calves' first feeding of colostrum:

	Percent Operations							
Method	**NDHEP 1991**	**Std. Error**	**Dairy 1996**	**Std. Error**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
First nursing	33.7	(1.7)	33.5	(1.2)	30.5	(1.2)	36.3	(1.4)
Hand-fed from bucket or bottle	64.0	(1.7)	62.5	(1.2)	64.8	(1.3)	59.2	(1.4)
Hand-fed using esophageal feeder	2.3	(0.6)	3.6	(0.4)	4.4	(0.5)	4.3	(0.5)
No colostrum	0.0	(0.0)	0.4	(0.2)	0.3	(0.1)	0.2	(0.1)
Total	100.0		100.0		100.0		100.0	

The percentage of operations that estimated immunoglobulin (Ig) levels in colostrum or evaluated its quality increased across all herd sizes from 2002 to 2007.

b. For operations that hand-fed colostrum, percentage of operations that estimated Ig levels of the colostrum or evaluated its quality, by herd size:

	Percent Operations			
Herd Size (Number Dairy Cows)	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Small (fewer than 100)	2.1	(0.6)	7.6	(1.3)
Medium (100 to 499)	10.6	(1.5)	19.8	(2.3)
Large (500 or more)	32.2	(2.8)	45.2	(3.2)
All operations	5.2	(0.5)	13.0	(1.1)

A smaller percentage of medium and large operations pooled colostrum from more than one cow in 2007 than in 2002.

c. For operations that normally hand-fed colostrum, percentage of operations that pooled colostrum from more than one cow, by herd size:

	Percent Operations			
Herd Size (Number Dairy Cows)	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Small (fewer than 100)	22.1	(1.4)	16.0	(1.7)
Medium (100 to 499)	37.4	(2.0)	26.0	(2.4)
Large (500 or more)	70.6	(2.4)	56.9	(3.1)
All operations	27.0	(1.1)	21.0	(1.3)

The percentage of operations by storage methods for colostrum was essentially unchanged between 2002 and 2007, with the largest percentage of operations not storing colostrum. Approximately 6 of 10 operations did not store colostrum in 2002 and 2007.

d. For operations that hand-fed colostrum, percentage of operations by primary method of storing colostrum:

	Percent Operations			
Method	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Stored without refrigeration	4.4	(0.6)	3.9	(0.7)
Stored in refrigerator	7.8	(0.6)	11.1	(0.9)
Stored in freezer	27.7	(1.1)	28.2	(1.6)
Other	0.5	(0.2)	0.0	(--)
Not stored	59.6	(1.3)	56.8	(1.8)
Total	100.0		100.0	

The percentage of operations that pasteurized colostrum did not change from 2002 to 2007.

e. For operations that hand-fed colostrum, percentage of operations that pasteurized colostrum, by herd size:

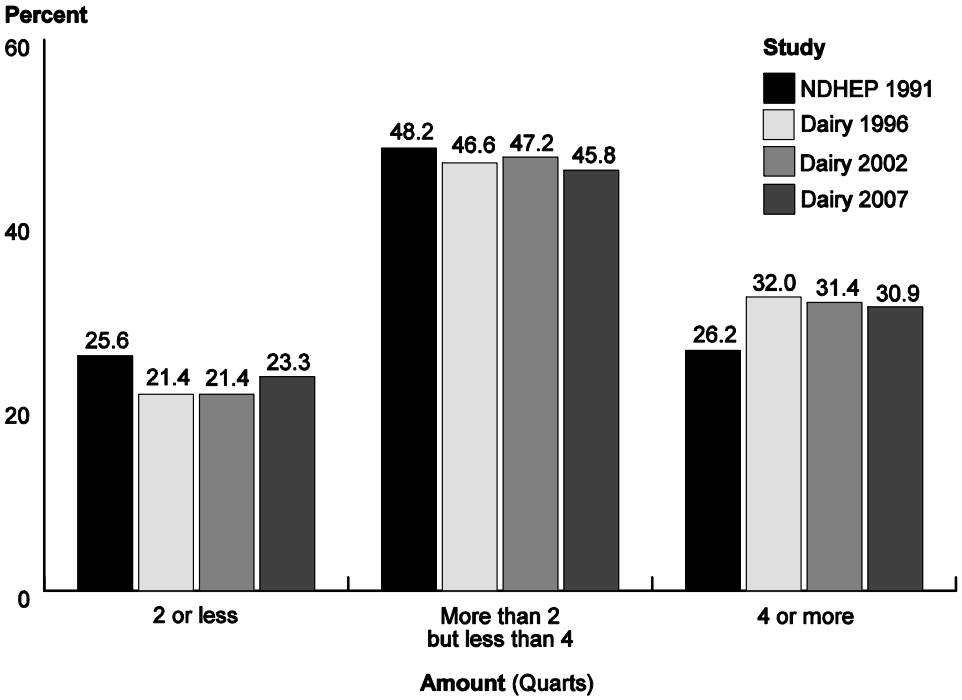
	Percent Operations			
Herd Size (Number Dairy Cows)	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Small (fewer than 100)	0.4	(0.2)	0.2	(0.2)
Medium (100 to 499)	0.8	(0.3)	0.9	(0.4)
Large (500 or more)	3.6	(0.9)	6.4	(1.6)
All operations	0.6	(0.2)	0.8	(0.2)

Operations provided calves approximately the same amount of colostrum during the first 24 hours of life from 1991 to 2007, with approximately one-quarter of operations feeding 2 quarts or less and about one-third feeding 4 or more quarts.

f. For operations that hand-fed colostrum, percentage of operations by amount of colostrum normally fed during the first 24 hours:

	Percent Operations							
Amount (Quarts)	**NDHEP 1991**	**Std. Error**	**Dairy 1996**	**Std. Error**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
2 or less	25.6	(1.8)	21.4	(1.3)	21.4	(1.4)	23.3	(1.6)
More than 2 but less than 4	48.2	(2.1)	46.6	(1.6)	47.2	(1.7)	45.8	(1.9)
4 or more	26.2	(1.9)	32.0	(1.5)	31.4	(1.5)	30.9	(1.7)
Total	100.0		100.0		100.0		100.0	

For Operations that Normally Hand-fed Colostrum, Percentage of Operations by Amount of Colostrum Normally Fed During the First 24 Hours



4. Medicated milk replacer

Approximately 56 percent of operations fed medicated milk replacer in 2002 and 2007.

a. Percentage of operations that fed medicated milk replacer, by herd size:

	Percent Operations			
Herd Size (Number Dairy Cows)	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Small (fewer than 100)	54.4	(1.6)	55.2	(1.8)
Medium (100 to 499)	64.1	(1.9)	68.2	(2.1)
Large (500 or more)	37.7	(2.5)	43.6	(3.1)
All operations	55.7	(1.3)	57.5	(1.4)

Photo by Judy Rodriguez

Although the percentage of operations that fed milk replacer remained unchanged between 2002 and 2007, the percentage of operations that fed each specific medication listed increased from 2002 to 2007.

b. For operations that fed a medicated milk replacer, percentage of operations by medication used:

	Percent Operations			
Medication Used	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Chlortetracycline (CTC)	7.1	(0.7)	12.1	(1.1)
Oxytetracycline (OTC)	13.7	(0.8)	21.9	(1.5)
Oxytetracycline in combination with Neomycin (OxyNEO)	25.6	(1.2)	49.5	(1.9)
Decoquinate	12.8	(0.9)	18.8	(1.4)
Lasalocid	3.2	(0.4)	7.2	(0.9)
Other	3.6	(0.5)	5.4	(0.9)

5. Weaning age

The age at weaning for both the operation and heifer averages has remained relatively steady since 1996.

a. Operation average age of heifers at weaning (weeks):

NDHEP 1991		Dairy 1996		Dairy 2002		Dairy 2007	
Op. Avg.	**Std. Error**	**Op. Avg.**	**Std. Error**	**Op. Avg.**	**Std. Error**	**Op. Avg.**	**Std. Error**
7.9	(0.1)	8.4	(0.1)	8.0	(0.1)	8.2	(0.1)

b. Heifer average age at weaning (weeks):

NDHEP 1991		Dairy 1996		Dairy 2002		Dairy 2007	
Heifer Avg.	Std. Error	Heifer Avg.	Std. Error	Heifer Avg.	Std. Error	Heifer Avg.	Std. Error
8.2	(0.1)	8.7	(0.1)	8.4	(0.1)	8.6	(0.1)

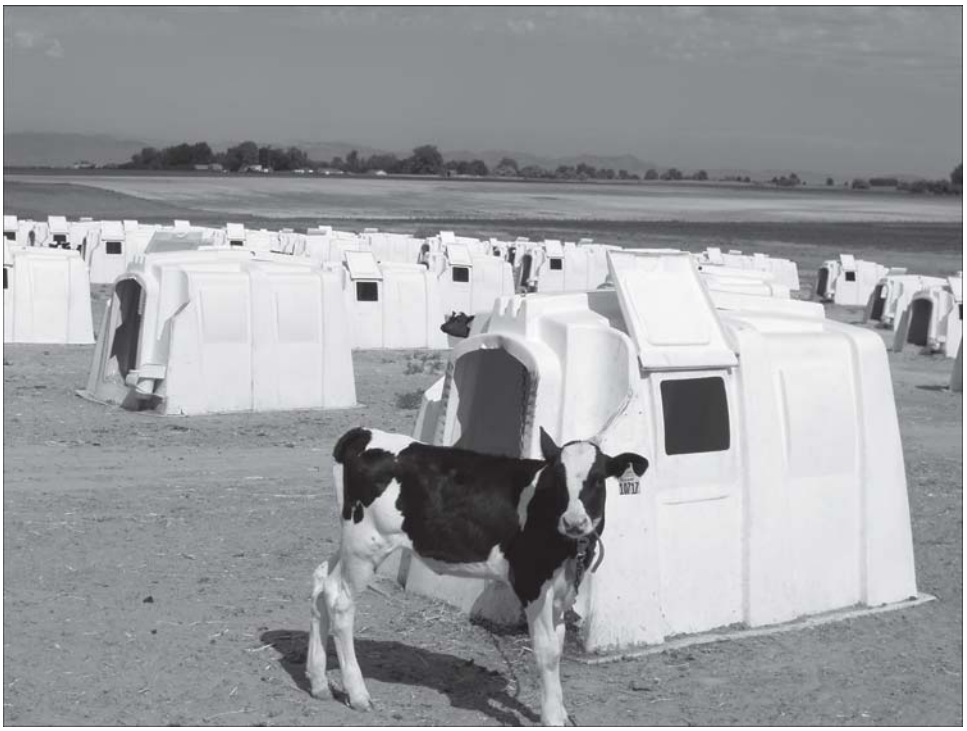


Photo by Dr. Jason Lombard

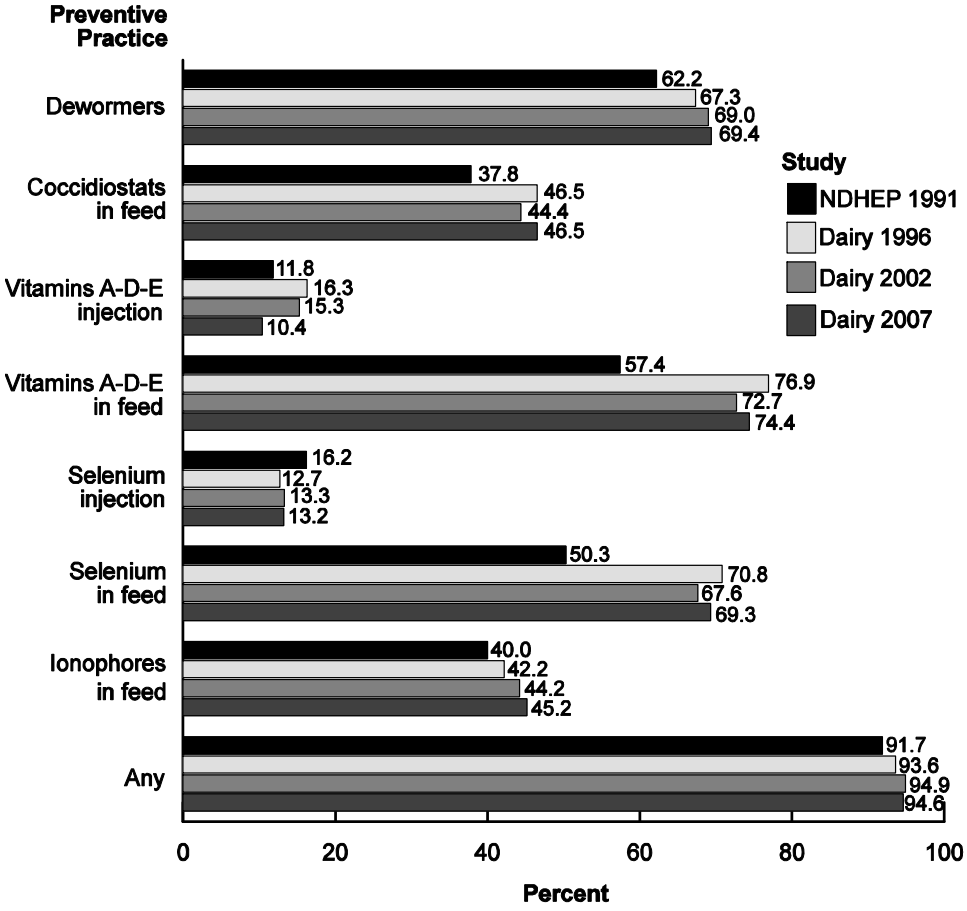
6. Preventive practices

Operation use of specific preventive practices for heifers has remained stable or increased since 1991. The largest increases in the use of preventive practices were observed for vitamins A-D-E in feed and selenium in feed.

Percentage of operations by preventive practices normally used for heifers:

	Percent Operations							
Preventive Practice	**NDHEP 1991**	**Std. Error**	**Dairy 1996**	**Std. Error**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Dewormers	62.2	(2.2)	67.3	(1.3)	69.0	(1.2)	69.4	(1.3)
Coccidiostats in feed	37.8	(2.0)	46.5	(1.2)	44.4	(1.3)	46.5	(1.4)
Vitamins A-D-E injection	11.8	(1.3)	16.3	(1.0)	15.3	(1.0)	10.4	(0.7)
Vitamins A-D-E in feed	57.4	(2.2)	76.9	(1.1)	72.7	(1.2)	74.4	(1.2)
Selenium injection	16.2	(1.8)	12.7	(0.8)	13.3	(0.9)	13.2	(0.9)
Selenium in feed	50.3	(2.2)	70.8	(1.2)	67.6	(1.3)	69.3	(1.3)
Ionophores in feed (e.g., Rumensin®, Bovatec®)	40.0	(2.2)	42.2	(1.2)	44.2	(1.3)	45.2	(1.4)
Probiotics	NA		13.1	(0.9)	14.2	(0.9)	20.0	(1.1)
Anionic salts in feed	NA		NA		20.6	(1.1)	20.9	(1.1)
Other	NA		4.8	(0.6)	3.8	(0.5)	4.6	(0.7)
Any	91.7	(1.1)	93.6	(0.7)	94.9	(0.6)	94.6	(0.7)

Percentage of Operations by Preventive Practices Normally Used for Heifers



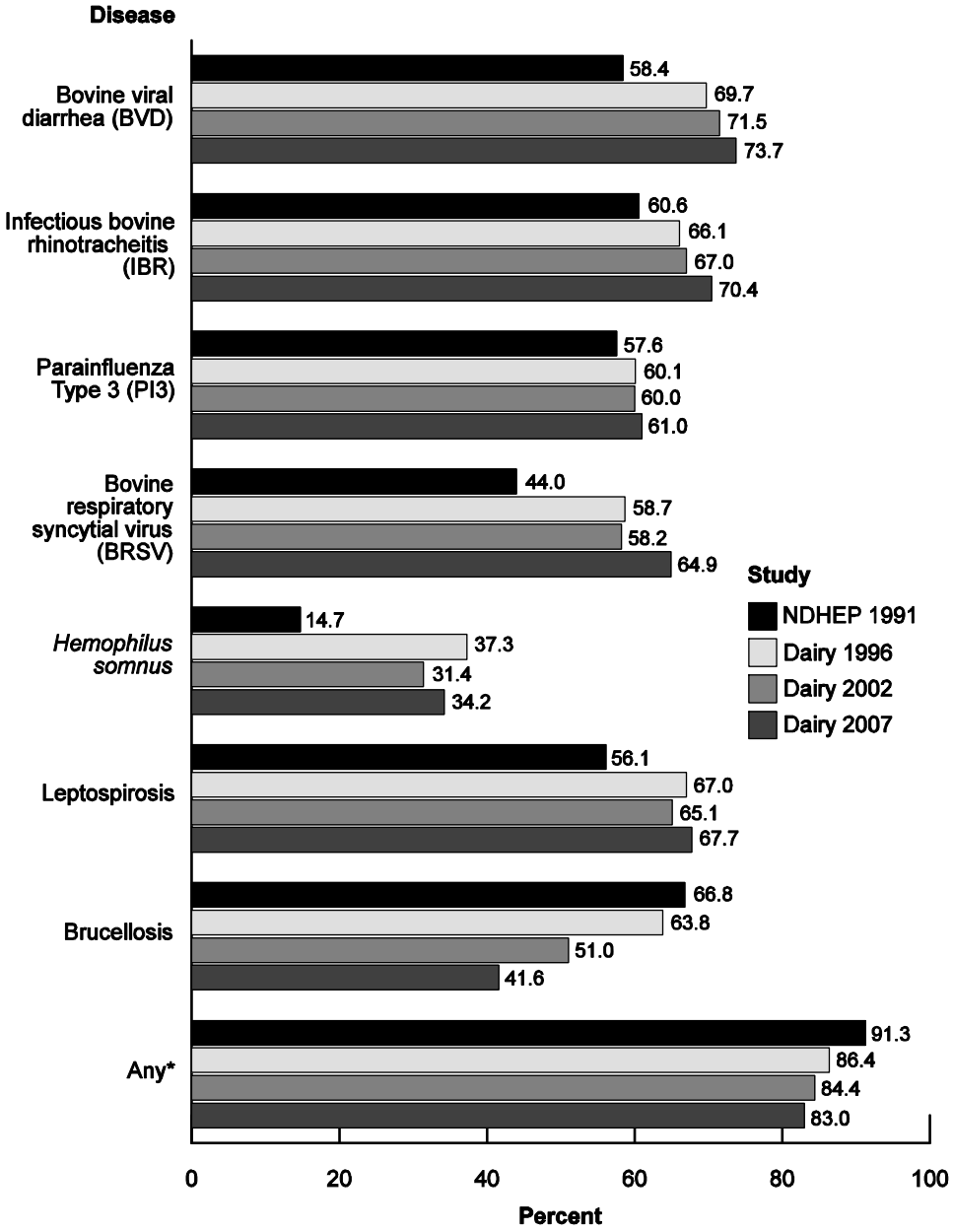
7. Vaccination practices

The percentage of operations administering any vaccine decreased from 91.3 percent in 1991 to 83.0 percent in 2007. With the exceptions of parainfluenza, brucellosis, and Johne's disease vaccines, vaccine use for all other diseases increased. The percentage of operations that vaccinated heifers against brucellosis decreased from 63.8 percent in 1996 to 41.6 percent in 2007. This decease may be due to the fact that many States switched from a mandatory to a voluntary brucellosis vaccination program from 1996 to 2007. In addition, the number of States that were certified brucellosis-free increased from 34 in 1996 to 49 in 2007, which may have impacted how many operations vaccinated against brucellosis.

Percentage of operations that normally vaccinated heifers against the following diseases:

	Percent Operations							
Disease	**NDHEP 1991**	**Std. Error**	**Dairy 1996**	**Std. Error**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Bovine viral diarrhea (BVD)	58.4	(2.1)	69.7	(1.3)	71.5	(1.2)	73.7	(1.3)
Infectious bovine rhinotracheitis (IBR)	60.6	(2.1)	66.1	(1.3)	67.0	(1.3)	70.4	(1.3)
Parainfluenza Type 3 (PI3)	57.6	(2.1)	60.1	(1.3)	60.0	(1.3)	61.0	(1.4)
Bovine respiratory syncytial virus (BRSV)	44.0	(2.1)	58.7	(1.3)	58.2	(1.3)	64.9	(1.4)
Haemophilus somnus	14.7	(1.4)	37.3	(1.3)	31.4	(1.2)	34.2	(1.3)
Leptospirosis	56.1	(2.2)	67.0	(1.3)	65.1	(1.3)	67.7	(1.3)
Salmonella	NA		18.9	(1.0)	16.8	(1.0)	21.5	(1.1)
E. coli mastitis	NA		18.1	(0.9)	21.3	(1.0)	24.1	(1.1)
Clostridia (blackleg/ malignant edema)	20.7	(1.4)	32.3	(1.1)	32.8	(1.1)	34.6	(1.3)
Brucellosis	66.8	(1.9)	63.8	(1.3)	51.0	(1.3)	41.6	(1.3)
Mycobacterium avium subspecies *paratuberculosis* (Johne's disease)	NA		5.4	(0.6)	4.6	(0.5)	5.0	(0.6)
Neospora	NA		NA		3.6	(0.4)	6.3	(0.6)
Other	NA		7.3	(0.6)	6.9	(0.6)	6.8	(0.7)
Any	91.3	(1.3)	86.4	(1.0)	84.4	(1.1)	83.0	(1.1)

Percentage of Operations that Normally Vaccinated Heifers Against the Following Diseases



*Includes vaccines for the diseases listed above plus *Salmonella*, *E. coli* mastitis, clostridia, Johne's disease, *Neospora,* and "Other."

8. Types of BVD vaccine

The majority of operations that administered BVD vaccines to heifers switched from giving killed vaccines in 1996 (58.4 percent of operations) to modified-live vaccines in 2007 (62.2 percent of operations).

For operations that gave BVD vaccinations to heifers, percentage of operations by type of BVD vaccine given:

	Percent Operations					
Type of BVD Vaccine	**Dairy 1996**	**Std. Error**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Killed	58.4	(1.5)	50.6	(1.6)	43.1	(1.6)
Modified live	40.7	(1.5)	49.2	(1.6)	62.2	(1.5)

D. Heifer Health

1. Calves born alive

The number of calves born alive as a percentage of cow inventory decreased from 93.4 percent in 1996 to 86.0 percent in 2007.

Number of calves born and alive*, as a percentage of January 1 cow inventory:

Dairy 1996		Dairy 2002		Dairy 2007	
Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
93.4	(0.5)	88.8	(0.5)	86.0	(0.6)

*In Dairy 2007, included “alive at 48 hours.”

2. Mortality

The percentages of unweaned and weaned heifer calves that died decreased from 1996 to 2007. The percentage of unweaned calves that died decreased from 10.5 percent in 2002 to 7.8 percent in 2007. Weaned heifer calf deaths increased from 2.2 percent in 1991 to 2.8 percent in 2002 and then decreased to 1.8 percent in 2007.

a. Number of unweaned and weaned heifer deaths, as a percentage of heifers born alive…

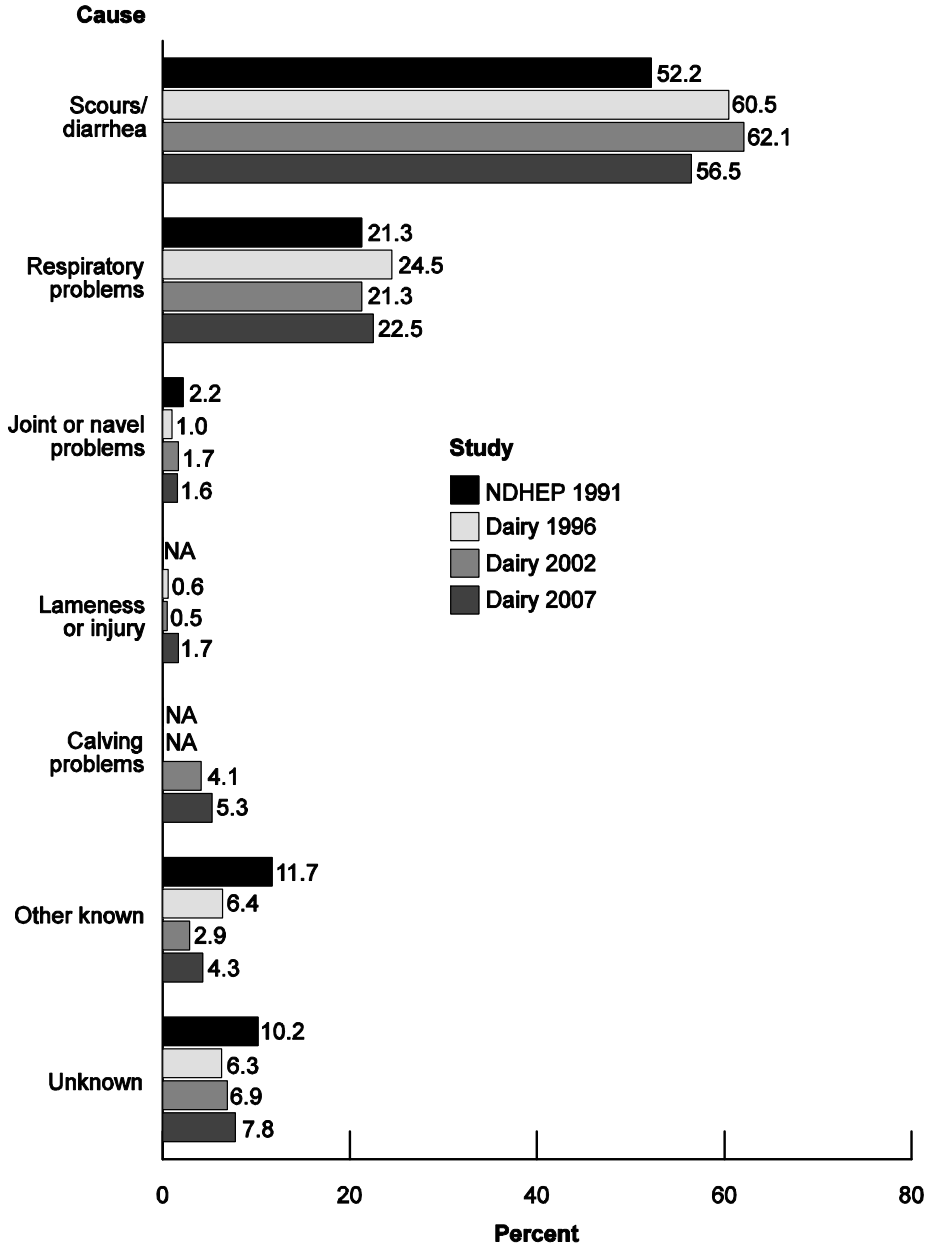
	…or moved onto the operation NDHEP 1991		Dairy 1996		Dairy 2002		Dairy 2007	
Heifer Type	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Unweaned	8.4	(0.4)	10.8	(0.4)	10.5	(0.3)	7.8	(0.2)
Weaned	2.2	(0.1)	2.4	(0.1)	2.8	(0.1)	1.8	(0.1)

Scours/diarrhea accounted for more than 50 percent of unweaned heifer deaths in each study year since 1991, while respiratory problems accounted for 20 to 25 percent of deaths during the same period.

b. Percentage of ***unweaned heifer*** deaths by cause:

	Percent Deaths							
Cause	**NDHEP 1991**	**Std. Error**	**Dairy 1996**	**Std. Error**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Scours/ diarrhea	52.2	(2.6)	60.5	(1.2)	62.1	(1.1)	56.5	(1.3)
Respiratory problems	21.3	(1.6)	24.5	(1.0)	21.3	(0.9)	22.5	(0.9)
Joint or navel problems	2.2	(0.7)	1.0	(0.1)	1.7	(0.2)	1.6	(0.3)
Lameness or injury	NA		0.6	(0.1)	0.5	(0.1)	1.7	(0.3)
Trauma	2.4	(0.8)	NA		NA		NA	
Lack of coordination/ severe depression	NA		0.4	(0.1)	0.4	(0.1)	0.3	(0.1)
Poison	NA		0.3	(0.1)	0.1	(0.0)	0.0	(0.0)
Calving problems	NA		NA		4.1	(0.6)	5.3	(0.7)
Other known	11.7	(1.8)	6.4	(1.1)	2.9	(0.4)	4.3	(0.7)
Unknown	10.2	(1.4)	6.3	(0.9)	6.9	(0.8)	7.8	(0.9)
Total	100.0		100.0		100.0		100.0	

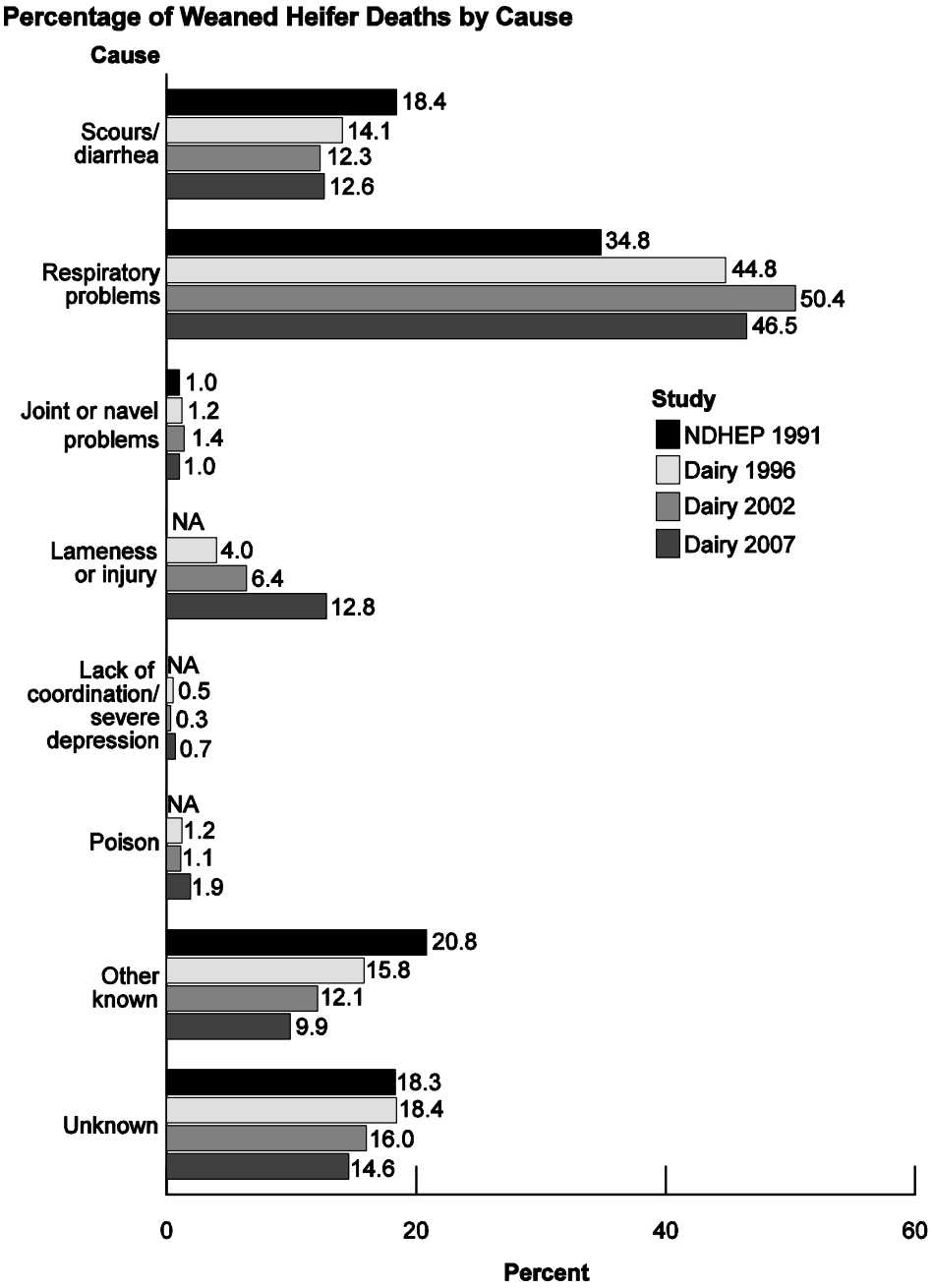
Percentage of Unweaned Heifer Deaths by Cause



The percentage of weaned heifer deaths caused by respiratory problems increased from 34.8 percent of deaths in 1991 to 46.5 percent in 2007. Weaned heifer deaths caused by lameness or injury increased from 4.0 percent of deaths in 1996 to 12.8 percent in 2007.

c. Percentage of ***weaned heifer*** deaths by cause:

	Percent Deaths							
Cause	**NDHEP 1991**	**Std. Error**	**Dairy 1996**	**Std. Error**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Scours/ diarrhea	18.4	(2.6)	14.1	(1.6)	12.3	(1.0)	12.6	(1.0)
Respiratory problems	34.8	(3.5)	44.8	(2.1)	50.4	(1.6)	46.5	(1.7)
Joint or navel problems	1.0	(0.4)	1.2	(0.5)	1.4	(0.3)	1.0	(0.3)
Lameness or injury	NA		4.0	(0.5)	6.4	(0.6)	12.8	(1.0)
Trauma	6.7	(0.9)	NA		NA		NA	
Lack of coordination/ severe depression	NA		0.5	(0.1)	0.3	(0.1)	0.7	(0.2)
Poison	NA		1.2	(0.3)	1.1	(0.4)	1.9	(0.9)
Other known	20.8	(2.0)	15.8	(2.4)	12.1	(1.2)	9.9	(1.0)
Unknown	18.3	(2.1)	18.4	(1.4)	16.0	(1.1)	14.6	(1.2)
Total	100.0		100.0		100.0		100.0	


Percentage of Weaned Heifer Deaths by Cause
Cause
Scours/ diarrhea
18.4
14.1
12.3
12.6
Respiratory problems
34.8
44.8
50.4
46.5
Joint or navel problems
1.0
1.2
1.4
1.0
Lameness or injury
NA
4.0
6.4
12.8
Lack of coordination/ severe depression
NA
0.5
0.3
0.7
Poison
NA
1.2
1.1
1.9
Other known
20.8
15.8
12.1
9.9
Unknown
18.3
18.4
16.0
14.6
Study
NDHEP 1991
Dairy 1996
Dairy 2002
Dairy 2007
0
20
40
60
Percent

3. Carcass disposal

The percentage of operations that used rendering to dispose of dead calves decreased from 43.8 percent in 2002 to 36.5 percent in 2007, while the percentage of operations that composted dead calves increased from 10.1 to 24.2 percent during the same period.

Percentage of operations by primary method used to dispose of dead calves:

	Percent Operations			
Method of Disposal	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Buried	35.3	(1.3)	32.6	(1.3)
Burned/incinerated	2.8	(0.4)	2.0	(0.4)
Rendered	43.8	(1.3)	36.5	(1.3)
Composted	10.1	(0.8)	24.2	(1.2)
Landfill	2.4	(0.4)	1.7	(0.3)
Other	5.6	(0.6)	3.0	(0.5)
Total	100.0		100.0	

E. Cow Management

1. Home-raised replacements

The percentage of operations that home-raised more than 40 percent of their cow inventory increased threefold from 2002 to 2007 (8.2 and 24.2 percent, respectively).

Percentage of operations by percentage of adult-cow inventory that was home-raised:

	Percent Operations			
Percent of Home-Raised Replacements	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
0	8.4	(0.8)	10.2	(0.8)
0.1 to 10.0	3.9	(0.6)	3.5	(0.6)
10.1 to 20.0	23.2	(1.2)	15.8	(1.1)
20.1 to 30.0	33.1	(1.3)	23.3	(1.2)
30.1 to 40.0	23.2	(1.1)	22.8	(1.2)
40.1 or more	8.2	(0.7)	24.4	(1.3)
Total	100.0		100.0	

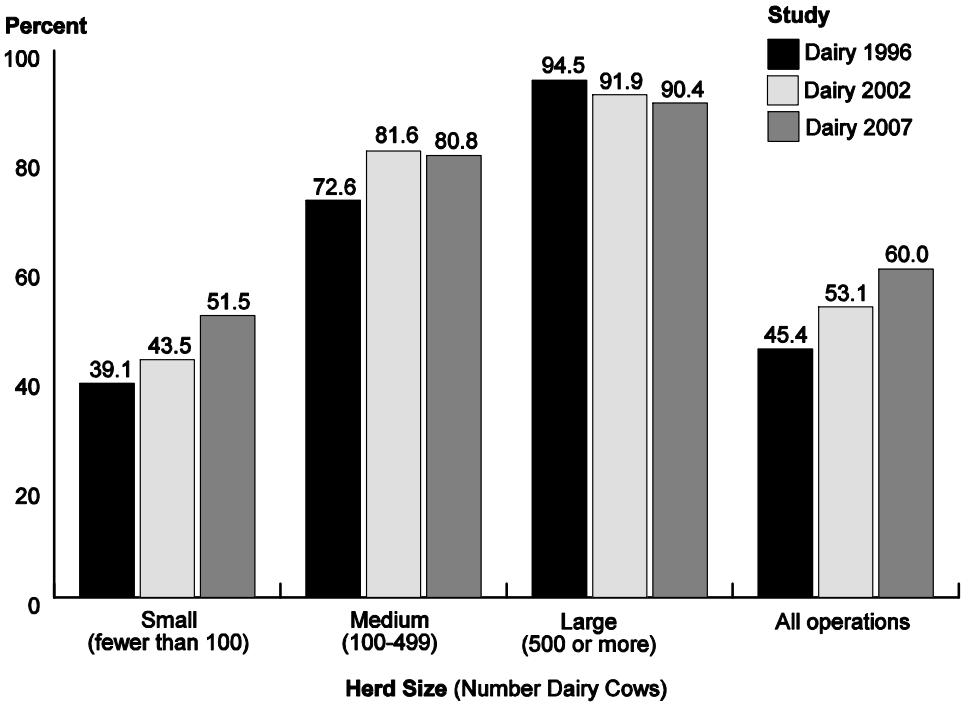
2. Housing

A higher percentage of small and medium operations housed maternity cows separate from lactating cows in 2007 compared with 1996. For all operations, the use of separate maternity housing increased from 45.4 percent in 1996 to 60.0 percent in 2007.

Percentage of operations in which maternity housing was separate from housing used for ***lactating*** cows, by herd size:

	Percent Operations					
Herd Size (Number Dairy Cows)	**Dairy 1996**	**Std. Error**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Small (fewer than 100)	39.1	(1.3)	43.5	(1.6)	51.5	(1.7)
Medium (100 to 499)	72.6	(2.1)	81.6	(1.7)	80.8	(1.8)
Large (500 or more)	94.5	(1.8)	91.9	(1.5)	90.4	(2.0)
All operations	45.4	(1.2)	53.1	(1.3)	60.0	(1.3)

Percentage of Operations in Which Maternity Housing was Separate from Housing Used for Lactating Cows, by Herd Size



3. Milking facilities

The percentage of operations that used a parlor as a primary milking facility increased from 28.8 percent in 1996 to 39.5 percent in 2007, while the percentage of operations that used a tiestall or stanchion decreased from 69.5 to 60.3 percent during the same period. A larger shift was observed in the percentage of cows, as 54.9 percent of cows were milked in parlors in 1996 compared with 78.2 percent in 2007.

Percentage of operations (and percentage of cows on these operations) by primary milking[1] facility used:

	Percent Operations						Percent Cows[2]					
Facility Type	Dairy 1996	Std. Error	Dairy 2002	Std. Error	Dairy 2007	Std. Error	Dairy 1996	Std. Error	Dairy 2002	Std. Error	Dairy 2007	Std. Error
Parlor	28.8	(0.9)	37.1	(1.0)	39.5	(1.0)	54.9	(1.0)	70.0	(0.8)	78.2	(0.6)
Tie stall or stanchion	69.5	(0.9)	61.9	(1.0)	60.3	(1.0)	43.9	(1.0)	28.9	(0.8)	21.8	(0.6)
Other	2.9	(0.5)	1.0	(0.2)	0.2	(0.1)	4.3	(0.7)	1.1	(0.2)	0.0	(0.0)

[1]Dairy 1996 did not ask about primary milking facilities; therefore, the column totals for 1996 are greater than 100 percent.
[2]As a percentage of January 1 cow inventory.

Percentage of Operations (and Percentage of Cows on These Operations) by Primary Milking Facility Used

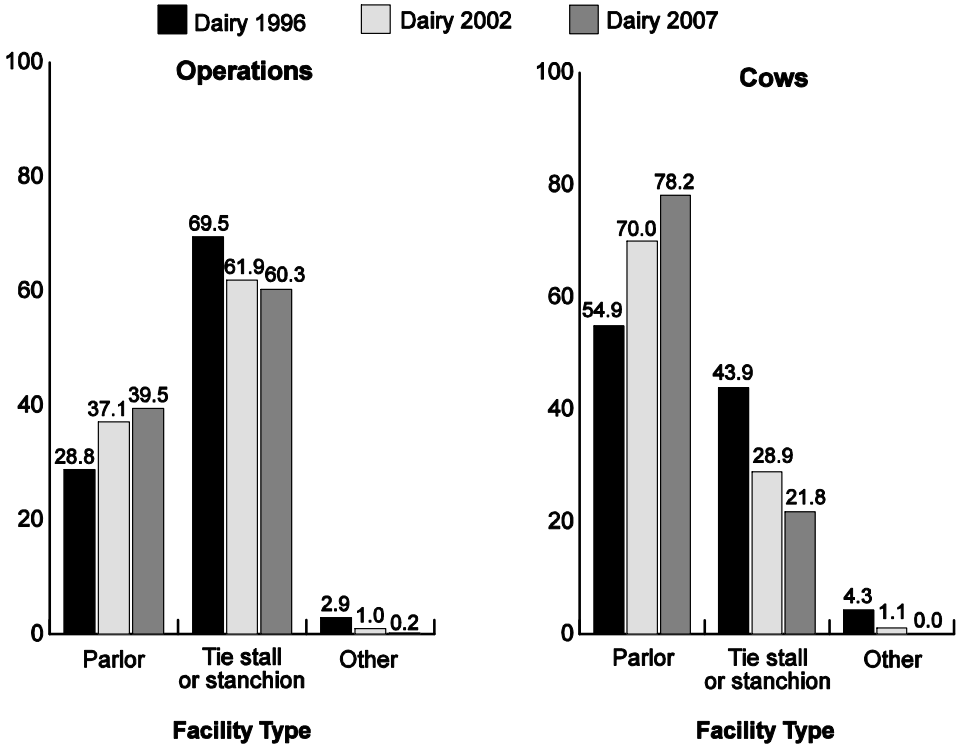


Photo by Dr. Jason Lombard

4. Nutrition

The percentage of operations that fed a total mixed ration increased for all herd sizes from 1996 to 2007.

a. Percentage of operations that fed a total mixed ration, by herd size:

	Percent Operations					
Herd Size (Number Dairy Cows)	**Dairy 1996**	**Std. Error**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Small (fewer than 100)	28.2	(1.3)	36.6	(1.6)	37.8	(1.6)
Medium (100 to 499)	68.8	(2.0)	78.3	(1.7)	84.7	(1.7)
Large (500 or more)	84.1	(3.0)	90.2	(1.7)	94.1	(1.4)
All operations	35.6	(1.1)	47.0	(1.3)	51.1	(1.3)

The percentage of operations with an RHA milk production of 16,000 pounds or more that fed a total mixed ration increased from 1996 to 2002 but was similar between 2002 and 2007.

b. Percentage of operations that fed a total mixed ration, by RHA milk production:

	Percent Operations					
RHA Milk Production (Pounds**)**	**Dairy 1996**	**Std. Error**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Less than 16,000	28.9	(2.0)	25.4	(2.3)	23.5	(2.4)
16,000 to 19,999	33.2	(1.7)	45.0	(2.2)	42.7	(2.3)
20,000 or more	55.4	(2.5)	65.7	(2.1)	70.7	(1.9)

The percentages of operations that used forage test results to balance feed rations were similar for individual herd sizes from 1996 to 2007, although a higher percentage of all operations tested forage in 2007 than in 1996 (75.5 and 67.8 percent, respectively).

c. Percentage of operations that used forage test results to balance feed rations, by herd size:

	Percent Operations					
Herd Size (Number Dairy Cows)	**Dairy 1996**	**Std. Error**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Small (fewer than 100)	64.1	(1.4)	66.1	(1.6)	70.1	(1.7)
Medium (100 to 499)	84.8	(1.3)	87.1	(1.3)	89.9	(1.4)
Large (500 or more)	89.2	(2.7)	88.8	(1.8)	90.7	(1.8)
All operations	67.8	(1.2)	71.2	(1.2)	75.5	(1.2)

The percentage of operations and percentage of cows on these operations that relied on pasture during the growing season to provide part of the ration forage component has increased since 2002.

d. Percentage of operations (and percentage of cows on these operations) that relied on pasture during the growing season to provide part of the ration forage component for cows:

Percent Operations				Percent Cows			
Dairy 2002	**Std. Error**	**Dairy 2007**	**Std. Error**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
47.6	(1.3)	58.9	(1.3)	24.7	(0.8)	33.0	(1.3)

5. Number of bulls

The percentage of operations with bulls has remained stable since 1996. Approximately half of dairy operations (48.3 percent) did not house bulls in 2007.

Percentage of operations by the number of bulls in the January 1 inventory used for breeding dairy cows or heifers:

	Percent Operations					
Number Bulls	**Dairy 1996**	**Std. Error**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
0	45.4	(1.3)	45.1	(1.4)	48.3	(1.4)
1	34.8	(1.3)	31.1	(1.3)	28.5	(1.3)
2 to 4	16.9	(0.8)	19.1	(1.0)	18.6	(1.0)
5 or more	2.9	(0.2)	4.7	(0.3)	4.6	(0.3)
Total	100.0		100.0		100.0	

6. Preventive practices

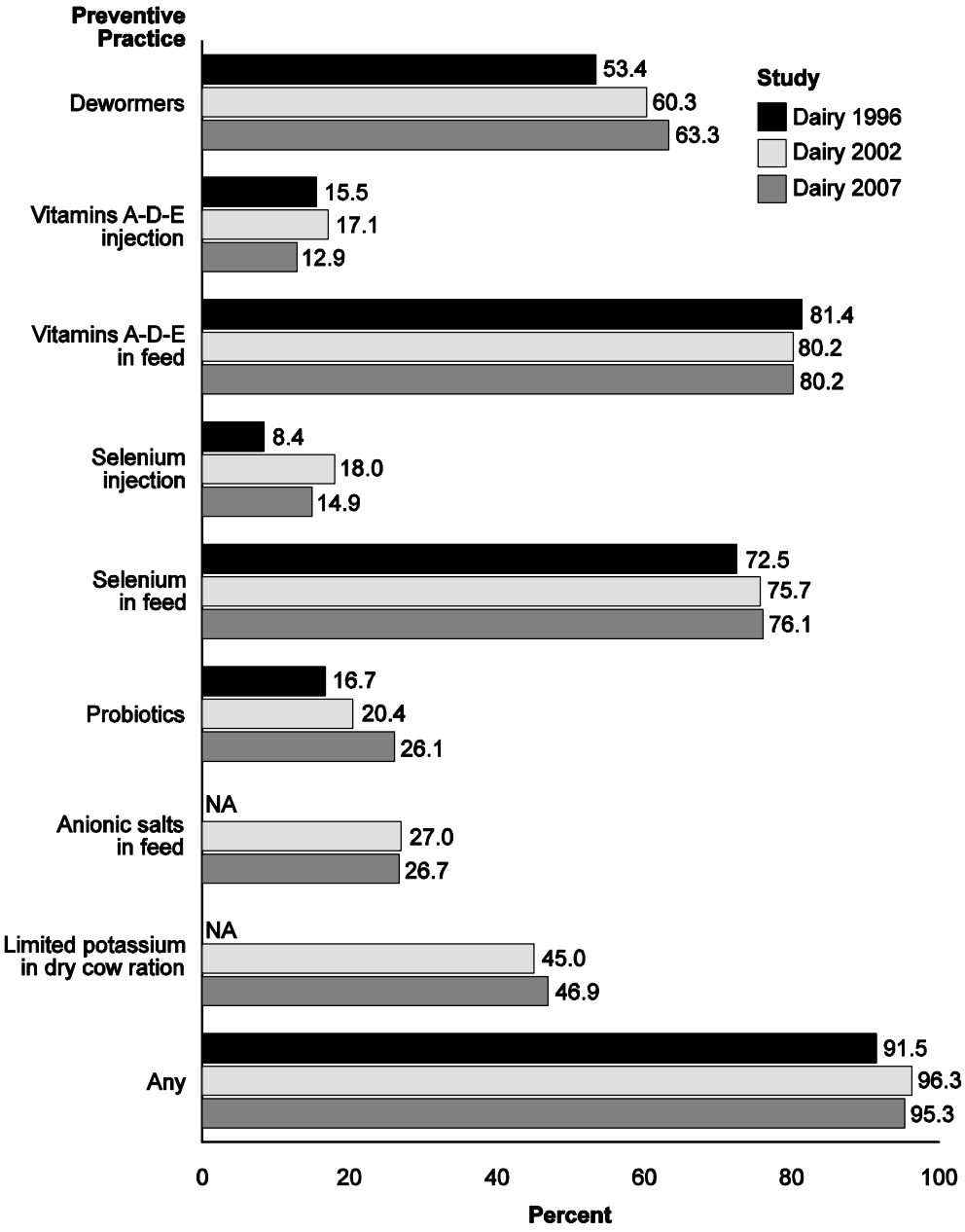
Since 1996, the use of dewormers, selenium injections, and probiotics increased while vitamin A-D-E injections decreased. In 2007, 95.3 percent of operations administered any preventive compared with 91.5 percent in 1996.

Percentage of operations by preventive practices normally used for cows:

	Percent Operations					
Preventive Practice	**Dairy 1996**	**Std. Error**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Dewormers	53.4	(1.3)	60.3	(1.3)	63.3	(1.4)
Vitamins A-D-E injection	15.5	(0.9)	17.1	(1.0)	12.9	(0.8)
Vitamins A-D-E in feed	81.4	(1.1)	80.2	(1.1)	80.2	(1.2)
Selenium injection	8.4*	(0.6)	18.0	(1.0)	14.9	(0.9)
Selenium in feed	72.5*	(1.2)	75.7	(1.1)	76.1	(1.2)
Probiotics	16.7	(0.9)	20.4	(1.0)	26.1	(1.2)
Anionic salts in feed	NA		27.0	(1.2)	26.7	(1.2)
Limited potassium in dry cow ration	NA		45.0	(1.3)	46.9	(1.4)
Ionophores in feed	NA		NA		26.8	(1.1)
Other	4.4	(0.5)	5.4	(0.6)	3.6	(0.6)
Any	91.5	(0.8)	96.3	(0.6)	95.3	(0.7)

*Lactating cows only.

Percentage of Operations by Preventive Practices Normally Used for Cows



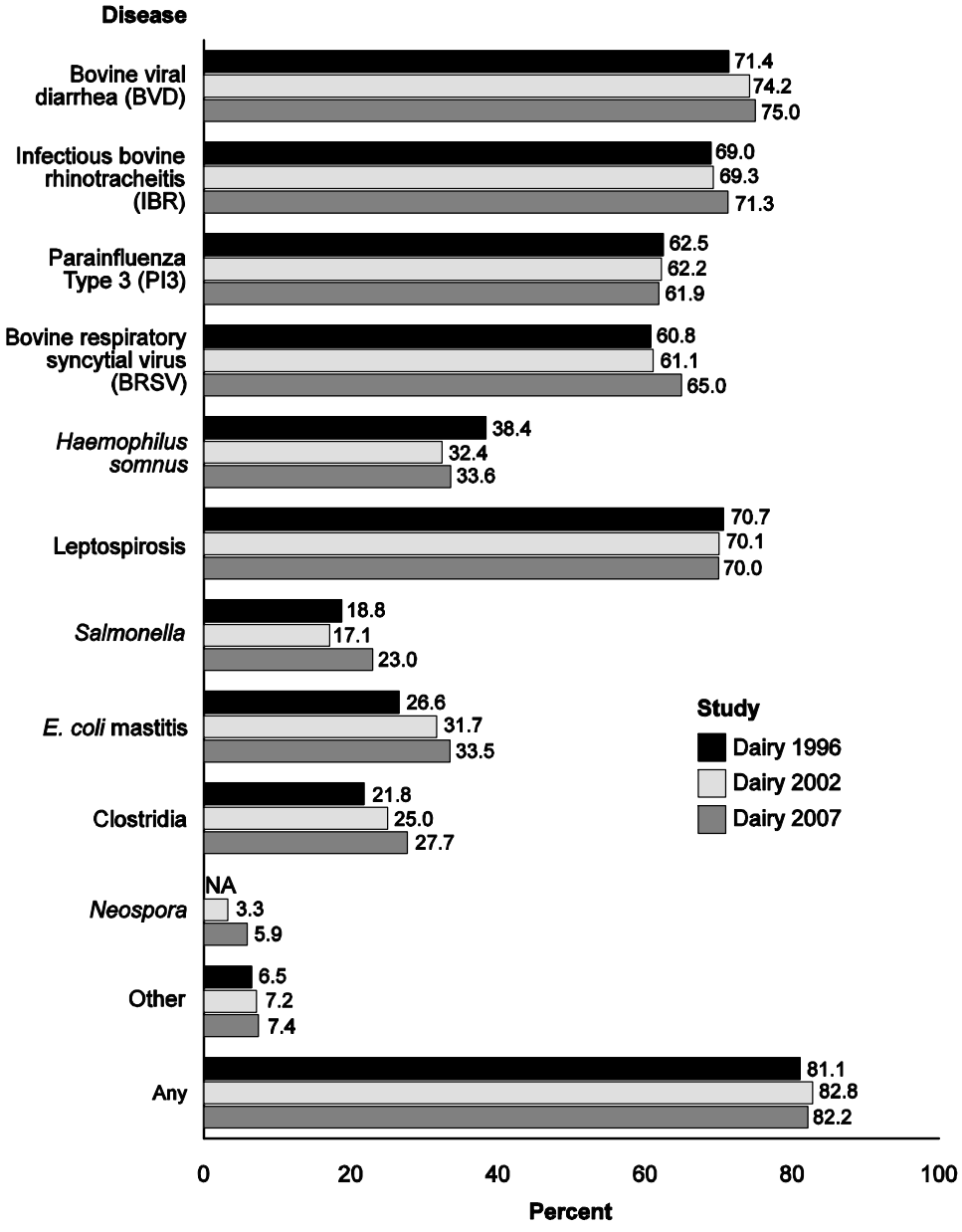
7. Vaccination practices

The use of *Salmonella*, *E coli*, and clostridia vaccines has increased since 1996, while the use of *Haemophilus somnus* vaccine decreased. Use of the most common vaccines (BVD, IBR, PI3, BRSV, and Leptospirosis) has remained steady since 1996.

Percentage of operations that normally vaccinated cows against the following diseases:

	Percent Operations					
Disease	**Dairy 1996**	**Std. Error**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Bovine viral diarrhea (BVD)	71.4	(1.3)	74.2	(1.2)	75.0	(1.3)
Infectious bovine rhinotracheitis (IBR)	69.0	(1.3)	69.3	(1.3)	71.3	(1.3)
Parainfluenza Type 3 (PI3)	62.5	(1.3)	62.2	(1.3)	61.9	(1.4)
Bovine respiratory syncytial virus (BRSV)	60.8	(1.3)	61.1	(1.3)	65.0	(1.4)
Haemophilus somnus	38.4	(1.3)	32.4	(1.2)	33.6	(1.3)
Leptospirosis	70.7	(1.3)	70.1	(1.3)	70.0	(1.3)
Salmonella	18.8	(1.0)	17.1	(1.0)	23.0	(1.1)
E. coli mastitis	26.6	(1.1)	31.7	(1.2)	33.5	(1.2)
Clostridia	21.8	(1.0)	25.0	(1.1)	27.7	(1.2)
Neospora	NA		3.3	(0.4)	5.9	(0.6)
Other	6.5	(0.6)	7.2	(0.6)	7.4	(0.7)
Any	81.1	(1.1)	82.8	(1.1)	82.2	(1.1)

Percentage of Operations that Normally Vaccinated Cows Against the Following Diseases



8. Types of BVD vaccine

Although the majority of operations administered killed BVD vaccine to cows, the percentage of operations that used modified-live vaccine increased from 29.3 percent in 1991 to 48.9 percent in 2007. The use of killed BVD vaccine decreased slightly during the same period.

a. For operations that gave BVD vaccinations to cows, percentage of operations by type of BVD vaccine given:

	Percent Operations					
Type of BVD	**Dairy 1996**	**Std. Error**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Killed	65.4	(1.4)	61.9	(1.5)	56.3	(1.6)
Modified live	29.3	(1.3)	36.7	(1.5)	48.9	(1.6)

A higher percentage of operations used a combination of Type 1 and Type II vaccines in 2007 compared to 2002 (60.8 and 39.4 percent, respectively). Producers are becoming more aware of the type of BVD vaccine they used, as the percentage of operations that did not know which vaccine was used decreased from 47.6 percent in 2002 to 27.2 percent in 2007.

b. For operations that gave any BVD vaccinations, percentage of operations by strain of BVD contained in vaccine administered:

	Percent Operations			
BVD Strain	**Dairy 2002**	**Standard Error**	**Dairy 2007**	**Standard Error**
Type I only	5.4	(0.6)	4.3	(0.6)
Type II only	7.6	(0.9)	7.7	(0.8)
Combination (Type I and Type II)	39.4	(1.4)	60.8	(1.5)
Did not know	47.6	(1.5)	27.2	(1.4)
Total	100.0		100.0	

The percentages of operations that gave annual BVD booster injections were similar in 1996, 2002, and 2007, with about 80 percent of operations giving booster injections.

c. For operations that gave BVD vaccinations to cows, percentage of operations that gave annual BVD booster injections:

Percent Operations					
Dairy 1996	**Standard Error**	**Dairy 2002**	**Standard Error**	**Dairy 2007**	**Standard Error**
77.4	(1.3)	82.9	(1.2)	80.2	(1.3)

9. Bovine somatotropin (bST)

With the exception of small operations, the percentage of operations that used bST and the percentage of cows that received bST increased from 1996 to 2002. From 2002 to 2007, the percentage of large operations that used bST decreased from 54.4 percent to 42.7 percent. Overall, the percentage of operations that used bST remained the same in 2002 and 2007 (15.2 percent for both study years). The percentage of cows that received bST on medium and large operations decreased from 24.5 and 34.1 percent, respectively, in 2002 to 17.7 and 22.6 percent, respectively, in 2007. Overall, the percentage of cows that received bST decreased from 22.3 percent in 2002 to 17.2 percent in 2007.

Percentage of operations (and percentage of cows milked on January 1) that used bST in cows during the current lactation (at the time of interview), by herd size:

	Dairy 1996 (All Cows in Inventory January 1)				**Dairy 2002** (Cows Milked January 1)				**Dairy 2007** (Cows Milked January 1)			
Herd Size (Number Dairy Cows)	**Pct. Ops.**	**Std. Error**	**Pct. Cows**	**Std. Error**	**Pct. Ops.**	**Std. Error**	**Pct. Cows**	**Std. Error**	**Pct. Ops.**	**Std. Error**	**Pct. Cows**	**Std. Error**
Small (fewer than 100)	6.5	(0.6)	3.7	(0.4)	8.8	(0.8)	6.2	(0.7)	9.1	(0.9)	6.2	(0.7)
Medium (100 to 499)	21.0	(1.7)	13.2	(1.3)	32.2	(1.9)	24.5	(1.5)	28.8	(2.0)	17.7	(1.4)
Large (500 or more)	38.7	(3.9)	17.9	(2.3)	54.4	(2.6)	34.1	(1.8)	42.7	(2.5)	22.6	(1.5)
All operations	9.4	(0.6)	10.1	(0.7)	15.2	(0.8)	22.3	(0.8)	15.2	(0.8)	17.2	(0.8)

F. Cow Health

1. Abortions

Abortion percentage for cows and heifers combined increased from 3.5 percent in 1996 to 4.5 percent in 2007.

a. Percentage of heifers, cows, and heifers and cows combined that aborted:

	Percent Heifers/Cows					
	Dairy 1996	Std. Error	Dairy 2002	Std. Error	Dairy 2007	Std. Error
Heifers	NA		NA		3.3[1]	(0.2)
Cows	NA		NA		5.0[2]	(0.2)
Both heifers and cows	3.5	(0.1)	4.0	(0.1)	4.5[3]	(0.2)

[1]Breeding age or older heifers on January 1, 2007
[2]Cow inventory minus breeding age and older heifers on January 1, 2007
[3]Cow inventory on January 1, 2007.

The percentages of operations by abortion percentage were similar across study years.

b. Percentage of operations by reported abortion percentage:

	Percent Operations					
Abortion Percent	Dairy 1996	Std. Error	Dairy 2002	Std. Error	Dairy 2007	Std. Error
Less than 2.0	42.7	(1.3)	39.3	(1.3)	38.2	(1.4)
2.0 to 4.9	36.2	(1.2)	34.6	(1.2)	34.3	(1.3)
5.0 to 9.9	16.2	(0.9)	20.3	(1.1)	20.6	(1.1)
10.0 to 14.9	3.2	(0.5)	4.7	(0.7)	4.9	(0.6)
15.0 or more	1.7	(0.4)	1.1	(0.3)	2.0	(0.4)
Total	100.0		100.0		100.0	

2. Cow morbidity

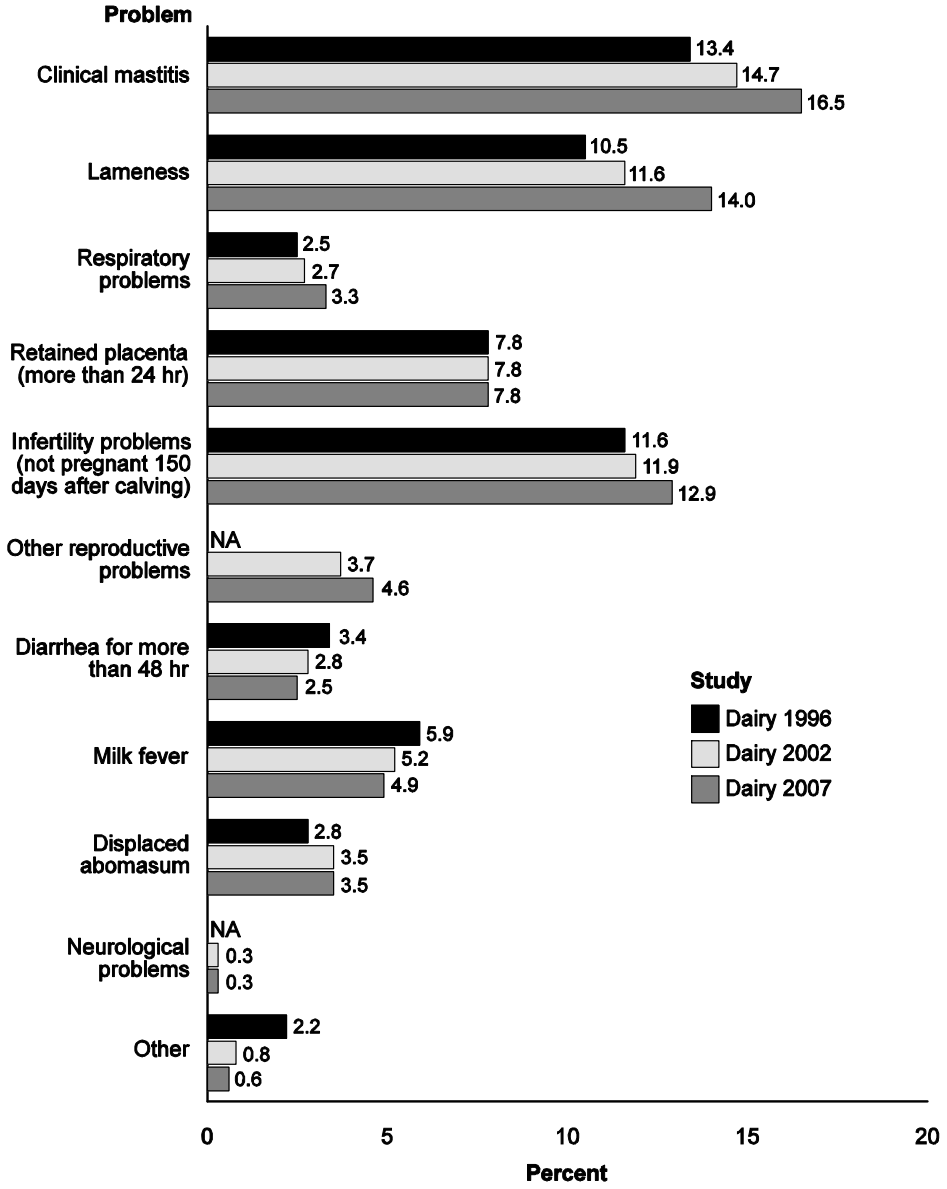
The percentage of cows with clinical mastitis, lameness, respiratory problems, infertility problems, or displaced abomasum increased from 1996 to 2007. The percentage of cows with diarrhea for more than 48 hours or milk fever decreased from 1996 to 2007.

Percentage of cows by health problem:

	Percent Cows*					
	Dairy 1996		Dairy 2002		Dairy 2007	
Problem	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**	**Pct.**	**Std. Error**
Clinical mastitis	13.4	(0.3)	14.7	(0.3)	16.5	(0.5)
Lameness	10.5	(0.3)	11.6	(0.3)	14.0	(0.4)
Respiratory problems	2.5	(0.1)	2.7	(0.1)	3.3	(0.1)
Retained placenta (more than 24 hours)	7.8	(0.2)	7.8	(0.2)	7.8	(0.2)
Infertility problems (not pregnant 150 days after calving)	11.6	(0.3)	11.9	(0.3)	12.9	(0.3)
Other reproductive problems (e.g., dystocia, metritis)	NA		3.7	(0.2)	4.6	(0.3)
Diarrhea for more than 48 hours	3.4	(0.2)	2.8	(0.2)	2.5	(0.2)
Milk fever	5.9	(0.1)	5.2	(0.1)	4.9	(0.1)
Displaced abomasum	2.8	(0.1)	3.5	(0.1)	3.5	(0.1)
Neurological problems	NA		0.3	(0.0)	0.3	(0.0)
Other health-related problems	2.2	(0.2)	0.8	(0.1)	0.6	(0.1)

*As a percentage of January 1 respective-year cow inventory.

Percentage of Cows* by Health Problem



*As a percentage of January 1 respective-year cow inventory.

3. Permanently removed cows

The percentage of cows removed from medium operations increased from 21.6 percent in 1996 to 23.7 percent in 2007, while the percentage of cows removed from large operations decreased from 27.4 percent in 1996 to 23.4 percent in 2007. For all operations, there were no differences in the percentages of cows permanently removed from operations.

a. Percentage of cows permanently removed* as a percentage of January 1 inventory, by herd size:

	Percent Cows					
Herd Size (Number Dairy Cows)	**Dairy 1996**	**Std. Error**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Small (fewer than 100)	23.9	(0.7)	24.9	(0.6)	24.1	(0.6)
Medium (100 to 499)	21.6	(0.4)	23.9	(0.5)	23.7	(0.5)
Large (500 or more)	27.4	(0.8)	27.5	(0.6)	23.4	(0.7)
All operations	24.0	(0.4)	25.5	(0.3)	23.6	(0.4)

*Permanently removed cows include those that permanently left the herd but excludes those that died.

There were no changes in the destination of permanently removed cows from 1996 to 2007, with about 75 percent of cows being sent to market, auction, or stockyard in all three study years.

b. For operations that permanently removed* cows, percentage of permanently removed cows by destination:

	Percent Cows					
Destination	**Dairy 1996**	**Std. Error**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Sent directly to another dairy	4.5	(1.0)	5.7	(0.6)	5.5	(0.7)
Sent to market, auction, or stockyard	74.0	(1.4)	74.0	(1.1)	76.2	(1.1)
Sent directly to packer or slaughter plant	21.0	(1.2)	19.6	(1.0)	17.5	(1.3)
Sent elsewhere	0.5	(0.1)	0.7	(0.1)	0.8	(0.3)
Total	100.0		100.0		100.0	

*Permanently removed cows include those that permanently left the herd but excludes those that died.

The reasons cows were permanently removed remained fairly constant from 1996 to 2007, although a lower percentage of cows were removed due to poor production in 2007 (16.1 percent) than in 1996 (21.4 percent).

c. For operations that permanently removed cows, percentage of cows removed, by reason:

	Percent Removals					
Reason	**Dairy 1996**	**Standard Error**	**Dairy 2002**	**Standard Error**	**Dairy 2007**	**Standard Error**
Udder or mastitis problems	25.3	(0.6)	25.4	(0.5)	23.0	(0.6)
Lameness or injury	14.4	(0.6)	15.5	(0.4)	16.0	(0.4)
Reproductive problems	25.5	(0.8)	25.0	(0.5)	26.3	(0.7)
Poor production not related to above	21.4	(0.8)	18.3	(0.7)	16.1	(0.7)
Aggressiveness or belligerence	1.0	(0.1)	0.9	(0.1)	0.7	(0.1)
Other diseases	4.1	(0.5)	5.6	(0.2)	3.7	(0.2)
Sold as replacements to another dairy	4.4	(1.0)	5.5	(0.6)	5.8	(0.7)
Other	3.9	(0.3)	3.8	(0.4)	8.4	(1.1)
Total	100.0		100.0		100.0	

4. Mortality

The percentage of cows that died increased across herd sizes from 1996 to 2007. The overall percentage of cows that died increased from 3.8 percent in 1996 to 5.7 percent in 2007.

a. Percentage of cows that died as a percentage of January 1 inventory, by herd size:

	Percent Cows					
Herd Size (Number Dairy Cows)	**Dairy 1996**	**Std. Error**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Small (fewer than 100)	3.6	(0.1)	4.4	(0.1)	4.8	(0.1)
Medium (100 to 499)	3.9	(0.1)	5.0	(0.1)	5.8	(0.2)
Large (500 or more)	4.0	(0.2)	4.9	(0.1)	6.1	(0.2)
All operations	3.8	(0.1)	4.8	(0.1)	5.7	(0.1)

The percentage of cow deaths due to lameness or injury increased from 12.7 percent in 1996 to 20.0 percent in 2007. Conversely, the percentage of cow deaths due to calving problems and other known reasons decreased from 1996 to 2007.

b. Percentage of cow deaths by cause:

	Percent Deaths					
Cause	**Dairy 1996**	**Std. Error**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Scours, diarrhea, or other digestive problems	9.0	(1.0)	8.6	(0.5)	10.4	(0.5)
Respiratory problems	9.6	(0.7)	10.3	(0.5)	11.3	(0.7)
Poison	0.9	(0.2)	0.4	(0.1)	0.4	(0.1)
Put down due to lameness or injury	12.7	(0.7)	13.9	(0.6)	20.0	(0.8)
Lack of coordination or severe depression	1.4	(0.2)	1.4	(0.2)	1.0	(0.1)
Mastitis	16.3	(0.8)	17.1	(0.6)	16.5	(0.7)
Calving problems	18.3	(0.7)	17.4	(0.7)	15.2	(0.7)
Other known reasons	17.0	(0.9)	11.1	(0.6)	10.2	(0.8)
Unknown reasons	14.8	(0.8)	19.8	(0.9)	15.0	(1.1)
Total	100.0		100.0		100.0	

5. Carcass disposal

Although rendering remained the primary method of dead-cow disposal, the percentage of operations that used this method decreased from 62.4 percent in 2002 to 56.9 percent in 2007. Conversely, use of composting increased from 6.9 percent of operations in 2002 to 16.8 percent in 2007. These changes in dead-cow disposal are similar to those observed in disposing of dead calves,

Percentage of operations by primary method used to dispose of dead cows:

	Percent Operations			
Method of Disposal	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Buried	22.7	(1.1)	20.3	(1.1)
Burned/incinerated	2.2	(0.4)	1.8	(0.4)
Rendered	62.4	(1.2)	56.9	(1.3)
Composted	6.9	(0.7)	16.8	(1.0)
Landfill	1.9	(0.3)	1.7	(0.3)
Other	3.9	(0.5)	2.5	(0.4)
Total	100.0		100.0	

G. Biosecurity

1. Physical contact with unweaned calves

The percentage of unweaned calves not exposed to weaned calves, bred heifers, or adult cattle increased from 1996 to 2007.

Percentage of operations where, after separation from the dam, unweaned heifers did not have physical contact* with the following groups:

	Percent Operations							
Age Group	**NDHEP 1991**	**Std. Error**	**Dairy 1996**	**Std. Error**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Weaned calves less than approximately 4 months of age	68.5	(2.0)	67.0	(1.3)	77.2	(1.2)	76.0	(1.2)
Calves from approximately 4 months of age to breeding	89.6	(1.3)						
Bred heifers not yet calved	95.4	(0.9)	81.2	(1.1)	86.7	(0.9)	86.8	(1.0)
Adult cattle	89.8	(1.3)	79.8	(1.1)	84.6	(1.0)	84.3	(1.1)

*Physical contact = possible nose-to-nose contact or sniffling/touching/licking each other, including through a fence.

2. Physical contact with other animals

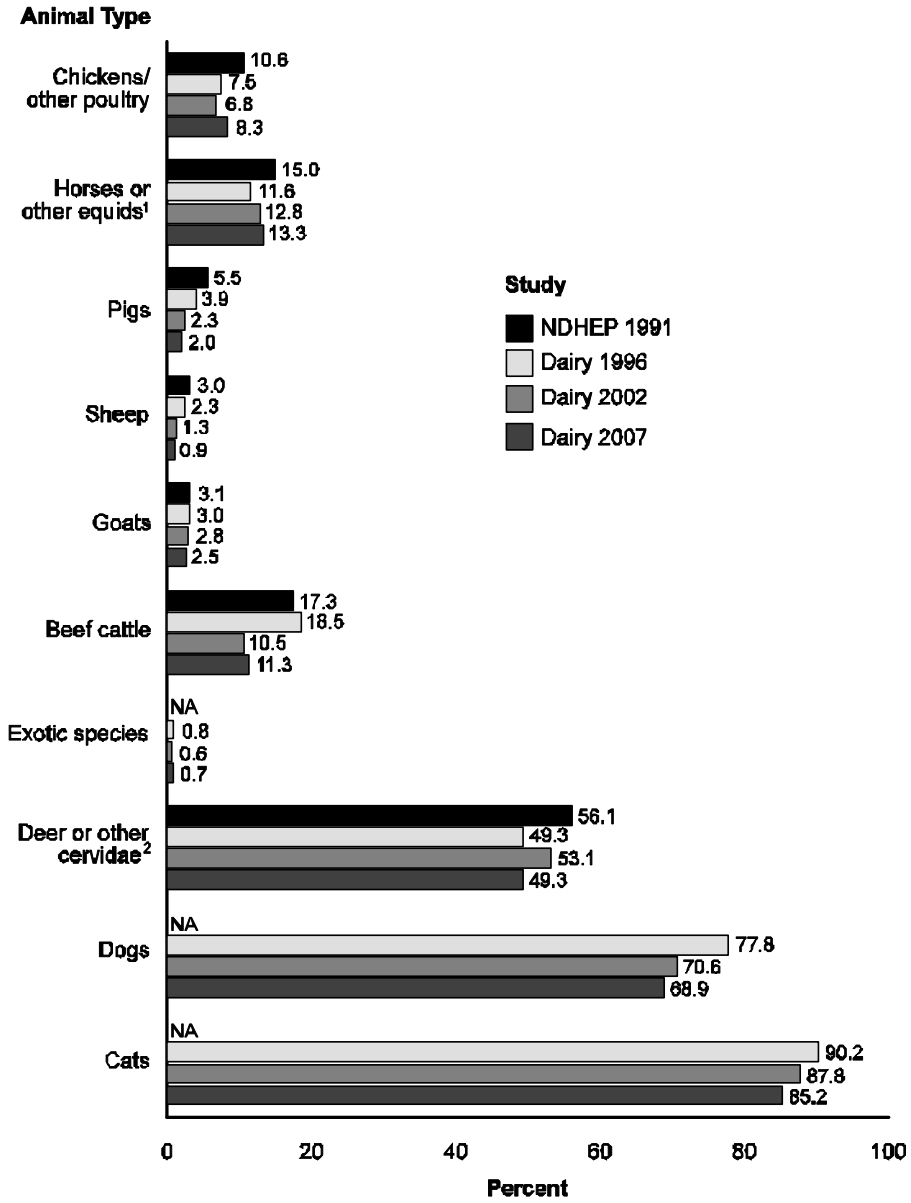
The percentage of operations in which pigs, sheep, or beef cattle had physical contact with dairy cattle and/or their feed, minerals, or water supply was lower in 2007 than in 1991. Dairy-cattle contact with the other listed animals was unchanged between 1991 and 2007.

Percentage of operations in which the following animals had physical contact with dairy cattle and/or their feed, minerals, or water supply:

	Percent Operations							
Animal Type	**NDHEP 1991**	**Std. Error**	**Dairy 1996**	**Std. Error**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Chickens/other poultry	10.6	(1.4)	7.5	(0.8)	6.8	(0.7)	8.3	(0.8)
Horses or other equids[1]	15.0	(1.6)	11.6	(0.9)	12.8	(0.9)	13.3	(1.0)
Pigs	5.5	(1.0)	3.9	(0.6)	2.3	(0.4)	2.0	(0.4)
Sheep	3.0	(0.6)	2.3	(0.5)	1.3	(0.3)	0.9	(0.3)
Goats	3.1	(0.7)	3.0	(0.5)	2.8	(0.5)	2.5	(0.4)
Beef cattle	17.3	(1.7)	18.5	(1.1)	10.5	(0.8)	11.3	(1.0)
Exotic species	NA		0.8	(0.2)	0.6	(0.2)	0.7	(0.2)
Deer or other cervidae[2]	56.1	(2.2)	49.3	(1.1)	53.1	(1.3)	49.3	(1.4)
Dogs	NA		77.8	(1.1)	70.6	(1.2)	68.9	(1.3)
Cats	NA		90.2	(0.8)	87.8	(0.8)	85.2	(0.9)

[1]In 1991, “horses” was the animal type; “other equids” was not listed.
[2]In 1991, “deer” was the animal type; “other cervidae” was not listed.

Percentage of Operations in Which the Following Animals had Physical Contact with Dairy Cattle and/or Their Feed, Minerals, or Water Supply



[1] In 1991, "horses" was the animal type; "other equids" was not listed.
[2] In 1991, "deer" was the animal type; "other cervidae" was not listed.

3. Biosecurity for new arrivals

From 1996 to 2007, about 4 of 10 operations brought cattle onto the operation.

Percentage of operations that brought the following classes of cattle onto the operation:

	Percent Operations						
Cattle Class	**Dairy 1996**	**Std. Error**	**Cattle Class**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Calves not yet weaned	5.0	(0.7)	Calves not yet weaned	5.1	(0.7)	3.4	(0.6)
Heifers weaned but not yet bred	7.3	(0.7)	Heifers weaned but not yet bred	6.7	(0.7)	6.4	(0.7)
Bred heifers not yet calved	18.5	(0.9)	Bred heifers not yet calved	15.8	(0.9)	12.2	(0.9)
Lactating cows	19.9	(1.0)	Lactating cows	16.4	(1.0)	13.8	(1.0)
Dry cows	7.1	(0.8)	Dry cows	5.9	(0.6)	4.3	(0.6)
Bulls	8.7	(0.7)	Dairy bulls	13.7	(0.9)	12.5	(0.9)
			Beef bulls	2.3	(0.4)	1.7	(0.3)
Other cattle	1.9	(0.4)	Beef heifers and cows	1.5	(0.3)	1.3	(0.3)
	2.0	(0.3)	Steers	1.1	(0.3)	1.8	(0.4)
Any cattle	43.9	(1.3)	Any cattle	45.7	(1.4)	38.9	(1.4)

4. Quarantine

There were no differences in the percentages of operations that quarantined new arrivals between 1996 and 2007 or in the number of days that new additions were quarantined.

a. For operations that brought the following classes of cattle onto the operation, percentage of operations that quarantined the following cattle classes upon arrival*:

			Percent Operations				
Cattle Class	**Dairy 1996**	**Std. Error**	**Cattle Class**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Calves not yet weaned	26.9	(5.2)	Calves not yet weaned	37.0	(7.3)	44.2	(8.3)
Heifers weaned but not yet bred	24.9	(4.7)	Heifers weaned but not yet bred	23.9	(3.9)	23.0	(4.7)
Bred heifers not yet calved	16.0	(2.0)	Bred heifers not yet calved	19.6	(2.3)	14.5	(2.3)
Lactating cows	6.2	(1.7)	Lactating cows	9.5	(1.6)	12.1	(2.4)
Dry cows	17.9	(4.8)	Dry cows	7.1	(2.2)	15.9	(4.8)
Bulls	11.2	(2.4)	Dairy bulls	15.9	(2.4)	17.1	(2.9)
			Beef bulls	23.6	(6.5)	20.3	(6.5)
Other heifers/cows	15.7	(6.0)	Beef heifers and cows	24.0	(8.5)	30.1	(9.8)
Steers	21.0	(6.6)	Steers	40.0	(11.4)	30.0	(9.6)

*Producers were asked for the number of head brought on and number of head quarantined.

b. For operations that quarantined new arrivals, average number of days new arrivals were quarantined, by cattle class:

			Average Number of Days				
Cattle Class	**Dairy 1996**	**Std. Error**	**Cattle Class**	**Dairy 2002**	**Std. Error**	**Dairy 2007**	**Std. Error**
Calves not yet weaned	40.8	(5.7)	Calves not yet weaned	49.2	(9.3)	42.4	(4.8)
Heifers weaned but not yet bred	21.5	(4.2)	Heifers weaned but not yet bred	28.2	(6.0)	20.0	(3.6)
Bred heifers not yet calved	16.8	(2.3)	Bred heifers not yet calved	23.7	(4.0)	22.0	(3.1)
Lactating cows	11.7	(2.3)	Lactating cows	20.1	(4.1)	15.6	(2.5)
Dry cows	8.9	(2.1)	Dry cows	21.4	(4.3)	16.5	(4.3)
Bulls	21.0	(3.1)	Dairy bulls	19.0	(2.5)	25.3	(3.5)
			Beef bulls	32.0	(12.9)	31.9	(12.6)
Other heifers/cows	24.3	(9.1)	Beef heifers and cows	31.1	(6.6)	33.3	(12.1)
Steers	41.5	(22.0)	Steers	41.3	(14.0)	40.7	(18.7)

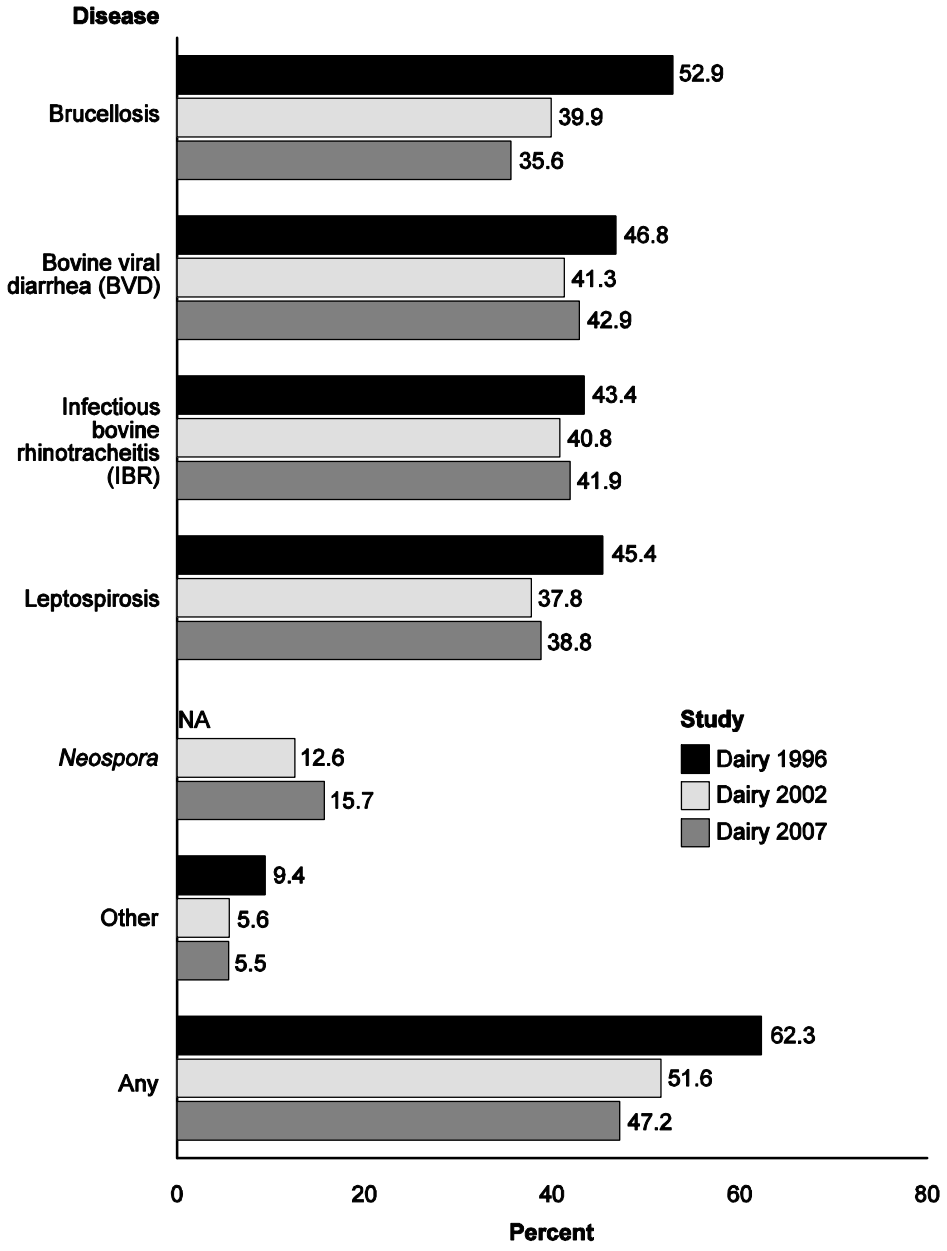
5. Vaccine requirements

No changes occurred from 1996 to 2007 in the percentage of operations that vaccinated new additions for BVD, IBR, and leptospirosis before the cattle were brought onto the operation. Approximately one-third to one-half of operations vaccinated for the diseases mentioned above. The percentages of operations that vaccinated for brucellosis decreased for each herd size from 1996 to 2007. Since many different ages of cattle are brought onto operations, the lower brucellosis vaccination percentages may be due partially to cattle too old or already vaccinated for brucellosis at the time of purchase. *Neospora* vaccination has remained unchanged in purchased cattle since 2002. The percentages of operations vaccinating for any disease decreased for small, large, and all operations.

For operations that brought any dairy cattle onto the operation, percentage of operations that normally required vaccination against the following diseases before bringing animals onto the operation, by herd size:

	Percent Operations											
	Herd Size (Number Dairy Cows)											
	Small (Fewer than 100)			**Medium** (100-499)			**Large** (500 or More)			**All Operations**		
Disease	**Dairy 1996**	**Dairy 2002**	**Dairy 2007**	**Dairy 1996**	**Dairy 2002**	**Dairy 2007**	**Dairy 1996**	**Dairy 2002**	**Dairy 2007**	**Dairy 1996**	**Dairy 2002**	**Dairy 2007**
Brucellosis	48.9 (2.5)	33.4 (2.5)	28.0 (2.6)	63.6 (2.9)	51.3 (2.7)	50.2 (3.5)	85.2 (3.0)	60.0 (3.1)	52.2 (3.9)	52.9 (2.0)	39.9 (1.9)	35.6 (2.0)
Bovine viral diarrhea (BVD)	43.1 (2.4)	36.2 (2.5)	34.8 (2.8)	59.4 (2.9)	51.2 (2.7)	59.9 (3.4)	58.8 (4.8)	53.9 (3.2)	56.7 (3.7)	46.8 (2.0)	41.3 (1.9)	42.9 (2.1)
Infectious bovine rhinotracheitis (IBR)	39.2 (2.3)	35.8 (2.6)	34.2 (2.8)	57.9 (2.9)	50.5 (2.7)	57.3 (3.4)	57.4 (4.8)	51.2 (3.2)	57.1 (3.7)	43.4 (1.9)	40.8 (1.9)	41.9 (2.1)
Leptospirosis	41.9 (2.4)	32.5 (2.5)	32.0 (2.7)	57.7 (2.9)	48.5 (2.7)	53.6 (3.4)	54.3 (4.8)	47.5 (3.2)	48.4 (3.8)	45.4 (2.0)	37.8 (1.8)	38.8 (2.1)
Neospora	NA	11.1 (1.6)	10.8 (1.7)	NA	15.5 (1.8)	26.6 (3.1)	NA	16.1 (2.3)	22.4 (3.3)	NA	12.6 (1.2)	15.7 (1.5)
Other	8.2 (1.1)	4.3 (0.8)	4.2 (1.1)	12.8 (2.2)	8.4 (1.4)	8.7 (1.8)	16.5 (3.6)	7.7 (1.5)	6.5 (1.6)	9.4 (1.0)	5.6 (0.7)	5.5 (0.9)
Any	58.0 (2.5)	44.6 (2.7)	37.7 (2.9)	74.8 (2.6)	64.0 (2.7)	65.2 (3.3)	88.8 (2.9)	71.9 (3.0)	68.5 (3.2)	62.3 (2.0)	51.6 (2.0)	47.2 (2.2)

For Operations that Brought any Dairy Cattle onto the Operation, Percentage of Operations that Normally Required Vaccination Against the Following Diseases Before Bringing Animals onto the Operation



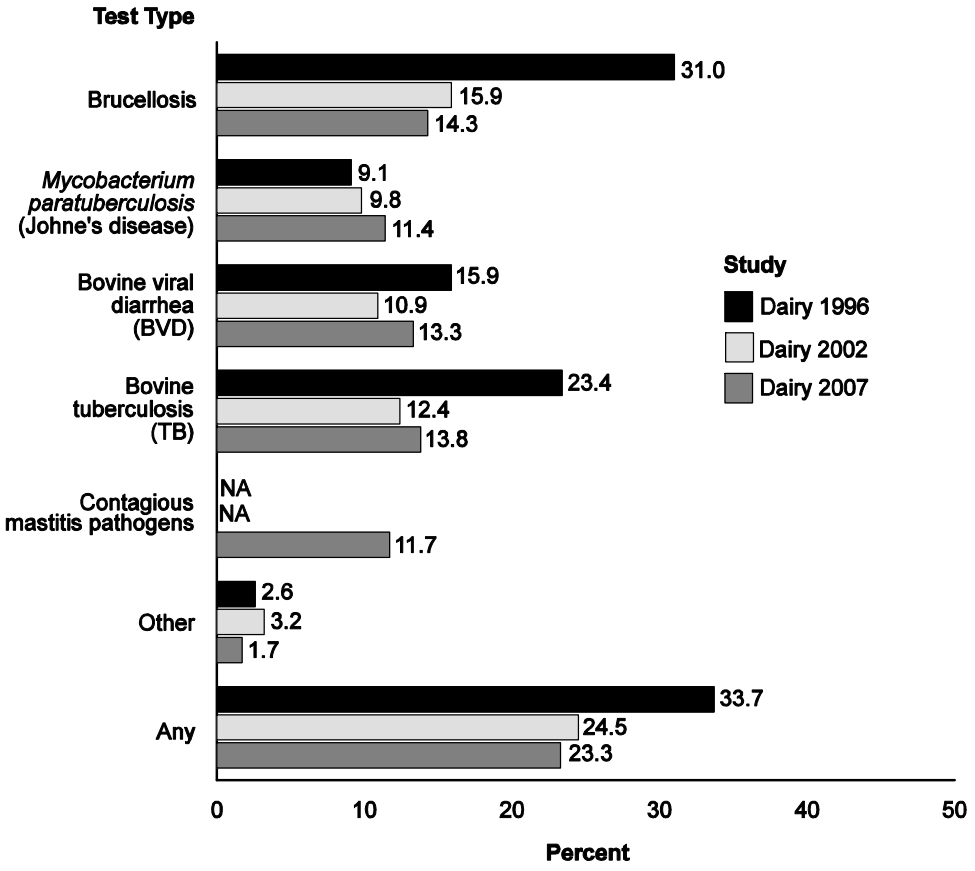
6. Testing requirements

Brucellosis testing for new additions decreased across herd sizes between 1996 and 2007. Tuberculosis testing has also decreased for small, large, and all operations since 1996. Testing for *Mycobacterium avium* subspecies *paratuberculosis* and BVD remained unchanged from 1996 to 2007. The percentage of operations that performed any testing decreased for small, large, and all operations since 1996, with less than 1 in 4 operations that purchased new additions (23.3 percent) performing any testing during 2007.

a. For operations that brought any dairy cattle onto the operation, percentage of operations that tested individual animals brought onto the operation, by testing normally required and by herd size:

	Percent Operations											
	Herd Size (Number Dairy Cows)											
	Small (Fewer than 100)			**Medium** (100-499)			**Large** (500 or More)			**All Operations**		
Test Type	**Dairy 1996**	**Dairy 2002**	**Dairy 2007**	**Dairy 1996**	**Dairy 2002**	**Dairy 2007**	**Dairy 1996**	**Dairy 2002**	**Dairy 2007**	**Dairy 1996**	**Dairy 2002**	**Dairy 2007**
Brucellosis	28.5 (2.1)	13.1 (1.8)	11.6 (1.9)	38.3 (2.9)	19.5 (2.1)	19.8 (2.8)	50.6 (4.4)	29.9 (2.7)	19.0 (3.0)	31.0 (1.7)	15.9 (1.3)	14.3 (1.5)
Mycobacterium avium subspecies *paratuberculosis* (Johne's disease)	8.5 (1.3)	8.3 (1.4)	9.9 (1.8)	11.0 (2.3)	12.7 (1.9)	16.6 (2.7)	9.6 (2.9)	12.2 (1.9)	7.2 (1.8)	9.1 (1.1)	9.8 (1.1)	11.4 (1.4)
Bovine viral diarrhea (BVD)	15.1 (1.6)	8.6 (1.4)	10.7 (1.8)	18.4 (2.5)	15.6 (2.1)	19.4 (2.8)	19.4 (3.9)	15.0 (2.1)	15.8 (2.7)	15.9 (1.3)	10.9 (1.1)	13.3 (1.4)
Bovine tuberculosis (TB)	22.3 (1.9)	10.8 (1.5)	12.0 (1.8)	26.8 (2.7)	14.3 (1.7)	17.8 (2.7)	31.4 (4.2)	20.7 (2.3)	15.8 (2.3)	23.4 (1.6)	12.4 (1.1)	13.8 (1.4)
Contagious mastitis pathogens	NA	NA	10.5 (1.8)	NA	NA	13.1 (2.3)	NA	NA	16.3 (3.3)	NA	NA	11.7 (1.4)
Other	2.3 (0.5)	2.8 (0.8)	1.6 (0.6)	3.6 (1.4)	4.3 (1.3)	2.2 (1.0)	3.9 (2.1)	3.5 (1.1)	0.4 (0.2)	2.6 (0.5)	3.2 (0.6)	1.7 (0.5)
Any	31.3 (2.1)	21.2 (2.2)	20.2 (2.4)	40.0 (2.9)	29.4 (2.5)	28.2 (3.2)	54.3 (4.5)	38.8 (2.9)	34.7 (3.8)	33.7 (1.8)	24.5 (1.6)	23.3 (1.8)

For Operations that Brought any Dairy Cattle Onto the Operation, Percentage of Operations that Tested Individual Animals Brought Onto the Operation, by Testing Normally Required



A higher percentage of operations in 2007 (13.0 percent) required a bulk-tank milk culture before bringing animals onto the operation than did operations in 1996 (5.8 percent). While the percentage of all operations that required proof of bulk-tank somatic cell count was unchanged from 1996 to 2007, the percentage of large operations that required a count decreased from 45.7 percent in 1996 to 19.8 percent in 2007.

b. For operations that brought any dairy cows onto the farm, percentage of operations that normally required testing or proof of udder health before bringing animals onto the farm, by herd size:

	Percent Operations											
	Herd Size (Number Dairy Cows)											
	Small (Fewer than 100)			**Medium** (100-499)			**Large** (500 or More)			**All Operations**		
Type of Proof	**1996**	**2002**	**2007**	**1996**	**2002**	**2007**	**1996**	**2002**	**2007**	**1996**	**2002**	**2007**
Individual-cow milk somatic cell count	24.7 (2.7)	26.7 (3.7)	NA	30.1 (4.1)	26.7 (4.0)	NA	27.9 (8.7)	29.5 (5.2)	NA	25.7 (2.3)	26.8 (2.8)	NA
Bulk-tank milk somatic cell count	13.4 (2.0)	14.3 (2.9)	18.8 (2.4)	21.3 (3.1)	19.2 (3.4)	24.4 (3.1)	45.7 (9.0)	34.1 (5.9)	19.8 (2.9)	15.3 (1.7)	16.6 (2.2)	20.3 (1.8)
Individual-cow milk culture	9.1 (1.7)	10.7 (2.5)	NA	8.4 (1.8)	10.6 (2.6)	NA	9.4 (4.1)	18.8 (4.8)	NA	9.0 (1.4)	11.0 (1.8)	NA
Bulk-tank milk culture	3.9 (0.9)	9.5 (2.4)	10.1 (1.7)	11.8 (2.4)	10.0 (2.6)	17.8 (2.8)	35.7 (8.4)	31.0 (6.0)	20.9 (2.9)	5.8 (0.9)	10.6 (1.8)	13.0 (1.4)

Appendix I: Methodology Overview

	NAHMS Dairy Studies			
	1991	**1996**	**2002**	**2007**
Data collection dates	4/1991-7/1992	1/1-1/26 1996	12/31/2001-2/12/2002	1/1-1/31 2007
Minimum number of dairy cattle	30	1	1	1
Number of States	28	20	21	17
Data collectors	National Agricultural Statistics Service enumerators			
States as a percentage of U.S. population coverage				
Operations	76.3	80.4	83.0	79.5
Cows	81.3	83.1	85.7	82.5
Respondent Sample profile (herd size)				
Small (fewer than 100 cows)	931	1,480	1,131	1,028
Medium (100-499 cows)	705	873	820	691
Large (500 or more cows)	175	189	510	475
Response category				
Survey complete	1,811	2,542	2,461	2,194
Percent of total	54.1	56.3	63.5	61.7
No milk cows	NA	646	227	214
Out of business/ no milk sold in 1995		179	183	111
Out of scope		16	45	6
Refused		969	821	785
Did not contact		NA	2	126
Inaccessible		164	137	118
Total	3346	4,516	3,876	3,554

Appendix II: 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, February 2008**
- Part V: Changes in Dairy Cattle Health and Management in the United States, 1991-2007, expected summer 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 spring 2008
- Info sheets, expected spring 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 info sheet, November 2007
- Colostrum Management info sheet, February 2008
- Part IV: Reference of Dairy Cattle Health and Management Practices in the United States, 2007, expected spring 2008
- Calf Health and Management Practices on U.S. Dairy Operations, 2007 interpretive report, expected spring 2008
- Additional info sheets, expected spring 2008

4. Estimate the prevalence of herds infected with bovine viral diarrhea virus (BVD)
- Info sheets, expected spring 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, expected spring 2008.
- Info sheets, expected spring 2008.

6. Estimate the herd-level prevalence and associated costs of *Mycobacterium avium* subspecies *paratuberculosis*
- Info sheets, expected spring 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, expected spring 2008