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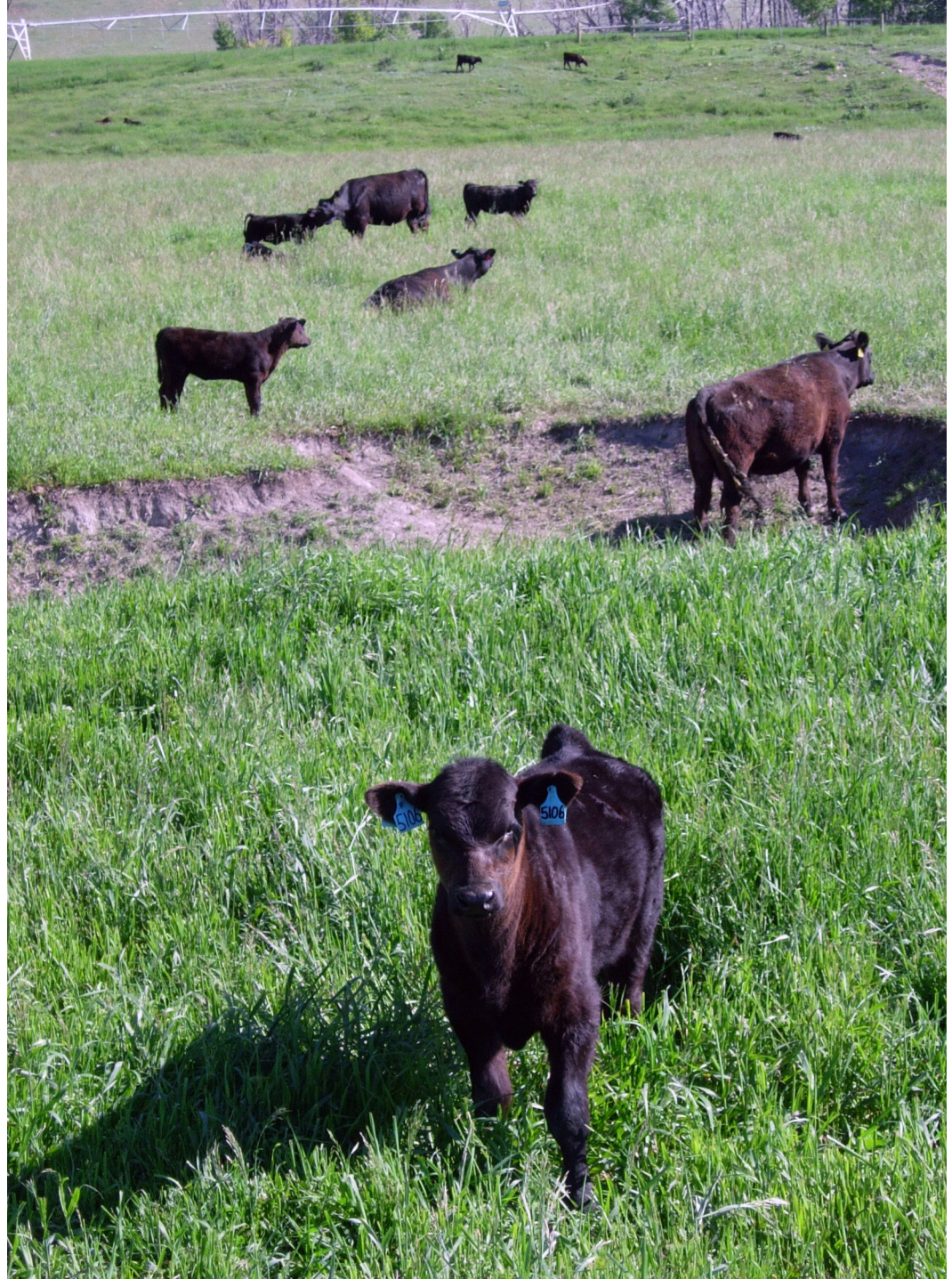
National
Animal Health
Monitoring
System

May 2020

Report 1

Beef 2017

Beef Cow-calf Management Practices in the United States, 2017



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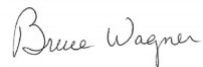
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Items of Note

The Beef 2017 study was conducted in 24 of the Nation's major cow-calf States (see map p 2) and provides valuable information to study participants, stakeholders, and the beef industry as a whole. Data collected for the study represented 78.9 percent of U.S. cow-calf operations and 86.6 percent of U.S. beef cows. Unless otherwise noted, estimates in this report refer to calendar year 2017. Where noted, estimates may refer to the previous 12 months from when the questionnaire was administered, which occurred in October and November of 2017.

Operations were placed in three size categories: small (1 to 49 cows), medium (50 to 199 cows), and large (200 or more cows).

On the majority of small (89.0 percent) and medium (66.6 percent) operations, the cow-calf operation was a supplemental source of income. On the majority of large operations (71.9 percent), the cow-calf operation was a primary source of income.

The majority of beef calves (55.6 percent) were born in February, March, or April, with 12.3 percent of calves born in February, 22.4 percent born in March, and 20.9 percent born in April.

Only 7.8 percent of calves born or expected to be born in 2017 had horns, indicating the widespread use of polled breeds. For horned calves that were dehorned, the average age at dehorning was 107.0 days.

Among commercial cow-calf operations, a higher percentage of large operations (90.9 percent) castrated calves before sale compared with medium (80.5 percent) and small (55.1 percent) operations. Overall, 62.0 percent of operations castrated calves before sale.

Overall, 42.5 percent of operations provided calf buyers with information about their calf health program (e.g., vaccinations administered, feed-bunk introduction, castration, etc.). By herd size, 35.2 percent of small, 59.9 percent of medium, and 78.8 percent of large operations provided calf buyers with information about their calf health program.

Overall, 77.3 percent of operations raised commercial cattle (cattle primarily marketed for consumption); 5.9 percent of operations raised seedstock cattle only (cattle primarily marketed for breeding purposes); and 16.9 percent of operations raised a combination of commercial and seedstock cattle.

Of heifers bred for calving in 2017, 76.8 percent were bred only by bulls, and 15.1 percent were bred by a combination of artificial insemination and bull breeding. Of cows bred for calving in 2017, 92.9 percent were bred only by bulls, and 5.5 percent were bred by a combination of artificial insemination and bull breeding.

For the purposes of this report, a defined breeding season is one in which producers remove the bull(s) from cows and/or heifers for at least 30 days. The majority of operations (58.7 percent) did not have a defined breeding season. Overall, 58.3 percent of beef cows were on operations with one or more defined breeding seasons, and 41.6 percent of beef cows were on operations with no defined breeding season.

Most operations monitored heifers and cows regularly during calving (93.2 and 89.0 percent, respectively). The majority of heifers (90.6 percent) and cows (96.2 percent) required no assistance at calving.

Overall, 8.1 percent of operations had treated any cattle with pneumatic darts in the previous 12 months, and 1.1 percent of cattle were treated with pneumatic darts. The percentage of operations that used pneumatic darts increased as herd size increased, with 4.3 percent of small, 15.8 percent of medium, and 32.8 percent of large operations using this practice.

Most producers (83.9 percent) were very likely to get information from a private veterinarian in the event of a foot-and-mouth disease outbreak (or an outbreak of another foreign animal disease) in the United States. In addition, most producers (93.8 percent) would contact a private veterinarian if they had an animal on their operation they suspected of having foot-and-mouth disease (or another foreign animal disease). By knowing who producers will turn to for information during an emergency, responders are able to target the dissemination routes of information critical to the emergency response effort.

About one-third of operations (32.9 percent) had brought new cattle onto the operation during the previous 12 months. Beef bulls intended for breeding were the cattle class brought onto the highest percentage of operations (18.8 percent). The percentage of operations that brought a new bull onto the operation increased as herd size increased, with 14.5 percent of small, 28.8 percent of medium, and 42.8 percent of large operations bringing on new beef bulls intended for breeding during the previous 12 months.

Individual-animal identifications (IDs) are important for disease traceback purposes. For example, if an animal is not properly identified before arriving at slaughter and turns out to be positive for an important disease such as tuberculosis, it can be difficult or impossible to identify where that animal originated, which might allow the disease to persist in the herd of origin. There are many types of individual-animal ID described later in this report. Overall, 62.9 percent of operations used plastic ear tags such as bangle tags on at least some cows. About one-fourth of operations used brucellosis vaccination ear tags (Bang's tags) or hot-iron brands on at least some cows (26.1 and 26.6 percent, respectively). The percentages of operations that used brucellosis vaccination ear tags, hot-iron brands, and ear notches on at least some cows all increased as herd size increased. Higher percentages of medium and large operations than small operations used other plastic ear tags (e.g., bangle tags), freeze brands, or any method of ID on at least some cows.

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Introduction

The National Animal Health Monitoring System (NAHMS) is a nonregulatory program of the United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service. NAHMS is designed to help meet the Nation's animal health information needs and has collected data on cattle health and management practices on U.S. cow-calf operations through three previous studies. The NAHMS Beef 2017 Study is the fourth in the series of studies on the U.S. cow-calf industry.

The NAHMS 1992-93 Cow-calf Health and Productivity Audit (CHAPA) provided the first national information on the health and management of cattle on cow-calf operations in the United States. While the study was in progress, the media began to report on "Mystery Calf Disease" throughout the United States. These media reports generated requests from stakeholders for information on the occurrence of this "new" disease—later referred to as weak calf syndrome. The CHAPA study became one vehicle that provided estimates of the frequency of occurrence and geographic distribution of the disease.

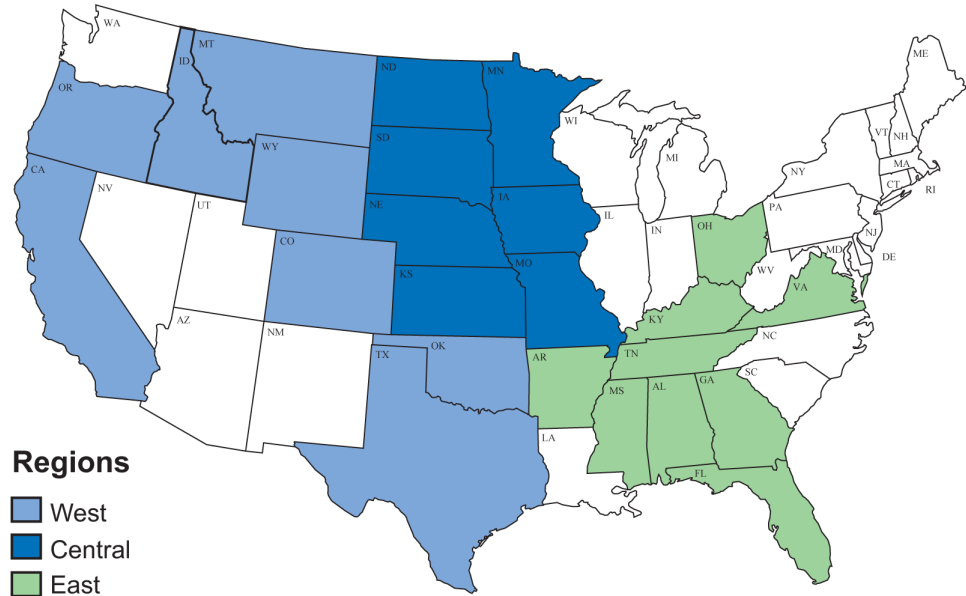
The NAHMS Beef '97 study was conducted in 23 States and represented 85.7 percent of U.S. beef cows and 77.6 percent of U.S. beef operations. Information from the NAHMS Beef '97 Study helped the U.S. beef industry identify educational needs and prioritize research efforts on topics such as antibiotic usage and Johne's disease, as well as potential foodborne pathogens, including *Salmonella*. Data from the Beef '97 Study were also critical in designing the enhanced surveillance plan for bovine spongiform encephalopathy (BSE).

The NAHMS Beef 2007-08 study was conducted in 24 States with the largest beef cow populations and provided valuable information representing 79.6 percent of U.S. cow-calf operations and 87.8 percent of U.S. beef cows. The NAHMS Beef 2007-08 study estimated the prevalence of persistent infection of bovine viral diarrhea (BVD) in beef calves and also helped the U.S. beef industry with estimates regarding producer awareness of BVD and management practices used to control it. In addition, the NAHMS Beef 2007-08 study estimated the prevalence of internal parasites in beef cows as well as an assessment of the effectiveness of anthelmintic treatment programs on reducing fecal egg counts in U.S. beef cow-calf operations.

The NAHMS Beef 2017 study was conducted in the 24 States with the Nation's largest beef cow populations. The study continues NAHMS' previous efforts of collecting vital information about the U.S. beef cow-calf industry as well as changes in industry practices and health management over time. The Beef 2017 study provided participants, stakeholders, and the industry as a whole with valuable information representing 78.9 percent of U.S. cow-calf operations and 86.6 percent of U.S. beef cows. This report,

"Beef Cow-calf Management Practices in the United States, 2017," is the first in a series of reports containing national information from the NAHMS Beef 2017 study. The report contains information collected from 2,013 U.S. beef cow-calf operations.

States/regions participating in the NAHMS Beef 2017 study



Terms Used in This Report

Animal average—The average value for all animals; the single reported value for each operation multiplied by the number of animals on that operation is summed over all operations and divided by the number of animals on all operations. This way, the result is adjusted for the number of animals on each operation. For an example, see average age at which calves were dehorned on (p 25).

Backgrounder operation—Often used interchangeably with a stocker operation, a backgrounder operation is a farm or ranch that raises weaned calves before the calves enter a feedlot. Calves that have spent time on backgrounder/stocker operations have recovered from the stress of weaning and tend to adapt more smoothly to a feedlot environment compared with freshly weaned calves. Sometimes distinctions are made between backgrounder and stocker operations. For example, stocker operations are more likely to keep calves for longer periods than backgrounder operations, which typically keep calves just long enough for them to get over the stress of weaning or leaving the farm or ranch of origin before they enter a feedlot environment. In addition, backgrounder operations typically haul feed to the calves, while stocker operations expect calves to graze on pasture for most of their nutritional needs. In general, a backgrounder or stocker operation is an intermediate step for calves between the farm or ranch of origin and a feedlot.

Beef cow—Female bovine that has calved at least once.

Beef heifer—Female bovine that has not yet calved.

Born alive—Calves born alive and surviving at least 2 hours following birth.

Calving season—The period during which calves are born. On some operations, calving might occur throughout the year. Other operations have defined calving seasons to ensure that all calves are born at around the same time (e.g., spring). Some operations have more than one calving season.

Commercial cattle—Animals raised and marketed primarily for beef consumption.

Cow-calf operation—A livestock operation with beef cows raised for the purpose of giving birth to beef calves. For commercial operations, calves are often raised to sell to a stocker/backgrounder operation or feedlot. Calves can also be fed-out on the cow-calf operation. If the operation is a seedstock operation, calves are usually raised for breeding purposes.

Culture for 'trich' (*Tritrichomonas foetus*)—Bulls can become permanently infected with the *Tritrichomonas foetus* organism, which is a cause of venereal disease in cattle. To diagnose this condition, fluid is collected from the prepuce of the bull and cultured. The fluid is examined under a microscope to evaluate whether the organism is present. Note: The scientific name of *Tritrichomonas foetus* used to be *Trichomonas foetus*, which led to its common name, "trich" (pronounced "trick").]

Dam—Female parent of a calf.

DNA markers—Markers used to detect specific cattle genes, such as those that identify the bull that sired a particular calf.

Dystocia—Abnormal or difficult labor (i.e., birthing of a calf).

Growth promotant—A production strategy used to help increase the efficiency of animal production by increasing animal weight gain and feed efficiency. Growth promotants can be antibiotics such as ionophores placed in feed or hormone implants placed in the ear.

Herd size—Herd size was based on an operation's January 1, 2017, inventory. Operations were placed in three size categories: small (1 to 49 cows), medium (50 to 199 cows), and large (200 or more cows).

Ionophore—A drug administered in feed that promotes the efficient use of feedstuffs by altering the fermentation pattern in the rumen. Monensin, lasalocid, and laidlomycin are the three ionophores approved for use in cattle. All three are approved for improving feed efficiency. Monensin and lasalocid are also approved for prevention and control of coccidiosis.

Intramuscular (IM)—An injection given in muscle.

Operation—Premises with at least one beef cow on January 1, 2017.

Operation average—The average value for all operations; a single value for each operation is summed over all operations reporting divided by the number of operations reporting. For example, operation average length of the last breeding season shown on page 73 is calculated by summing the reported average length of the last breeding season over all operations divided by the number of operations.

Physical contact—Includes nose-to-nose contact or sniffing, touching, or licking each other, including through a fence.

Polled cattle—Cattle that do not have horns. Some breeds of cattle, such as Angus, are naturally polled, meaning horns do not grow on these cattle. Cattle are also considered polled after they have been dehorned.

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. 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). An estimate of 3.4 with a standard error of 0.3 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. When estimates are reported as being ‘higher’ or ‘lower’, a statistical difference is implied but was not tested. Not all statistically different estimates are mentioned in the text of this report.

Preconditioning practices—Practices that help a calf become ready to leave the operation of origin and that help reduce the calf’s stress when adjusting to a new location, such as a feedlot. Typical recommended preconditioning practices include keeping the calf on the operation for at least 45 days after weaning, dehorning (if horned), castrating bulls, administering appropriate vaccines, deworming, and getting the calf used to eating from a feed bunk and drinking from a water tank.

Regions

West—California, Colorado, Idaho, Montana, Oklahoma, Oregon, Texas, Wyoming

Central—Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota

East—Alabama, Arkansas, Florida, Georgia, Kentucky, Mississippi, Ohio, Tennessee, Virginia

Replacement heifers—Weaned female offspring being kept with the intent of being bred and becoming beef cows.

Scours—Loose feces (diarrhea) in animals.

Scrotal measurement—Measurement of the circumference of the scrotum containing the two testicles. This measurement is highly correlated with fertility of the bull and numerous reproductive traits of the bull’s daughters.

Seedstock cattle—Animals raised and marketed primarily as breeding stock rather than for consumption.

Semen test or semen evaluation—Semen is collected from a bull and viewed under a microscope. The number of sperm cells present, the percentage of normal sperm cells, as well as their motility is correlated with fertility of the bull.

Service—Term used when bull breeds or mates a cow.

Shipment—For this report, a shipment is defined as a group of cattle moved all at once, regardless of the number of cattle in the shipment or the number of vehicles used to ship them.

Subcutaneous (SQ)—An injection given under the skin.

Standardized performance analysis (SPA)—A standardized method of evaluating a cow-calf operation's production and economic performance.

Steer—A castrated male bovine (i.e., testicles are removed so the animal can no longer breed).

Stocker operation—Often used interchangeably with a backgrounder operation, a stocker operation is a farm or ranch that raises weaned calves before they enter the feedlot. Calves that have spent time on backgrounder/stocker operations have recovered from the stress of weaning and tend to adapt more smoothly to a feedlot environment compared with freshly weaned calves. Sometimes, distinctions are made between backgrounder and stocker operations. For example, stocker operations are more likely to keep calves for longer periods than backgrounder operations, which typically keep calves just long enough for them to get over the stress of weaning or leaving the farm or ranch of origin before they enter a feedlot environment. In addition, backgrounder operations typically haul feed to the calves, while stocker operations expect calves to graze on pasture for most of their nutritional needs. In general, a backgrounder or stocker operation is an intermediate step for calves between the farm or ranch of origin and a feedlot.

'Trich'—(Pronounced “trick.”) Common name for *Tritrichomonas foetus*, the protozoan that causes Trichomoniasis, a disease of cattle transmitted during breeding.

Tritrichomonas foetus—Pronounced “Try-trick-o-mo-nus feet-us.” A protozoan parasite that can permanently infect bulls. When a cow is bred by an infected bull, the organism is transferred to the cow’s uterus, where it can cause embryonic death or abortion.

Unweaned calf—A calf still nursing a cow or a calf still consuming milk.

Veterinary Feed Directive (VFD)—A paper or electronic form that authorizes the owner or caretaker of animals to obtain and use animal feed containing medically important antibiotics (i.e., medically important to humans) to treat their animals in accordance with the FDA approved directions for use.

Weaning age—The age of a calf when it is separated from its mother. Weaning usually occurs when calves are from 4 to 8 months old.

Weaned steer, heifer, or bull—A young steer, heifer, or bull no longer nursing a cow, i.e., no longer consuming milk. Weaning normally occurs when calves are 4 to 8 months of age.

Section I: Population Estimates

Where applicable, column or row totals are shown as 100.0 to aid in interpretation; however, estimates may not always sum to 100.0 due to rounding. Unless otherwise noted, estimates in this report refer to calendar year 2017. Where noted, estimates may refer to the previous 12 months from when the study questionnaire was administered, which occurred in October and November 2017.

A. Income Provided by the Cow-calf Operation

1. Level of income

The majority of operations (81.3 percent) indicated that their cow-calf operation was a supplemental source of income. The percentage of operations in which the cow-calf operation was a primary source of income increased as herd size increased.

A.1.a. Percentage of operations by level of income provided by the cow-calf operation, and by herd size:

Level of income	Percent Operations							
	Herd Size (number of beef cows)							
	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Primary source of income	7.5	(0.9)	32.4	(2.2)	71.9	(3.0)	15.8	(0.9)
Supplemental source of income	89.0	(1.2)	66.6	(2.2)	27.7	(2.9)	81.3	(1.0)
Other	3.5	(0.8)	1.0	(0.5)	0.4	(0.3)	2.8	(0.6)
Total	100.0		100.0		100.0		100.0	

The cow-calf operation was a primary source of income on a higher percentage of operations in the West and Central regions (15.8 and 23.5 percent, respectively) than operations in the East region (10.1 percent).

A.1.b. Percentage of operations by level of income provided by the cow-calf operation, and by region:

	Percent Operations					
	Region					
	West		Central		East	
Level of income	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Primary source of income	15.8	(1.4)	23.5	(2.0)	10.1	(1.1)
Supplemental source of income	79.2	(1.9)	74.9	(2.1)	88.8	(1.3)
Other	5.0	(1.4)	1.6	(0.7)	1.1	(0.7)
Total	100.0		100.0		100.0	

B. Calf Crop

1. Calves born

Ideally, all calves born on an operation would be born alive. A small percentage of calves, however, die during birth or are found dead by producers at an unknown time following birth. Overall, nearly all calves (97.7 percent) were born alive. The percentages of calves born alive to heifers and to cows were similar across herd sizes. A higher percentage of calves were born alive to cows than to heifers.

B.1.a. Percentage of calves born alive* or expected to be born alive to heifers, cows, or any females in 2017, by herd size:

Percent Calves								
Herd Size (number of beef cows)								
	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Calves born to...	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Heifers	95.2	(0.7)	94.5	(0.4)	95.7	(0.3)	95.2	(0.3)
Cows	97.7	(0.2)	98.0	(0.1)	98.3	(0.1)	98.0	(0.1)
Any females	97.4	(0.2)	97.6	(0.1)	98.0	(0.1)	97.7	(0.1)

*((calves born alive in 2017) / (calves born alive + calves born dead in 2017)) x 100.0.

The percentages of calves born alive to heifers and to cows were similar across regions.

B.1.b. Percentage of calves born alive* or expected to be born alive to heifers, cows, or any females 2017, by region:

	Percent Calves					
	Region					
	West		Central		East	
Calves born to...	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Heifers	95.5	(0.4)	95.3	(0.4)	94.3	(0.7)
Cows	98.3	(0.1)	97.9	(0.1)	97.8	(0.2)
Any females	98.0	(0.1)	97.5	(0.1)	97.4	(0.2)

*((calves born alive in 2017) / (calves born alive + calves born dead in 2017)) x 100.0.

2. Monthly calving distribution

Weather, feed availability, and anticipated market prices, are a few factors considered when making the decision of when to begin the calving season. For example, on most operations calving occurs in spring and calves are sold in fall. Calving at a different time of year such that calves are available for sale during a period other than fall might result in better prices for weaned calves. The breeding season determines when the calving season begins. The gestation period for cows is 283 days. Thus, in order to start calving in March, the breeding season should begin in late May. On operations with no defined breeding season, bulls are never removed from cows, and calving occurs year-round.

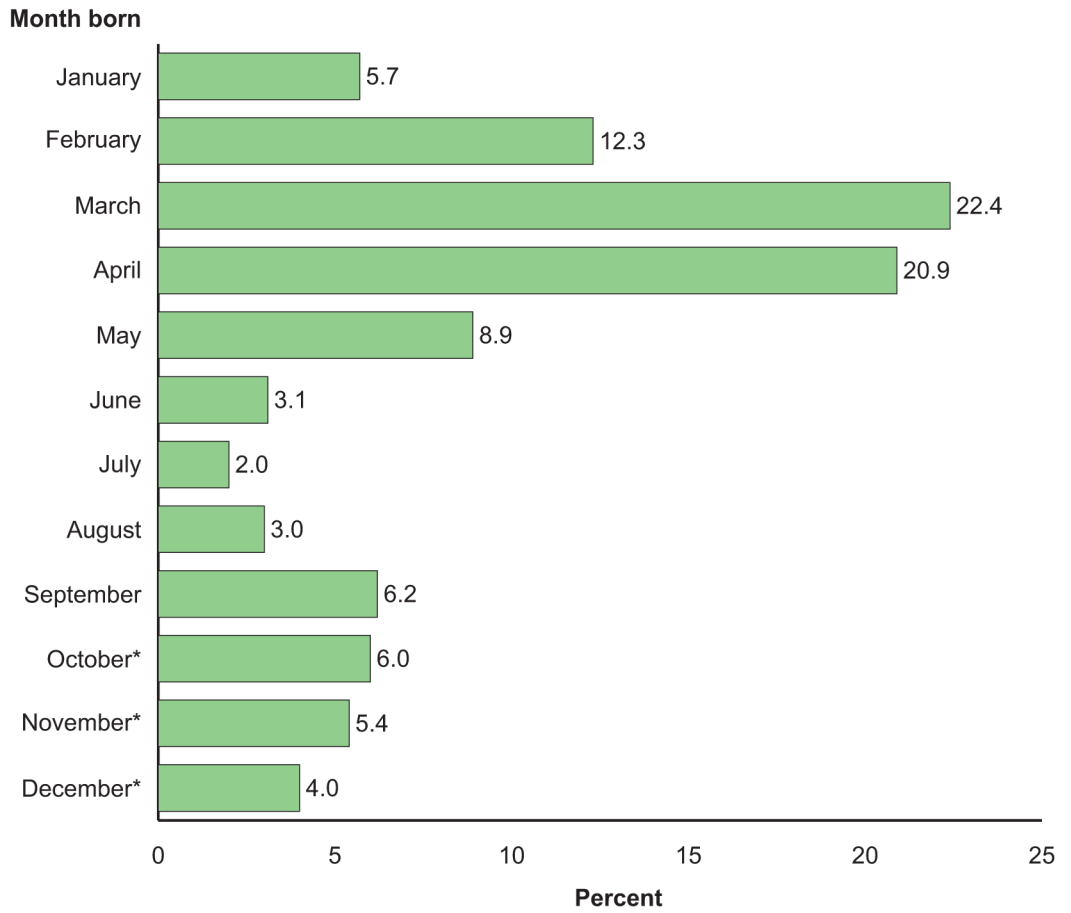
Overall, 55.6 percent of calves were born in February, March, or April. During the same period, 47.6, 54.6, and 63.7 percent of calves were born on small, medium, and large operations, respectively.

B.2.a. Percentage of calves born alive in 2017, by month born and by herd size:

Percent Calves								
Herd Size (number of beef cows)								
Month born	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
January	5.7	(0.5)	6.3	(0.7)	5.0	(0.5)	5.7	(0.3)
February	11.3	(0.9)	13.3	(1.6)	12.2	(1.0)	12.3	(0.7)
March	21.3	(1.0)	21.0	(1.1)	24.8	(1.5)	22.4	(0.7)
April	15.0	(0.8)	20.3	(1.0)	26.7	(1.4)	20.9	(0.7)
May	7.5	(0.5)	9.2	(0.8)	9.7	(1.0)	8.9	(0.5)
June	3.8	(0.3)	3.2	(0.4)	2.4	(0.4)	3.1	(0.2)
July	3.7	(0.3)	1.6	(0.2)	1.0	(0.2)	2.0	(0.2)
August	4.5	(0.5)	3.2	(0.4)	1.7	(0.3)	3.0	(0.2)
September	7.5	(0.7)	7.0	(0.6)	4.3	(0.5)	6.2	(0.4)
October *	6.8	(0.7)	6.5	(0.6)	4.6	(0.5)	6.0	(0.3)
November*	6.8	(0.6)	5.0	(0.5)	4.7	(0.5)	5.4	(0.3)
December*	6.1	(0.7)	3.5	(0.4)	2.7	(0.3)	4.0	(0.3)
Total	100.0		100.0		100.0		100.0	

*Born alive or expected to be born alive.

Percentage of calves born alive in 2017, by month born



*Born alive or expected to be born alive.

A higher percentage of calves were born in February through May in the Central (78.4 percent) and West (64.0 percent) regions compared with calves born in the East region (43.0 percent). Over one-fourth of calves (27.9 percent) were born in October through December in the East region, while only 15.3 and 7.8 percent of calves were born in October through December in the West and Central regions, respectively.

B.2.b. Percentage of calves born alive in 2017, by month born and by region:

Month born	Percent Calves					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
January	7.2	(0.5)	2.4	(0.5)	8.4	(0.8)
February	15.0	(0.8)	10.6	(1.7)	10.4	(0.7)
March	22.2	(1.0)	27.0	(1.5)	15.4	(0.8)
April	18.8	(0.9)	29.4	(1.5)	10.9	(0.7)
May	8.0	(0.6)	11.4	(1.0)	6.3	(0.5)
June	2.9	(0.3)	2.9	(0.5)	3.8	(0.3)
July	22.	(0.3)	1.1	(0.2)	3.2	(0.3)
August	2.6	(0.4)	2.7	(0.4)	44.	(0.5)
September	5.8	(0.6)	4.6	(0.6)	9.4	(0.8)
October *	5.8	(0.5)	4.0	(0.5)	9.4	(0.8)
November*	5.1	(0.4)	2.6	(0.4)	10.7	(0.9)
December*	4.4	(0.4)	1.2	(0.3)	7.8	(0.9)
Total	100.0		100.0		100.0	

*Born alive or expected to be born alive.

A higher percentage of operations had one or more calves born in February, March, April, or May than in any of the other months.

B.2.c. Percentage of operations that had one or more calves born alive in 2017, by month born and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Month born	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
January	25.8	(1.7)	31.4	(2.1)	34.2	(2.8)	27.4	(1.4)
February	39.9	(1.9)	52.0	(2.4)	52.5	(3.2)	43.0	(1.5)
March	59.6	(2.0)	72.4	(2.2)	76.6	(2.9)	63.1	(1.6)
April	54.4	(2.1)	71.3	(2.1)	78.0	(2.5)	59.1	(1.6)
May	40.9	(2.0)	51.5	(2.4)	52.0	(3.3)	43.7	(1.6)
June	28.3	(1.8)	31.7	(2.3)	25.7	(2.9)	28.9	(1.5)
July	26.3	(1.8)	22.1	(2.0)	14.9	(2.4)	24.9	(1.4)
August	26.5	(1.8)	28.9	(2.2)	18.3	(2.6)	26.6	(1.4)
September	31.0	(1.8)	37.6	(2.2)	27.7	(2.8)	32.2	(1.4)
October *	29.2	(1.8)	39.2	(2.2)	30.5	(2.6)	31.4	(1.4)
November*	34.7	(1.9)	37.9	(2.2)	30.5	(2.4)	35.2	(1.5)
December*	28.1	(1.8)	27.8	(2.0)	22.2	(2.2)	27.7	(1.4)

*Born alive or expected to be born alive.

Across all regions, over one-half of operations had one or more calves born in March and April. A higher percentage of operations in the West and East regions than operations in the Central region had calves born in November or December.

B.2.d. Percentage of operations that had one or more calves born alive in 2017, by month born and by region:

	Percent Operations					
	Region					
	West		Central		East	
Month born	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
January	31.9	(2.5)	14.6	(2.0)	31.9	(2.2)
February	48.6	(2.6)	33.7	(2.8)	43.8	(2.4)
March	64.6	(2.7)	66.1	(2.8)	59.0	(2.5)
April	59.1	(2.8)	68.4	(2.8)	52.0	(2.5)
May	45.1	(2.8)	46.7	(2.9)	39.6	(2.4)
June	28.0	(2.5)	27.4	(2.6)	31.0	(2.3)
July	25.3	(2.5)	18.6	(2.4)	29.3	(2.3)
August	23.3	(2.4)	25.5	(2.5)	31.4	(2.3)
September	33.2	(2.6)	27.7	(2.5)	34.6	(2.3)
October *	33.4	(2.6)	25.6	(2.4)	33.4	(2.1)
November*	37.4	(2.7)	21.1	(2.2)	43.6	(2.4)
December*	34.9	(2.7)	12.2	(1.8)	31.2	(2.2)

*Born alive or expected to be born alive.

There are many advantages to having a short calving season (3 or fewer months.) For example, calves born over a shorter period will be more uniform in size at weaning. Another advantage of a short calving season pertains to nutrition. Dietary needs of cows vary based on the stage of lactation or gestation. Cows in early lactation have much higher protein requirements than dry cows in the middle-third of gestation. If cows are calving throughout the year, it can be difficult to match the nutritional needs of all cows, especially if they are all housed as one group.

Less than one-half of operations (45.6 percent) had one or more calves born within 3 or fewer months. In other words, 54.4 percent of operations had one or more calving seasons lasting more than 3 months.

B.2.e. Percentage of operations by number of months in which one or more calves were born alive or were expected to be born alive in 2017, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Number of months	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
1	10.7	(1.3)	1.8	(0.7)	3.7	(1.5)	8.5	(1.0)
2	18.6	(1.6)	13.4	(1.7)	13.9	(2.6)	17.3	(1.2)
3	18.7	(1.6)	23.2	(2.1)	23.0	(2.7)	19.8	(1.3)
4	14.6	(1.4)	17.6	(2.0)	19.0	(2.9)	15.4	(1.1)
5	11.0	(1.3)	11.2	(1.5)	12.9	(2.1)	11.1	(1.0)
6	8.6	(1.2)	7.5	(1.2)	8.5	(1.7)	8.4	(0.9)
7	5.8	(1.0)	6.2	(1.2)	4.9	(1.1)	5.8	(0.8)
8	4.5	(0.9)	4.0	(0.9)	5.3	(1.3)	4.4	(0.7)
9	2.1	(0.6)	4.9	(1.1)	1.8	(0.6)	2.7	(0.5)
10	1.6	(0.5)	2.3	(0.6)	1.8	(0.8)	1.7	(0.4)
11	1.9	(0.6)	2.4	(0.6)	1.3	(0.7)	2.0	(0.5)
12	2.0	(0.6)	5.4	(1.0)	3.8	(1.1)	2.8	(0.5)
Total	100.0		100.0		100.0		100.0	

In the Central region, 56.5 percent of operations had calves born within 3 or fewer months, while in the West and East regions, 41.2 and 42.5 percent of operations, respectively, had calves born within 3 or fewer months.

B.2.f. Percentage of operations by number of months in which one or more calves were born alive or were expected to be born alive in 2017, and by region:

Number of months	Percent Operations					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
1	9.4	(1.6)	7.8	(1.8)	8.0	(1.5)
2	16.5	(2.1)	21.9	(2.5)	14.6	(1.8)
3	15.3	(1.9)	26.8	(2.6)	19.9	(2.1)
4	14.7	(1.9)	14.6	(2.0)	16.9	(1.9)
5	12.2	(1.9)	9.3	(1.6)	11.3	(1.4)
6	8.3	(1.7)	7.7	(1.6)	9.0	(1.4)
7	7.9	(1.6)	3.3	(1.0)	5.3	(1.0)
8	4.9	(1.3)	3.7	(1.3)	4.3	(0.8)
9	3.2	(0.9)	1.5	(0.7)	2.9	(0.7)
10	2.4	(0.8)	0.6	(0.4)	1.7	(0.5)
11	2.3	(0.9)	1.0	(0.5)	2.5	(0.9)
12	2.8	(0.9)	1.7	(0.8)	3.6	(0.7)
Total	100.0		100.0		100.0	

3. Dehorning

Cattle born with horns are often dehorned as calves. Removing horns reduces the risk of injury to other cattle and to people who handle the cattle. Some beef breeds, such as Angus, are naturally polled, meaning they do not grow horns. Dehorning is one of several preconditioning practices recommended before calves enter the feedlot. Generally, horned calves should be dehorned as early following birth as possible.

There were no differences by herd size in the percentage of calves that had or were expected to have horns.

B.3.a. Percentage of calves born alive or expected to be born alive during 2017 that had or were expected to have horns, by herd size:

Percent Calves							
Herd Size (number of beef cows)							
Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
8.3	(1.5)	5.8	(0.8)	9.3	(1.1)	7.8	(0.7)

Over twice the percentage of calves in the West region (13.8 percent) had or were expected to have horns compared with calves in the Central and East regions (3.6 and 4.4 percent, respectively).

B.3.b. Percentage of calves born alive or expected to be born alive during 2017 that had or were expected to have horns, by region:

Percent Calves					
Region					
West		Central		East	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
13.8	(1.4)	3.6	(0.7)	4.4	(0.8)

A higher percentage of small operations than medium or large operations expected none of their calves to have horns. Slightly more than three-fourths of operations (76.3 percent) expected no calves to have horns.

B.3.c. Percentage of operations by percentage of calves born alive or expected to be born alive in 2017 that had or were expected to have horns, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Percent calves	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
0	79.9	(1.7)	69.3	(2.2)	53.8	(3.3)	76.3	(1.3)
0.1–24.9	9.6	(1.2)	23.7	(2.0)	35.4	(3.2)	13.9	(1.0)
25.0–49.9	1.8	(0.6)	0.7	(0.3)	3.5	(0.9)	1.7	(0.4)
50.0–74.9	3.0	(0.7)	2.3	(0.7)	2.9	(0.9)	2.8	(0.6)
75.0–99.9	0.7	(0.4)	1.0	(0.4)	2.1	(0.7)	0.8	(0.3)
100.0	5.0	(1.0)	3.0	(0.9)	2.3	(0.8)	4.4	(0.8)
Total	100.0		100.0		100.0		100.0	

A lower percentage of operations in the West region (66.3 percent) expected none of their calves to have horns than operations in the Central and East regions (79.6 and 85.7 percent, respectively).

B.3.d. Percentage of operations by percentage of calves born alive or expected to be born alive in 2017 that had or were expected to have horns, and by region:

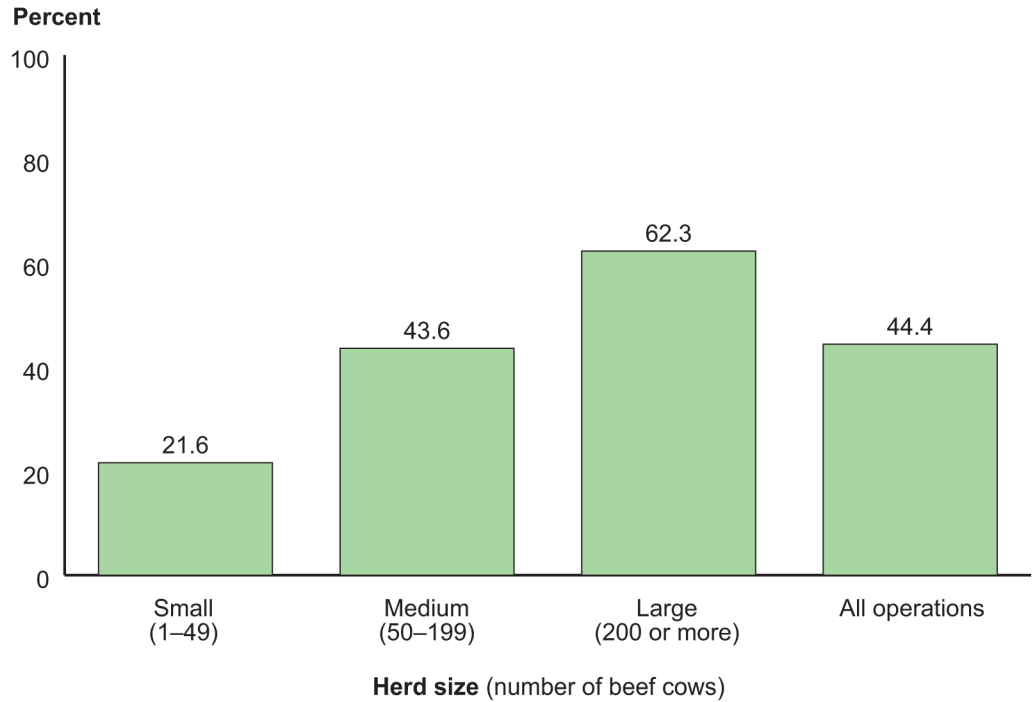
Percent calves	Percent Operations					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
0	66.3	(2.6)	79.6	(2.2)	85.7	(1.6)
0.1–24.9	15.9	(1.9)	15.6	(1.9)	10.1	(1.3)
25.0–49.9	2.7	(1.0)	1.0	(0.6)	1.0	(0.4)
50.0–74.9	5.1	(1.2)	1.3	(0.7)	1.3	(0.5)
75.0–99.9	1.9	(0.7)	0.1	(0.1)	0.1	(0.1)
100.0	8.1	(1.7)	2.2	(0.9)	1.8	(0.7)
Total	100.0		100.0		100.0	

A higher percentage of horned calves on large operations (62.3 percent) were or would be dehorned on the operation than horned calves on small operations (21.6 percent).

B.3.e. Of the 7.8 percent of calves that had or were expected to have horns (table B.3.a.), percentage of calves that were or would be dehorned on the operation, by herd size:

Percent Calves							
Herd Size (number of beef cows)							
Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
21.6	(5.6)	43.6	(5.9)	62.3	(5.5)	44.4	(4.1)

Of calves born alive or expected to be born alive in 2017 that had or were expected to have horns, percentage of calves that were or would be dehorned on the operation, by herd size



There were no regional differences in the percentage of horned calves that were or would be dehorned on the operation.

B.3.f. For the 7.8 percent of calves that had or were expected to have horns (table B.3.a.), percentage of calves that were or would be dehorned on the operation, by region:

Percent Calves					
Region					
West		Central		East	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
40.9	(4.9)	66.0	(9.0)	36.9	(7.8)

A higher percentage of large operations (63.9 percent) dehorned all of their horned calves compared with small and medium operations (25.4 and 46.2 percent, respectively). Overall, 86.7 percent of operations either dehorned all horned calves or did not dehorn any horned calves.

B.3.g. For the 23.7 percent of operations that had horned calves born alive or expected to be born alive in 2017 (table B.3.c.), percentage of operations by percentage of horned calves that were or would be dehorned on the operation, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Percent calves dehorned	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
0	62.2	(4.6)	39.2	(4.2)	20.0	(4.0)	51.6	(3.2)
0.1–99.9	12.4	(3.1)	14.5	(2.9)	16.0	(3.2)	13.3	(2.1)
100.0	25.4	(4.0)	46.2	(4.3)	63.9	(4.5)	35.1	(2.9)
Total	100.0		100.0		100.0		100.0	

A higher percentage of operations in the Central region (59.7 percent) dehorned or expected to dehorn all horned calves compared with operations in the West or East regions (29.2 and 25.2 percent, respectively).

B.3.h. For the 23.7 percent of operations that had horned calves born alive or expected to be born alive in 2017 (table B.3.c.), percentage of operations by percentage of horned calves that were or would be dehorned on the operation, and by region:

Percent calves dehorned	Percent Operations					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
0	57.8	(4.5)	24.9	(5.6)	62.7	(5.8)
0.1–99.9	13.0	(3.0)	15.3	(4.5)	12.1	(3.6)
100.0	29.2	(3.9)	59.7	(6.1)	25.2	(5.3)
Total	100.0		100.0		100.0	

Large operations dehorned calves at a younger average age (90.4 days) than small operations (162.3 days).

B.3.i. Average age (in days) of calves when dehorned, by herd size:

Average Age* (days)							
Herd Size (number of beef cows)							
Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Avg.	Std. error	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error
162.3	(16.8)	112.0	(16.3)	90.4	(9.1)	107.0	(7.9)

*See Terms Used in This Report for definitions of animal average.

Operations in the Central region dehorned calves at a younger average age (72.0 days) than operations in the East region (133.2 days).

B.3.j. Average age (in days) of calves when dehorned, by region:

Average Age (days)					
Region					
West		Central		East	
Avg.	Std. error	Avg.	Std. error	Avg.	Std. error
115.4	(9.3)	72.0	(15.6)	133.2	(9.2)

Of operations that dehorned calves, 40.3 percent dehorned calves at an average age of 92 days or less, while 22.7 percent reported an average age of calves at dehorning of 184 days or more.

B.3.k. Percentage of operations by average age (in days) of calves when dehorned:

Average age (days)	Percent operations	Std. error
0–31	9.0	(1.9)
32–61	15.7	(2.8)
62–92	15.6	(3.0)
93–122	14.4	(3.3)
123–153	7.4	(2.0)
154–183	15.2	(3.1)
184–214	11.2	(2.8)
215 or more	11.5	(3.1)
Total	100.0	

4. Castration

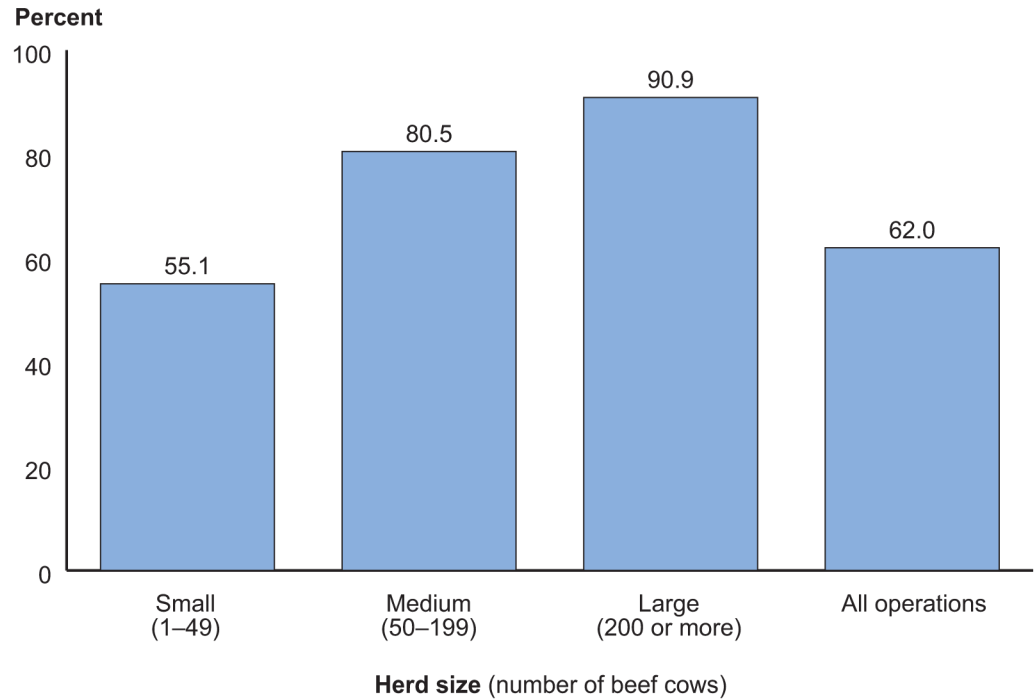
In commercial cattle operations, calves are primarily raised to produce beef for human consumption, while in seedstock cattle herds, calves are primarily raised for breeding purposes. In commercial cattle herds, bull calves are often castrated before they leave the operation. Castration involves removing the testicles surgically or through the use of a rubber band placed above the testicles, which eventually causes them to fall off. In general, bull calves should be castrated as early as possible. Castration makes male calves less aggressive and, therefore, safer for producers to work around, and it also improves meat quality. In seedstock herds, bull calves are often sold for breeding purposes, so castration is not routinely practiced. For this reason, this section is limited to commercial herds, and 77.3 percent of herds in this report were commercial herds (table C.1.a.).

A higher percentage of large operations (90.9 percent) castrated calves before sale compared with medium (80.5 percent) and small (55.1 percent) operations. Overall, 62.0 percent of commercial operations castrated bull calves before sale.

B.4.a. For commercial operations that had calves born in 2017, percentage of operations that castrated or would castrate any bull calves born in 2017 before sale, by herd size:

Percent Operations							
Herd Size (number of beef cows)							
Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
55.1	(2.2)	80.5	(2.1)	90.9	(1.9)	62.0	(1.7)

For commercial operations that had calves born in 2017, percentage of operations that castrated or would castrate any bull calves born in 2017 before sale, by herd size



A higher percentage of operations in the Central region (86.2 percent) castrated or would castrate calves born in 2017 before sale compared with operations in the West and East regions (57.0 and 48.9 percent, respectively).

B.4.b. For commercial operations that had calves born in 2017, percentage of operations that castrated or would castrate any bull calves born in 2017 before sale, by region:

Percent Operations					
Region					
West		Central		East	
Percent	Std. error	Percent	Std. error	Percent	Std. error
57.0	(3.1)	86.2	(2.4)	48.9	(2.8)

Of bull calves born on commercial operations in 2017, the percentage of bull calves castrated or that would be castrated before sale increased as herd size increased.

B.4.c. Of bull calves born on commercial operations in 2017, percentage of bull calves castrated or that would be castrated before sale, by herd size:

Percent Bull Calves							
Herd Size (number of beef cows)							
Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
60.1	(2.6)	83.6	(1.7)	91.7	(1.4)	79.0	(1.2)

Of bull calves born on commercial operations in 2017, a higher percentage of bull calves were castrated or would be castrated before sale on operations in the Central region than on operations in the West and East regions.

B.4.d. Of bull calves born on commercial operations in 2017, percentage of bull calves castrated or that would be castrated before sale, by region:

Percent Bull Calves					
Region					
West		Central		East	
Percent	Std. error	Percent	Std. error	Percent	Std. error
76.4	(2.0)	92.0	(1.3)	63.4	(2.7)

Most operations either castrated or would castrate all or none of the bull calves on the operation.

B.4.e. Percentage of commercial operations by percentage of bull calves born in 2017 that were castrated or that would be castrated before sale:

Percent Castrated	Percent operations	Std. error
0	37.9	(1.7)
0.1–99.9	8.8	(1.0)
100.0	53.3	(1.7)
Total	100.0	

There were no differences by herd size in the average age at which bull calves born in 2017 were or would be castrated before sale.

B.4.f. For commercial operations that castrated or would castrate bull calves born in 2017 before sale, average age (in days) of bull calves castrated, by herd size:

Average Age (days)							
Herd Size (number of beef cows)							
Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Avg.	Std. error	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error
75.6	(3.9)	69.8	(4.6)	64.5	(4.0)	69.1	(2.5)

One-third of operations castrated or would castrate bull calves when they were less than 32 days old.

B.4.g. For commercial operations that castrated or would castrate bull calves born in 2017 before sale, percentage of operations by average age (in days) when bull calves were castrated:

Average age (days)	Percent operations	Std. error
0–31	33.2	(2.0)
32–61	23.5	(1.9)
62–92	19.1	(1.7)
93–122	7.2	(1.0)
123 or more	17.0	(1.6)
Total	100.0	

5. Weaning

Weaned calves no longer receive milk from their dams. Typically, calves are weaned by placing calves and cows in separate pens. On many operations, calves are sold and removed from the operation immediately after being separated from their dams. Many calves make an intermediate stop at a sale barn prior to arriving at their next destination, and some go directly to a feedlot or backgrounder/stocker operation after weaning. Some weaned heifers might be kept as replacements, meaning they will eventually be introduced into the breeding herd.

Of calves weaned or expected to be weaned in 2017, 47.4 percent were bulls and steers, and 52.6 percent were heifers. Overall, 16.3 percent of weaned calves were heifers kept for replacements. There were no differences by herd size in the percentages of calves by calf group.

B.5.a. Percentage of calves weaned or expected to be weaned in 2017, by calf group and by herd size:

Percent Calves								
Herd Size (number of beef cows)								
Calf group	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Replacement heifers	16.7	(1.1)	15.2	(0.8)	17.0	(0.8)	16.3	(0.5)
Other heifers	36.6	(1.1)	37.6	(0.7)	34.8	(0.9)	36.3	(0.5)
Bulls and steers	46.7	(0.8)	47.2	(0.5)	48.2	(0.6)	47.4	(0.4)
Total	100.0		100.0		100.0		100.0	

During 2017, calves were weaned or expected to be weaned at an average age of 195.8 days. There were no percentage differences in weaning age by herd size.

B.5.b. For calves weaned or expected to be weaned in 2017, average age (in days) of calves at weaning, by herd size:

Average Age (days)							
Herd Size (number of beef cows)							
Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Avg.	Std. error	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error
193.2	(2.1)	192.8	(2.5)	200.7	(2.7)	195.8	(1.5)

There were no regional differences in the average age of calves weaned or expected to be weaned in 2017.

B.5.c. For calves weaned or expected to be weaned in 2017, average age (in days) of calves at weaning, by region:

Average Age (days)					
Region					
West		Central		East	
Average	Std. error	Average	Std. error	Average	Std. error
198.2	(2.1)	193.8	(2.8)	195.2	(2.3)

The average weaning age on the majority of operations (68.0 percent) was less than 210 days.

B.5.d. Percentage of operations by average age (in days) of calves at weaning:

Average age (days)	Percent operations	Std. error
Less than 180	34.3	(1.6)
180–209	33.7	(1.6)
210–239	19.4	(1.3)
240–269	7.4	(0.9)
270 or more	5.2	(0.7)
Total	100.0	

As expected, the average weaning weight of bull and steer calves was higher than the average weaning weight of heifers. The average weaning weight of calves on small operations (534 lb) was lower than on large operations (561 lb).

B.5.e. Average weaning weight (in lb), by calf group and by herd size:

Average Weight (lb)								
Herd Size (number of beef cows)								
Calf group	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error
Replacement heifers	524	(12)	526	(6)	555	(5)	536	(4)
Other heifers	511	(4)	522	(5)	536	(5)	524	(3)
Bulls and steers	557	(5)	569	(5)	585	(5)	571	(3)
All	534	(5)	542	(5)	561	(5)	547	(3)

The average weaning weight of calves in the East region (521 lb) was lower than the average weaning weight of calves in the Central (555 lb) and West (553 lb) regions.

B.5.f. Average weaning weight (in lb) of calves, by calf group and by region:

Average Weight (lb)						
Region						
Calf group	West		Central		East	
	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error
Replacement heifers	544	(8)	539	(6)	517	(6)
Other heifers	529	(5)	532	(5)	501	(5)
Bulls and steers	578	(5)	579	(5)	544	(6)
All	553	(4)	555	(5)	521	(5)

Producers were asked to provide their opinion regarding the most important factor for determining when to wean calves. The study questionnaire provided eight specific options, in addition to an “other” option. The majority of operations (51.8 percent) used calf age and/or weight to determine when to wean calves. The eight options are briefly described below:

- 1. Calf age/weight**—Calves gain weight as they get older. Some producers have a target weight or age for calves and wean them when they achieve that weight or age.
- 2. End of grazing lease or permit**—Some cattle producers might lease grazing land for their cattle. When the lease is up, they need to move their cattle. Grazing permits are often associated with government-owned land, and these permits have an expiration date as well. Many grazing areas are large open lands without handling facilities. When cattle are moved off of leased or permit grazing land, they are normally relocated closer to handling facilities, which facilitate weaning.
- 3. Forage availability**—When the quantity of forage declines, the growth rate of calves is also likely to decline. Some producers choose to wean calves when this happens.
- 4. Physical condition of cow**—Physical condition refers mainly to the amount of fat a cow carries. Most producers want cows to enter the winter in good physical condition. Many producers will wean their calves before or soon after they notice a decline in cow condition.
- 5. Market price or contract**—Some producers will wean and sell calves when a shift in the market price for calves indicates a greater profit can be made. Producers who have sold their calves prior to weaning via contract wean calves because they agreed to deliver calves on a certain date.
- 6. Cash flow**—Some producers will wean and sell calves when cash is needed.
- 7. Date/time of year**—Some producers might wean calves at a certain time every year, such as early November, regardless of other factors.
- 8. Tradition**—Some producers might wean calves based on tradition. For example, they may wean calves every year after processing activities, such as administering vaccinations.

B.5.g. Percentage of operations by most important factor for determining when to wean calves:

Most important factor	Percent operatons	Std. error
Calf age/weight	51.8	(1.5)
End of grazing lease or permit	1.9	(0.4)
Forage availability	5.6	(0.7)
Physical condition of cow	10.3	(1.1)
Market price or contract	4.2	(0.7)
Cash flow	2.5	(0.4)
Date/time of year	12.2	(0.9)
Tradition	7.7	(0.9)
Other	3.9	(0.6)
Total	100.0	

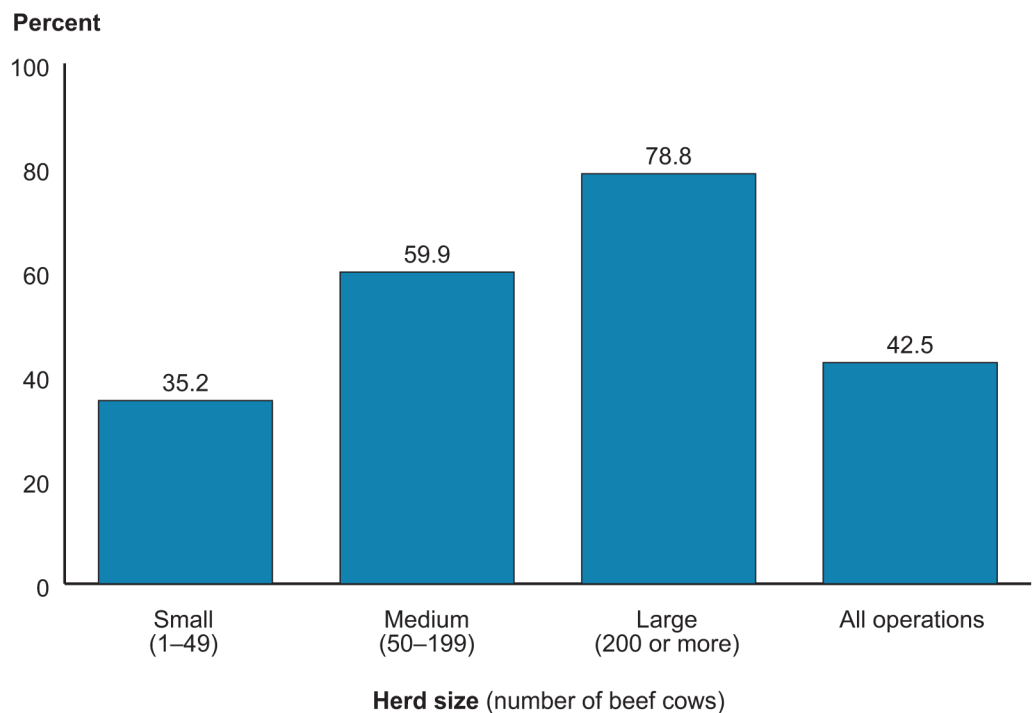
6. Marketing calves

Administering vaccinations, treating for parasites, dehorning, introducing calves to a feed bunk, and castrating bull calves can lead to higher prices for calves at sale. These practices can be considered part of a calf health program. The percentage of operations that usually provided information about their calf health programs to buyers increased as herd size increased, with 35.2 percent of small operations, 59.9 percent of medium operations, and 78.8 percent of large operations providing this information to buyers.

B.6.a. Percentage of operations that usually provided buyers with information about their calf health program, by herd size:

Percent Operations							
Herd Size (number of beef cows)							
Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
35.2	(1.8)	59.9	(2.1)	78.8	(2.6)	42.5	(1.4)

Percentage of operations that usually provided buyers with information about their calf health program, by herd size



A higher percentage of operations in the Central region (72.9 percent) usually provided buyers with information about their calf health program compared with operations in the West (35.2 percent) and East (27.7 percent) regions.

B.6.b. Percentage of operations that usually provided buyers with information about their calf health program, by region:

Percent Operations					
Region					
West		Central		East	
Percent	Std. error	Percent	Std. error	Percent	Std. error
35.2	(2.4)	72.9	(2.6)	27.7	(2.1)

Of operations that usually provided information about their calf health program to buyers, 63.7 percent provided this information orally, and 34.3 percent provided it in written form. A higher percentage of large operations (57.6 percent) provided this information in written form compared with medium (43.2 percent) and small (26.5 percent) operations.

B.6.c. For the 42.5 percent of operations that usually provided buyers with information about their calf health program (table B.6.a.), percentage of operations by method used to convey information, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Method	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Written documentation	26.5	(2.7)	43.2	(3.1)	57.5	(3.6)	34.3	(2.0)
Told buyer orally	71.3	(2.8)	55.1	(3.1)	40.1	(3.5)	63.7	(2.0)
Other	2.2	(1.1)	1.7	(0.7)	2.3	(1.0)	2.1	(0.7)
Total	100.0		100.0		100.0		100.0	

Of operations that usually provided buyers with information about their calf health program, a higher percentage in the Central region (49.2 percent) provided this information in written form compared with operations in the West (21.8 percent) and East (23.1 percent) regions.

B.6.d. For the 42.5 percent of operations that usually provided buyers with information about their calf health program (table B.6.a.), percentage of operations by method used to convey information, and by region:

Method	Percent Operations					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Written documentation	21.8	(2.9)	49.2	(3.2)	23.1	(3.4)
Told buyer orally	75.4	(3.3)	48.6	(3.2)	76.3	(3.4)
Other	2.8	(1.8)	2.3	(0.9)	0.6	(0.4)
Total	100.0		100.0		100.0	

After buying calves from a particular operation for 1 year or more, a feedlot, stocker operation, or company might want to continue to buy calves from that operation because they know what to expect. The percentage of operations in which the same people or companies tended to buy weaned calves from the same operation each year increased as herd size increased, ranging from 34.0 percent of small operations to 60.2 percent of large operations.

B.6.e. Percentage of operations in which the same people or companies tended to buy weaned calves from the operation each year, by herd size:

Percent Operations							
Herd Size (number of beef cows)							
Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
34.0	(1.9)	44.5	(2.4)	60.2	(3.3)	37.4	(1.5)

A higher percentage of operations in the Central region (48.0 percent) had the same people or companies buy weaned calves from the operation each year compared with the operations in the West (33.3 percent) and East (34.3 percent) regions.

B.6.f. Percentage of operations in which the same people or companies tended to buy weaned calves from the operation each year, by region:

Percent Operations					
Region					
West		Central		East	
Percent	Std. error	Percent	Std. error	Percent	Std. error
33.3	(2.6)	48.0	(3.0)	34.3	(2.2)

Producers were asked if they targeted any specific marketing channels for their beef calves. The study questionnaire provided six marketing channels to choose from, which are briefly described below.

- 1. Breed-influenced program**—A marketing strategy in which a beef product is labeled based on cattle breed, such as Certified Angus beef.
- 2. Age and source verification program**—Program that allows buyers to verify the source and age of beef cattle to target certain marketing channels. Some programs might require a producer affidavit to enter the program.
- 3. Conventional**—Conventionally raised beef cattle are not marketed under any specific claim related to how the cattle were raised. Much of the beef produced in the United States is conventionally raised.
- 4. Natural**—Programs that use a marketing strategy in which a beef product is labeled based on specific management practices. Many natural programs require that cattle have never received antibiotics, growth promotants, or supplemental hormones.
- 5. Grass fed**—Grass-fed cattle remain on forage-based diets their entire lives, with the exception of their preweaning period, during which they are still consuming milk.
- 6. Certified organic**—In order to fit this marketing strategy, an operation must be recognized as “certified-organic” by the USDA National Organic Program (NOP). The NOP is responsible for developing national standards for organically produced agricultural products. Third-party certifiers are responsible for certifying a farm as organic.

The organic rules specify that only certified-organic feed can be fed to cows, which means the feed cannot be derived from plants that were genetically modified or that were grown using synthetic herbicides, pesticides, or fertilizer. There are also prohibitions on using growth promotants, hormones, and antibiotics. There are also rules specifying the required level of pasture access for certified-organic beef.

The highest percentage of operations (59.8 percent) did not target a specific marketing channel, meaning that they raised cattle conventionally. There were no differences by herd size in the percentages of operations that targeted conventional, grass-fed, or certified-organic marketing channels. A higher percentage of large operations targeted breed-influenced, age-and-source-verified, and natural marketing channels compared with small operations.

B.6.g. Percentage of operations by marketing channels used for beef calves produced, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Marketing channel	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Breed-influenced program	7.7	(1.0)	15.6	(1.7)	20.9	(2.7)	9.9	(0.9)
Age-and-source verification program	3.3	(0.7)	12.4	(1.6)	18.0	(2.3)	5.9	(0.6)
Conventional	59.1	(2.0)	62.2	(2.3)	60.4	(3.2)	59.8	(1.5)
Natural	13.4	(1.4)	17.9	(1.9)	26.1	(3.0)	14.9	(1.1)
Grass-fed	23.0	(1.7)	18.4	(1.9)	22.8	(3.2)	22.1	(1.3)
Certified organic*	0.5	(0.2)	0.4	(0.3)	1.2	(0.7)	0.5	(0.2)

*Operation certified to the USDA organic standards.

A higher percentage of operations in the Central region used a breed-influenced marketing channel compared with operations in the West or East regions. A higher percentage of operations in the Central region used an age-and-source-verified marketing channel than operations in the East region. There were no regional differences in the percentages of operations that used conventional, natural, grass-fed, or certified-organic marketing channels.

B.6.h. Percentage of operations by marketing channels used for beef calves produced, and by region:

Marketing channel	Percent Operations					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Breed-influenced program	8.1	(1.3)	15.7	(1.9)	7.7	(1.3)
Age-and-source verification program	5.6	(1.1)	9.1	(1.4)	3.8	(0.8)
Conventional	56.2	(2.8)	64.0	(2.8)	60.8	(2.3)
Natural	14.8	(1.9)	17.8	(2.2)	12.9	(1.7)
Grass-fed	25.8	(2.5)	19.7	(2.4)	19.5	(1.9)
Certified organic*	0.3	(0.2)	0.8	(0.5)	0.6	(0.4)

*Operation certified to the USDA organic standards.

C. Breeding and Calving Practices

1. Breeding herd description

In commercial cattle herds, calves are primarily raised to produce beef for human consumption. In seedstock cattle herds, calves are primarily raised for breeding purposes. Seedstock cattle are typically registered with a breed association. Overall, 77.3 percent of operations described their breeding herd as commercial; 5.9 percent of operations described their breeding herd as seedstock; and 16.9 percent described their breeding herd as a combination of commercial and seedstock. The percentages of operations by type of breeding herd were similar across herd sizes.

C.1.a. Percentage of operations by best description of the operations' breeding herd, and by herd size:

Description	Percent Operations							
	Herd Size (number of beef cows)							
	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	
Seedstock cattle (cattle are primarily marketed for breeding purposes)	6.1	(0.9)	4.8	(0.9)	7.3	(2.5)	5.9	(0.7)
Commercial cattle (cattle are primarily marketed for consumption)	77.9	(1.7)	75.9	(2.2)	72.7	(3.2)	77.3	(1.3)
Both seedstock and commercial cattle	16.0	(1.5)	19.3	(2.1)	20.0	(2.6)	16.9	(1.2)
Total	100.0		100.0		100.0		100.0	

The percentages of operations by type of breeding herd were similar across regions.

C.1.b. Percentage of operations by best description of the operations' breeding herd, and by region:

Description	Percent Operations					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Seedstock cattle (cattle are primarily marketed for breeding purposes)	5.4	(1.2)	6.8	(1.4)	5.7	(1.1)
Commercial cattle (cattle are primarily marketed for consumption)	77.3	(2.3)	77.3	(2.5)	77.2	(2.1)
Both seedstock and commercial cattle	17.2	(2.2)	15.9	(2.2)	17.2	(1.9)
Total	100.0		100.0		100.0	

2. Breeding practices

Many reproductive technologies are available to beef producers, and some of these technologies can improve reproductive efficiency. Producers were asked if they used any of the following reproductive technologies.

Estrus synchronization—Cows and heifers are treated with hormones so they can be bred (typically via artificial insemination) at approximately the same time.

Artificial insemination—A process by which semen is collected from the bull, processed, stored, and introduced by humans into the heifer's or cow's reproductive tract for the purpose of conception.

Palpation for pregnancy—A procedure in which one's hand is inserted into the rectum of a cow or heifer in order to feel the structures of the reproductive tract to determine whether a cow or heifer is pregnant. If the animal is pregnant, the stage of pregnancy can also be determined by palpation.

Blood test for pregnancy—A specific protein in the blood is measured to determine pregnancy.

Ultrasound for pregnancy—The presence and stage of pregnancy are determined via ultrasound equipment.

Pelvic measurement—Measurement of the birth canal of heifers and cows to determine which individuals are more likely to have difficulty calving.

Body condition scoring—Numeric scoring system used to estimate body energy reserves and nutritional status of cows. The body condition score indicates whether a cow is thin, fat, or somewhere in between.

Semen evaluation—Assessment of bull fertility determined by collecting its semen and examining it under a microscope to assess motility and morphology (i.e., assessing the percentage of sperm that are normal vs. misshapen).

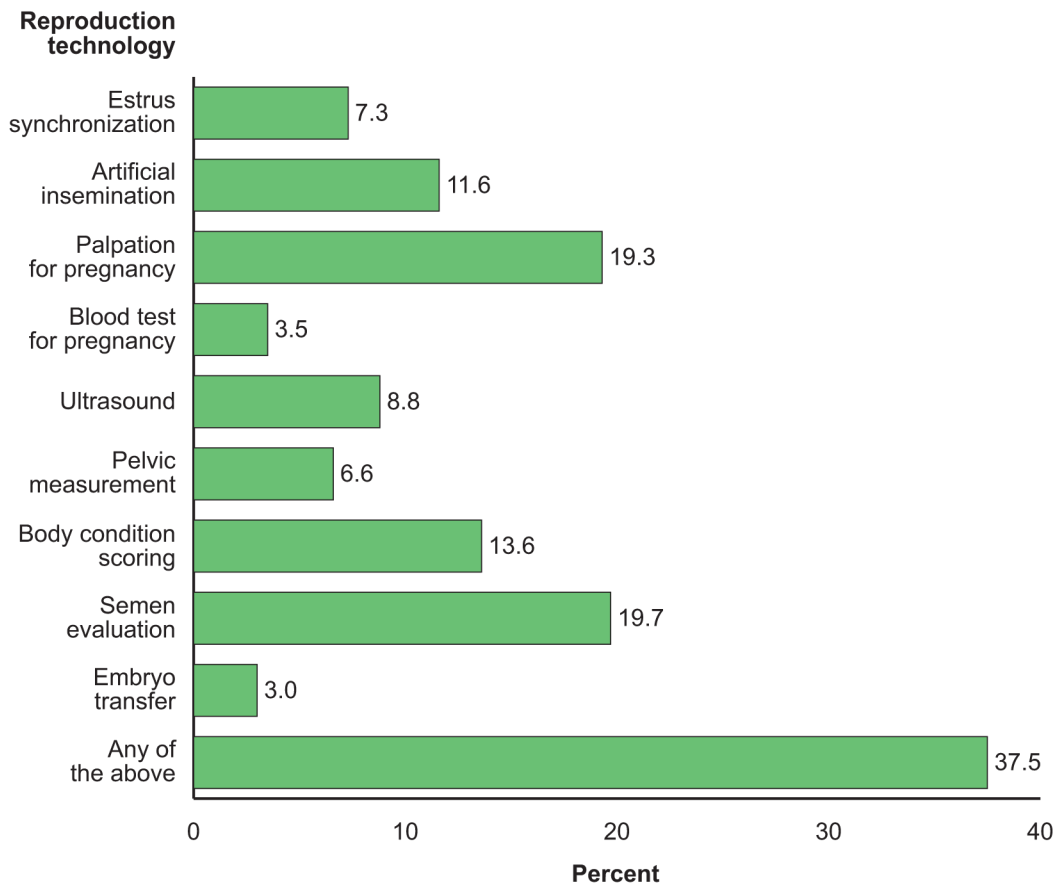
Embryo transfer—Procedure in which an embryo is removed from a donor cow and placed in the uterus of a recipient cow for the duration of gestation. The donor cow should be of high genetic merit. The recipient, however, need not have high genetic merit. Holsteins are sometimes used as recipients.

The percentages of operations that used estrus synchronization, artificial insemination, palpation for pregnancy, ultrasound, body condition scoring, and semen evaluation increased as herd size increased. Across all operations, adoption of these technologies was not widespread, with only 37.5 percent of operations using at least one of these technologies.

C.2.a. Percentage of operations by reproduction technology(ies) used, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Reproduction technology	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Estrus synchronization	4.8	(0.8)	12.2	(1.5)	24.9	(2.6)	7.3	(0.7)
Artificial insemination	8.7	(1.1)	17.7	(1.8)	29.4	(2.8)	11.6	(0.9)
Palpation for pregnancy	14.2	(1.4)	29.3	(2.1)	53.6	(3.3)	19.3	(1.2)
Blood test for pregnancy	2.8	(0.7)	5.6	(1.0)	5.8	(1.2)	3.5	(0.5)
Ultrasound	4.7	(0.9)	16.0	(1.7)	39.4	(3.1)	8.8	(0.8)
Pelvic measurement	4.4	(0.8)	12.8	(1.7)	15.0	(2.2)	6.6	(0.7)
Body condition scoring	10.7	(1.3)	19.8	(1.9)	30.6	(3.0)	13.6	(1.0)
Semen evaluation	14.5	(1.4)	31.0	(2.2)	50.5	(3.3)	19.7	(1.1)
Embryo transfer	2.5	(0.6)	4.4	(1.0)	5.5	(1.2)	3.0	(0.5)
Any of the above	30.4	(1.8)	53.3	(2.3)	78.1	(2.6)	37.5	(1.5)

Percentage of operations by reproduction technology(ies) used



A higher percentage of operations in the Central region than in the West and East regions used estrus synchronization, artificial insemination, ultrasound, pelvic measurement, body condition scoring, and semen evaluation. A higher percentage of operations in the Central and West regions used palpation for pregnancy compared with operations in the East region. A higher percentage of operations in the West region than in the East region used any reproductive technology, and a higher percentage of operations in the West region than in the East region used semen evaluation.

C.2.b. Percentage of operations by reproduction technology(ies) used, and by region:

Reproduction technology	Percent Operations					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Estrus synchronization	4.7	(0.8)	13.6	(1.9)	5.4	(1.0)
Artificial insemination	8.0	(1.3)	22.1	(2.3)	7.7	(1.2)
Palpation for pregnancy	21.6	(2.2)	24.9	(2.2)	12.3	(1.6)
Blood test for pregnancy	3.8	(1.0)	2.5	(0.7)	4.0	(1.0)
Ultrasound	7.9	(1.3)	16.8	(1.9)	3.7	(1.0)
Pelvic measurement	4.0	(1.0)	15.6	(2.0)	2.9	(0.6)
Body condition scoring	12.2	(1.8)	25.4	(2.5)	6.2	(1.1)
Semen evaluation	18.5	(2.0)	34.5	(2.7)	9.6	(1.4)
Embryo transfer	2.8	(0.9)	4.1	(1.1)	2.5	(0.7)
Any of the above	37.1	(2.6)	58.3	(2.9)	22.1	(2.0)

Of operations that used embryo transfer, 6.3 percent used Holstein cows or heifers as recipients.

C.2.c. For the 3.0 percent of operations that used embryo transfer (table C.2.a.), percentage of operations that used Holstein cows or heifers as recipients for embryo transfer:

Percent Operations	Std. error
6.3	(3.6)

Of operations that used any reproductive technologies, the highest percentage (41.4 percent) used just one technology.

C.2.d. For the 37.5 percent of operations that used any reproductive technologies (table C.2a.), percentage of operations by number of technologies used, and by herd size:

Number of reproductive technologies used	Percent Operations							
	Herd Size (number of beef cows)							
	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
1	50.6	(3.7)	30.3	(3.0)	18.8	(2.6)	41.4	(2.4)
2	17.9	(2.7)	20.7	(2.7)	25.8	(3.7)	19.5	(1.9)
3	11.1	(2.3)	21.1	(2.9)	17.3	(2.9)	14.7	(1.6)
4 or more	20.5	(3.0)	27.9	(3.0)	38.1	(3.5)	24.5	(2.1)
Total	100.0		100.0		100.0		100.0	

Replacement heifers were exposed only to bulls on 49.9 percent of operations. This percentage is relatively low because only 56.0 percent of operations had any replacement heifers that were bred to calve in 2017. For operations that had replacement heifers bred to calve in 2017, 89.1 percent (49.9/56.0) exposed these heifers only to bulls.

C.2.e. Percentage of operations in which any **replacement heifers** were bred or intended to be bred for calving in 2017, by breeding method:

Breeding Method	Percent operations	Std. error
Exposed only to bulls	49.9	(1.6)
Only artificially inseminated	2.6	(0.5)
Exposed to bulls and artificially inseminated	4.9	(0.6)
Brought on as bred females	3.3	(0.6)
Had any replacement heifers on hand to calve	56.0	(1.6)

Most operations (95.5 percent) had cows that were exposed only to bulls. Almost all operations (98.4 percent) had cows that were bred to calve in 2017.

C.2.f. Percentage of operations in which any **cows** were bred or intended to be bred for calving in 2017, by breeding method:

Breeding method	Percent operations	Std. error
Exposed only to bulls	95.5	(0.7)
Only artificially inseminated	2.5	(0.5)
Exposed to bulls and artificially inseminated	5.2	(0.6)
Brought on as bred females	2.6	(0.5)
Had any cows on hand to calve	98.4	(0.5)

As shown in table C.2.a, artificial insemination is not widely practiced on beef operations, as only 11.6 percent of operations used it. There are disadvantages and advantages to artificial insemination.

Perhaps the biggest disadvantage of artificial insemination is the additional labor required to perform it, especially if the operation does not practice estrus synchronization (using hormones to bring all cows and heifers into heat at the same time). Operations that do not use estrus synchronization must devote resources to monitor cows and heifers for signs of estrus.

Advantages of using artificial insemination include reducing or eliminating the need for bulls on the operation; having access to semen from sires of superior genetic merit (straws of semen are much less expensive than purchasing a bull of superior genetic merit); and, when combined with estrus synchronization, a shorter calving season. One advantage of a shorter calving season is that calves are more uniform in age at weaning. In addition, genetic improvements in the herd can be accomplished more rapidly by using artificial insemination rather than natural breeding.

The breeding of beef heifers is often timed so that they have their first calf by the time they are 2 years old. To achieve this, heifers are bred shortly after reaching puberty. At the time of calving, these heifers are still growing and have not reached their full size. Because of their smaller size at calving, heifers are more likely to have dystocia (calving difficulty), so producers often use a different bull on heifers than on cows. Bulls used on heifers are often chosen based on genetic characteristics that indicate heifers bred to these bulls will be less likely to experience dystocia.

In herds progressively improving their genetics, the best genetics are in the youngest animals. Thus, using artificial insemination in heifers provides an opportunity to use superior bulls on the best animals available for breeding in a given season. Keeping heifer calves as replacements from these heifers offers a faster way to improve the genetics in the herd.

Most heifers and nearly all cows were exposed only to bulls (76.8 and 92.9 percent, respectively). A higher percentage of heifers (15.1 percent) than cows (5.5 percent) were artificially inseminated and exposed to bulls. The latter practice usually involves artificial insemination followed by turning the heifers out with a bull to breed any heifers that did not get pregnant via artificial insemination. Given that 90.7 percent of all females were exposed only to bulls, it is apparent that artificial insemination is not widely adopted on U.S. beef operations.

C.2.g. Percentage of heifers, cows, and any females bred or intended to be bred for calving in 2017, by breeding method:

Breeding method	Percent heifers	Std. error	Percent cows	Std. error	Percent any females	Std. error
Exposed only to bulls	76.8	(1.8)	92.9	(0.7)	90.7	(0.8)
Only artificially inseminated	3.4	(0.6)	1.0	(0.2)	1.3	(0.2)
Both artificially inseminated and exposed to bulls	15.1	(1.6)	5.5	(0.6)	6.8	(0.7)
Brought on as bred females	4.6	(0.8)	0.7	(0.2)	1.2	(0.2)
Total	100.0		100.0		100.0	

3. Calving percentage

Calving percentage refers to the percentage of calves born (dead or alive) relative to the number of females exposed to bulls and/or artificially inseminated. Most operations strive for a calving percentage of 90 percent or higher. When the calving percentage is lower than 90 percent, potential causes can include low fertility of bulls, reproductive diseases, and inadequate nutrition.

Overall, 83.0 percent of heifers and 93.5 percent of cows calved in 2017. Heifers had a lower calving percentage than cows in each of the herd size categories. Large operations had a higher calving percentage in heifers compared with medium and small operations. Calving percentage in cows was higher on large operations than on small operations.

C.3.a. For females on hand for calving in 2017,¹ percentage of females that calved or were expected to calve^{2 3} in 2017, by type of female and by herd size:

Percent Females								
Herd Size (number of beef cows)								
Female type	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Heifers	74.2	(2.8)	82.5	(2.2)	91.6	(1.5)	83.0	(1.3)
Cows	91.3	(0.7)	93.4	(0.7)	95.7	(0.5)	93.5	(0.4)
Any females	88.9	(0.7)	91.6	(0.8)	94.4	(0.7)	91.7	(0.4)

¹Females exposed to bulls and/or artificially inseminated.

²The study questionnaire was administered October through November 2017. This estimate includes females that calved up to the time of questionnaire administration or that were expected to calve through December 2017.

³(Females calved) / [(females exposed to bulls or artificially inseminated [including purchases]) - (those pregnant but died or were sold or moved off the operation before calving)] x 100.0.

Heifers in the Central region had a higher calving percentage than heifers in the East region. In addition, cows in the Central region had a higher calving percentage than cows in the East and West regions. Heifers had a lower calving percentage than cows in each of the three regions.

C.3.b. For females on hand for calving in 2017,¹ percentage of females that calved or were expected to calve in 2017,^{2 3} by type of female and by region:

Female type	Percent Females					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Heifers	80.3	(2.2)	88.1	(1.9)	79.1	(2.4)
Cows	92.6	(0.7)	96.6	(0.4)	90.4	(0.8)
Any females	90.4	(0.8)	95.1	(0.6)	88.9	(0.8)

¹Females exposed to bulls and/or artificially inseminated.

²The study questionnaire was administered October through November 2017. This estimate includes females that calved up to the time of questionnaire administration or that were expected to calve through December 2017.

³(Females calved) / [(females exposed to bulls or artificially inseminated [including purchases]) - (those pregnant but died or were sold or moved off the operation before calving)] x 100.0.

Most females that calve on an operation each year are cows. Heifers make up a relatively small percentage of females that calve. Of females that calved in 2017, 11.9 percent were heifers, and 88.1 percent were cows. There were no differences by herd size in the percentages of heifers or cows that calved.

C.3.c. For females that calved or were expected to calve in 2017, percentage that were heifers and percentage that were cows, by herd size:

Percent Females*								
Herd Size (number of beef cows)								
Female type	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Heifers	11.1	(0.8)	11.2	(0.6)	13.4	(0.6)	11.9	(0.4)
Cows	88.9	(0.8)	88.8	(0.6)	86.6	(0.6)	88.1	(0.4)
All females	100.0		100.0		100.0		100.0	

*The questionnaire was administered in October and November 2017. This estimate includes females that calved up to the time of questionnaire administration or that were expected to calve through December 2017.

There were no regional differences in the percentages of heifers or cows that calved.

C.3.d. For females that calved or were expected to calve in 2017, percentage that were heifers and percentage that were cows, by region:

Percent Females*						
Region						
Female type	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Heifers	11.4	(0.6)	12.7	(0.7)	11.5	(0.8)
Cows	88.6	(0.6)	87.3	(0.7)	88.5	(0.8)
All females	100.0		100.0		100.0	

*The questionnaire was administered in October and November 2017. This estimate includes females that calved up to the time of questionnaire administration or that were expected to calve through December 2017.

4. Calving management

Ideally, cows and heifers would deliver their calves naturally, without assistance. In some cases, however, cows and heifers need help when delivering a calf. Producers were asked for the percentages of calvings that required an easy pull, hard pull, surgery (Caesarean), or no assistance. Minimal effort is required for easy pulls, which can be accomplished by using hands, or ropes or chains attached to the calf's front legs and pulling. Hard pulls require the application of a substantial amount of traction, such as that generated by a mechanical "calf jack." For this study, repositioning a calf (e.g., when the head presents before the front legs) was considered a hard pull. The Caesarean option involves delivering the calf surgically, and this is often done when the calf is too big to fit through the birth canal.

Over 90 percent of heifers and cows required no assistance during calving. Heifers were more likely than cows to require an easy pull (6.2 versus 3.2 percent, respectively) or a hard pull (3.0 versus 0.6 percent, respectively).

C.4.a. Percentage of calves born to heifers and percentage of calves born to cows, by level of assistance required during calving:

Level of assistance	Percent Calves Born* to...					
	Heifers		Cows		All females	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Easy pull	6.2	(0.6)	3.2	(0.5)	3.6	(0.5)
Hard pull (mechanical calf puller or abnormal presentation or position)	3.0	(0.3)	0.6	(0.1)	0.9	(0.1)
Caesarean	0.2	(0.0)	0.0	(0.0)	0.1	(0.0)
No assistance	90.6	(0.7)	96.2	(0.6)	95.5	(0.5)
Total	100.0		100.0		100.0	

*Born alive or dead from January through September, 2017.

As shown in table C.4.a., the vast majority of calvings required no assistance. Some heifers and cows, however, will experience calving difficulties, so regular monitoring, especially of heifers, is recommended during calving season.

Most operations monitored heifers (93.2 percent) and cows (89.0 percent) on a regular basis when calves were expected. “Regular basis” was defined as a frequency other than haphazard. There were no differences by herd size in the percentages of operations that regularly monitored heifers and cows when calves were expected.

C.4.b. Percentage of operations that monitored heifers and percentage of operations that monitored cows on a regular basis during calving, by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Animal type	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Heifers ¹	93.3	(1.6)	92.0	(1.5)	96.3	(1.3)	93.2	(1.1)
Cows ²	88.5	(1.3)	90.9	(1.3)	88.4	(1.9)	89.0	(1.0)

¹For operations in which heifers calved.

²For operations in which cows calved.

For operations that monitored heifers on a regular basis, the highest percentage (33.8 percent) monitored heifers two times in a 24-hour period. Over one-half of operations (56.3 percent) monitored heifers two or fewer times during a 24-hour period. Large operations (47.6 percent) were more likely to monitor heifers five or more times per 24 hours compared with medium operations (29.1 percent) and small operations (13.7 percent).

C.4.c. For the 93.2 percent of operations that monitored **heifers** on a regular basis during calving (table C.4.b.), percentage of operations by number of times heifers were monitored during a 24-hour period, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Number of times	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
1	26.8	(2.9)	16.7	(2.0)	7.9	(1.7)	22.5	(2.0)
2	37.1	(3.1)	31.3	(2.8)	17.4	(2.8)	33.8	(2.2)
3-4	22.4	(2.7)	22.8	(2.7)	27.1	(3.5)	22.9	(1.9)
5 or more	13.7	(2.1)	29.1	(2.9)	47.6	(3.4)	20.7	(1.7)
Total	100.0		100.0		100.0		100.0	

The normal calving process is classified into three stages.

Stage 1 is characterized by cervical dilation and mild uterine contractions spaced far apart. Contractions at this point are usually not evident as abdominal contractions. During stage 1, heifers and cows might isolate themselves from the rest of the herd and show signs of being restless or nervous, often lying down and getting up repeatedly. Stage 1 usually lasts 2 to 6 hours, but may last longer in heifers. The appearance of the amniotic sac (water bag) signals the end of stage 1 and the beginning of stage 2.

Stage 2 is characterized by the intensity of uterine contractions and the noticeable straining of heifers and cows. Healthy heifers with a normal calf presentation (front feet first) should deliver a calf within 1 hour of the water bag's appearance, and cows in the same situation should deliver the calf within 30 minutes. Stage 2 ends with delivery of the calf.

Stage 3 is characterized by the expulsion of fetal membranes (placenta). Stage 3 typically lasts 1 to 8 hours.

For operations that monitored heifers on a regular basis prior to calving, the majority (64.6 percent) waited 2 hours or less before assisting heifers in labor.

C.4.d. For the 93.2 percent of operations that monitored **heifers** on a regular basis during calving (table C.4.b.), percentage of operations by average number of hours heifers were normally allowed to labor before assistance was given, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Average number of hours	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
1 or less	32.2	(3.2)	32.1	(3.1)	40.0	(3.9)	32.9	(2.2)
2	28.4	(2.9)	37.3	(3.2)	38.9	(3.7)	31.7	(2.1)
3	10.4	(2.0)	12.3	(2.0)	10.8	(2.2)	10.9	(1.4)
4	12.7	(2.1)	8.8	(1.9)	5.2	(1.5)	11.0	(1.5)
5–6	6.7	(1.7)	5.3	(1.4)	1.9	(1.0)	5.9	(1.2)
7 or more	9.5	(2.0)	4.3	(1.0)	3.1	(1.2)	7.5	(1.3)
Total	100.0		100.0		100.0		100.0	

For operations that monitored cows on a regular basis during calving, the highest percentage (38.0 percent) monitored cows once during a 24-hour period. Over one-half of operations (69.2 percent) monitored cows two or fewer times during a 24-hour period.

C.4.e. For the 89.0 percent of operations that monitored **cows** on a regular basis during calving (table C.4.b.), percentage of operations by number of times cows were monitored during a 24-hour period, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Number of times	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
1	40.6	(2.0)	31.9	(2.0)	26.9	(2.9)	38.0	(1.6)
2	31.0	(1.9)	32.3	(2.3)	30.3	(3.2)	31.2	(1.5)
3 to 4	18.5	(1.6)	21.5	(2.2)	20.0	(3.3)	19.2	(1.3)
5 or more	9.9	(1.2)	14.3	(1.9)	22.8	(2.8)	11.5	(1.0)
Total	100.0		100.0		100.0		100.0	

For operations that monitored cows on a regular basis during calving, the majority (57.8 percent) waited 2 or fewer hours before assisting cows in labor.

C.4.f. For the 89.0 percent of operations that monitored **cows** on a regular basis during calving (table C.4.b.), percentage of operations by average number of hours cows were normally allowed to labor before assistance was given, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Average number of hours	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
1 or less	29.4	(2.0)	26.9	(2.4)	34.2	(3.5)	29.1	(1.5)
2	25.9	(1.9)	36.2	(2.6)	35.7	(3.5)	28.7	(1.5)
3	11.1	(1.4)	11.7	(1.6)	10.0	(1.8)	11.1	(1.1)
4	13.3	(1.5)	10.3	(1.6)	7.9	(1.9)	12.4	(1.1)
5–6	11.7	(1.5)	6.8	(1.3)	8.6	(2.5)	10.5	(1.1)
7 or more	8.6	(1.3)	8.2	(1.3)	3.6	(1.1)	8.3	(1.0)
Total	100.0		100.0		100.0		100.0	

The Sandhills Calving System was developed by University of Nebraska-Lincoln researchers, and it was named after the Sandhills area of north-central Nebraska, where it was developed. In this system, cows yet to calve are moved to new pasture on a regular basis, such as once a week or every two weeks, leaving behind those cow-calf pairs that calved in the past week or two. One of the basic principles of this system is to keep calves of the same age together. In this system, older calves cannot transmit diseases, such as those that cause scours, to younger calves.

Separating pregnant cows from cow-calf pairs was not widely practiced in 2017, with just 13.0 percent of operations performing this practice. A higher percentage of large operations (40.2 percent) separated pregnant cows from cow-calf pairs compared with medium (20.3 percent) and small (9.0 percent) operations.

C.4.g. Percentage of operations that separated pregnant cows from cow-calf pairs, by herd size:

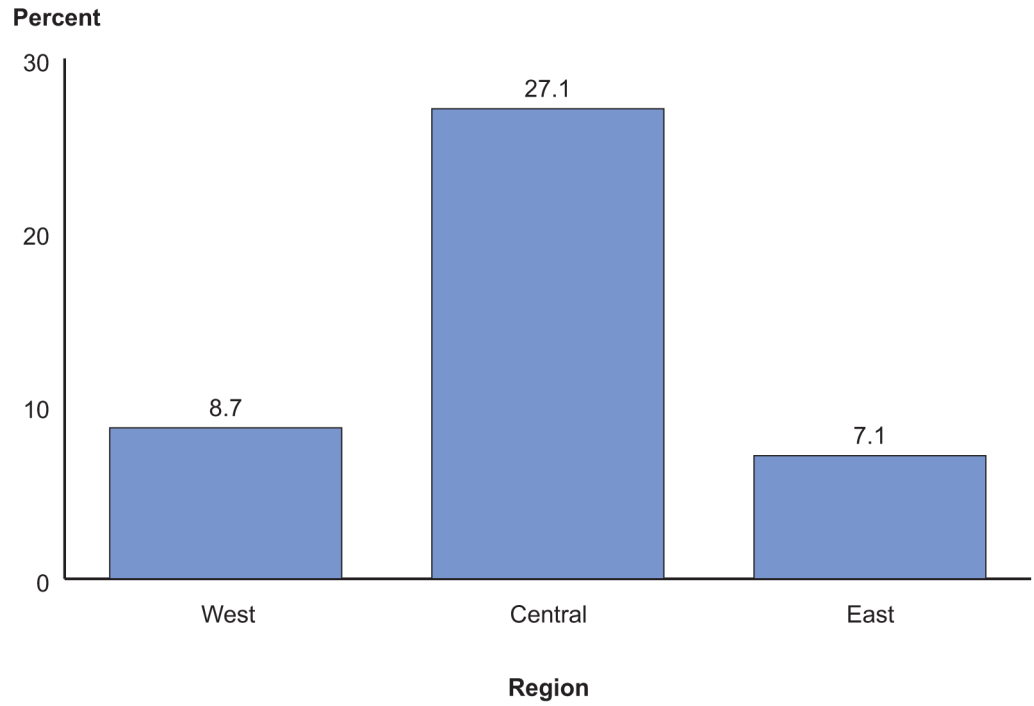
Percent Operations							
Herd Size (number of beef cows)							
Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
9.0	(1.1)	20.3	(1.9)	40.2	(3.0)	13.0	(0.9)

A higher percentage of operations in the Central region (27.1 percent) separated pregnant cows from cow-calf pairs compared with operations in the West (8.7 percent) or East (7.1 percent) regions.

C.4.h. [C9] Percentage of operations that separated pregnant cows from cow-calf pairs, by region:

Percent Operations					
Region					
West		Central		East	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
8.7	(1.2)	27.1	(2.4)	7.1	(1.2)

Percentage of operations that separated pregnant cows from cow-calf pairs, by region



For operations that separated pregnant cows from cow-calf pairs, 89.8 percent performed the separation within 7 days of calving. Based on how the study question for the following table was worded, operations could have indicated that they either moved cow-calf pairs out of the pen—leaving the pregnant cows— or used the recommended Sandhills system and moved pregnant cows out of the pen, leaving the cow-calf pairs.

C.4.i. For the 13.0 percent of operations that separated cow/calf pairs from pregnant cows (table C.4.g.), percentage of operations by number of days after calving that cow/calf pairs were separated, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Number of days	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Immediately after calving	34.2	(5.9)	29.0	(5.0)	17.0	(4.0)	29.7	(3.5)
Within 1 day	27.6	(6.1)	23.7	(4.5)	19.6	(4.0)	25.0	(3.5)
Within 7 days	31.4	(6.2)	35.1	(5.2)	47.3	(5.5)	35.1	(3.7)
Within 14 days	6.9	(3.1)	6.0	(2.3)	10.3	(3.0)	7.1	(1.8)
More than 14 days	0.0	(—)	6.1	(2.9)	5.9	(2.2)	2.9	(1.0)
Total	100.0		100.0		100.0		100.0	

For operations that separated pregnant cows from cow-calf pairs, there were no substantial regional differences in the number of days at which separation occurred.

C.4.j. For the 13.0 percent of operations that separated cow/calf pairs from pregnant cows (table c.4.g), percentage of operations by number of days after calving that cow/calf pairs were separated, by region:

	Percent Operations					
	Region					
	West		Central		East	
Number of days	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Immediately after calving	20.2	(5.6)	31.7	(4.9)	37.7	(8.5)
Within 1 day	25.7	(7.0)	29.2	(5.1)	11.6	(4.8)
Within 7 days	45.0	(7.3)	31.3	(4.9)	32.5	(8.8)
Within 14 days	5.3	(1.8)	5.7	(2.6)	14.1	(5.5)
More than 14 days	3.8	(1.4)	2.1	(1.6)	4.0	(2.1)
Total	100.0		100.0		100.0	

5. Breeding seasons

Having a defined breeding season, and thereby a defined calving season, offers numerous benefits for producers. One goal of a defined breeding season is to have all cows calve within a relatively short period, such as within a 45-, 60-, or 90-day window. One advantage of having a defined breeding season pertains to nutrition. The dietary needs of cows vary based on stage of gestation. For example, cows in early lactation shortly after calving have much higher protein requirements than dry cows in the middle third of gestation. If cows are calving throughout the year, it is difficult to match the nutritional needs of all cows housed as one group. Having a defined breeding season in which all cows are in similar stages of gestation also makes practices like vaccination more convenient.

For this study, to have a defined breeding season, producers needed to remove bulls from heifers and/or cows for at least 30 days. The majority of operations (58.7 percent) did not have a defined breeding season. There are many possible explanations for this relatively high percentage of operations without a defined breeding season, including that these operations do not have a separate holding pen for bulls.

The percentage of operations that had no set breeding season decreased as herd size increased. The percentage of operations that had one defined breeding season increased as herd size increased.

C.5.a. Percentage of operations by number of defined breeding seasons on the operation, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Number of defined breeding seasons*	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
1	28.1	(1.6)	38.8	(2.1)	55.7	(3.1)	31.7	(1.3)
2 or more	7.2	(0.9)	16.5	(1.7)	18.0	(2.6)	9.6	(0.8)
No set season	64.7	(1.7)	44.7	(2.2)	26.3	(2.6)	58.7	(1.4)
Total	100.0		100.0		100.0		100.0	

*Defined breeding season was determined by removal of the bull from heifers and/or cows for at least 30 days.

A lower percentage of operations in the Central region (32.5 percent) had no defined breeding season compared with operations in the West (66.6 percent) and East (69.5 percent) regions. A higher percentage of operations in the Central region had one or more defined breeding seasons compared with operations in the West and East regions.

C.5.b. Percentage of operations by number of defined breeding seasons on the operation, and by region:

	Percent Operations					
	Region					
	West		Central		East	
Number of defined breeding seasons*	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
1	27.9	(2.1)	51.2	(2.7)	21.2	(2.0)
2 or more	5.5	(0.9)	16.3	(1.9)	9.3	(1.3)
No set season	66.6	(2.1)	32.5	(2.7)	69.5	(2.2)
Total	100.0		100.0		100.0	

*Defined breeding season was determined by removal of the bull from heifers and/or cows for at least 30 days.

Overall, 58.3 percent of cows were on operations that had one or more defined breeding seasons. The percentage of cows on operations with one breeding season increased as herd size increased. The percentage of cows on operations with no set breeding season decreased as herd size increased.

C.5.c. Percentage of cows by number of defined breeding seasons on the operation, and by herd size:

Percent Cows								
Herd Size (number of beef cows)								
Number of defined breeding seasons*	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
1	27.1	(3.3)	44.1	(2.4)	59.0	(2.7)	43.6	(1.6)
2 or more	9.8	(1.4)	16.0	(1.7)	18.1	(2.3)	14.7	(1.1)
No set season	63.1	(3.1)	39.8	(2.3)	22.9	(2.1)	41.6	(1.4)
Total	100.0		100.0		100.0		100.0	

*Defined breeding season was determined by removal of the bull from cows and/or heifers for at least 30 days.

A lower percentage of cows in the Central region (19.2 percent) were on operations that had no set breeding season compared with beef cows on operations in the West (53.3 percent) and East (55.6 percent) regions. A higher percentage of cows in the Central region (60.9 percent) were on operations that had one defined breeding season compared with cows on operations in the West and East regions (36.9 and 29.1 percent, respectively).

C.5.d. Percentage of cows by number of defined breeding seasons on the operation, and by region:

	Percent Cows					
	Region					
	West		Central		East	
Number of defined breeding seasons*	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
1	36.9	(1.7)	60.9	(2.8)	29.1	(4.2)
2 or more	9.7	(1.2)	19.9	(2.3)	15.3	(2.2)
No set season	53.3	(1.9)	19.2	(2.1)	55.6	(3.7)
Total	100.0		100.0		100.0	

*Defined breeding season was determined by removal of the bull from cows and/or heifers for at least 30 days.

The gestation period for cows is 283 days. Thus, in order to start calving in March, the breeding season should begin in late May, and in order to begin calving in April, the breeding season should begin in late June.

For operations that had one or more defined breeding seasons, 44.8 percent began their most recent breeding season in May or June, and these operations accounted for 49.6 percent of cows. The percentage of operations that began the most recent breeding season in May was similar to the percentage of operations that began the most recent breeding season in June. Each of these percentages, however, were higher than the percentages for the other months.

C.5.e. For the 41.3 percent of operations that had one or more defined breeding seasons (table C.5.a.), percentage of operations and percentage of cows on these operations on October 1, 2017, by month the last breeding season began:

Month born	Percent operations	Std. error	Percent cows	Std. error
January	3.9	(1.1)	2.7	(0.5)
February	5.3	(1.1)	7.8	(2.2)
March	7.2	(1.3)	6.1	(1.0)
April	8.1	(1.3)	9.8	(1.6)
May	23.1	(1.9)	24.6	(2.0)
June	21.7	(1.8)	25.0	(1.9)
July	10.2	(1.5)	9.0	(1.3)
August	3.4	(0.8)	2.2	(0.6)
September	4.1	(1.0)	3.7	(0.9)
October	3.7	(1.0)	2.2	(0.5)
November	4.5	(1.0)	2.9	(0.6)
December	4.7	(1.0)	4.0	(0.8)
Total	100.0		100.0	

Of operations with one or more defined breeding season, 73.3 percent completed the most recent breeding season in 105 or fewer days. Similarly, 73.4 percent of cows were on operations that completed the most recent breeding season in 105 or fewer days.

C.5.f. For the 41.3 percent of operations with one or more defined breeding seasons (table C.5.a.), percentage of operations and percentage of cows on these operations on October 1, 2017, by length of the last breeding season:

Length of last breeding season (days)	Percent operations	Std. error	Percent cows	Std. error
Fewer than 64	32.8	(2.3)	27.7	(2.0)
64–84	12.7	(1.5)	19.0	(1.8)
85–105	27.8	(2.2)	26.7	(2.2)
106–149	20.8	(1.9)	20.0	(2.3)
150 or more	5.9	(1.0)	6.6	(1.2)
Total	100.0		100.0	

Of operations with one or more defined breeding season, the operation average number of days in the most recent breeding season was 86.7.

C.5.g. For the 41.3 percent of operations with one or more defined breeding seasons (table C.5.a.), operation average number of days in the breeding season, by herd size:

Operation Average (days)							
Herd Size (number of beef cows)							
Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Avg.	Std. error	Avg.	Std. error	Avg,	Std. error	Avg,	Std. error
84.5	(2.4)	91.6	(2.4)	86.4	(2.8)	86.7	(1.7)

Producers were asked to provide the factor most used to determine the timing of the last calving season. A description of the factors appears below:

Tradition—Refers to the practice of calving during the same period every year—regardless of other factors—and might be linked to family tradition.

Weather (during calving)—Weather is a main factor of calf illness and death loss for beef operations. Many operations try to time their calving season for milder weather.

Forage availability—Many operations calve in the spring to take advantage of grazing availability shortly after the calving season is over.

Increasing weaning weights—A producer might opt for a calving season that allows calves to attain a maximum age and weight at a predetermined weaning time.

Market cycle—Cattle prices fluctuate in an often predictable fashion and are based on supply and demand. A producer who uses market cycle is trying to time the sale of calves to obtain better prices.

Labor availability—Many cow-calf operators also produce crops and, therefore, time their calving season to end before planting time.

Timing of herd movement—Refers to the movement of cattle from one area to another. The timing of herd movement might be important to operations that share the same grazing area as other producers. If cattle are not bred before they are placed on grazing land, any bull on the range could breed the operation's cows. These producers might time their calving season so cows will be bred before being placed on shared grazing land.

For operations with one or more breeding seasons, tradition was the most common factor for determining the timing of the most recent breeding season. Weather was the next most common factor reported.

C.5.h. For the 41.3 percent of operations with one or more breeding seasons (table C.5.a.), percentage of operations and percentage of cows on these operations on October 1, 2017, by factor most used to determine timing of the last calving season:

Factor	Percent operations	Std. error	Percent cows	Std. error
Tradition	44.6	(2.3)	40.0	(2.5)
Weather	25.9	(2.1)	25.4	(1.9)
Forage availability	8.3	(1.2)	10.7	(1.4)
Increasing weaning weights	4.9	(1.0)	5.7	(1.6)
Market cycle	7.0	(1.2)	8.6	(1.4)
Labor availability	2.6	(0.6)	4.3	(0.8)
Timing of herd movement	3.1	(0.8)	4.2	(0.8)
Other	3.6	(1.0)	1.1	(0.3)
Total	100.0		100.0	

6. Bull management

The number and type of bulls needed for breeding are primarily determined by the number of cows to be bred and the length of the breeding season. If an operation calves year-round, they can get by with fewer bulls. A rule of thumb is that the age of a yearling bull in months indicates how many females he can service in a breeding season. For example, a 15-month old yearling bull could service about 15 females. Mature bulls can breed more females in a breeding season than a yearling bull. Traditional bull-to-cow ratios are about 25 to 30 cows per mature bull, but some bulls can service up to 50 cows.

If an operation keeps its own replacement heifers for breeding, bulls need to be managed to avoid inbreeding, which can result in genetic defects and other problems. It is also recommended that yearling bulls be housed in separate pastures from mature bulls to avoid risk of injury to younger bulls.

A higher percentage of small operations than medium or large operations used only yearling bulls (less than 2 years of age) or only mature bulls (2 years or older) during the last breeding season. These differences are not surprising, since small operations might only need one bull for the breeding season. A higher percentage of large operations used both mature and yearling bulls for the last breeding season compared with medium and small operations.

C.6.a. Percentage of operations by type of bull used for breeding during the last breeding season, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Bull type	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Yearling only (less than 2 yr of age)	7.1	(1.0)	2.4	(0.7)	0.6	(0.4)	5.8	(0.8)
Mature only (2 yr of age or older)	80.9	(1.6)	57.1	(2.3)	33.2	(2.9)	73.6	(1.3)
Both	11.2	(1.3)	40.4	(2.3)	66.2	(2.9)	20.1	(1.1)
Neither	0.8	(0.4)	0.1	(0.1)	0.0	(0.0)	0.6	(0.3)
Total	100.0		100.0		100.0		100.0	

There were no regional differences in the percentage of operations that used only yearling bulls for the most recent breeding season. A lower percentage of operations in the Central region than in the West and East regions used only mature bulls for the most recent breeding season. A higher percentage of operations in the Central region used both mature and yearling bulls for the most recent breeding season compared with operations in the West and East regions.

C.6.b. Percentage of operations by type of bull used for breeding during the last breeding season, and by region:

	Percent Operations					
	Region					
	West		Central		East	
Bull type	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Yearling only (less than 2 yr of age)	4.5	(1.1)	7.7	(1.7)	5.8	(1.3)
Mature only (2 yr of age or older)	75.2	(2.1)	59.5	(2.7)	82.6	(1.7)
Both	19.7	(1.9)	32.8	(2.4)	10.5	(1.2)
Neither	0.6	(0.5)	0.0	(0.0)	1.1	(0.5)
Total	100.0		100.0		100.0	

Larger operations have more cows than smaller operations. Therefore, larger operations need more bulls than smaller operations to service their cows. As expected, the operation average number of yearling and mature bulls per operation increased as herd size increased.

C.6.c. For the 99.4 percent of operations that used any yearling or mature bulls for breeding during the last breeding season (table C.6.a.), operation average number of bulls used, by type of bull and by herd size:

Operation Average Number of Bulls								
Herd Size (number of beef cows)								
Bull type	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Avg.	Std. error	Avg.	Std. error	Avg,	Std. error	Avg.	Std. error
Yearling (less than 2 yr of age)	0.3	(0.0)	0.9	(0.1)	3.4	(0.2)	0.6	(0.0)
Mature (2 yr of age or older)	1.5	(0.1)	3.8	(0.1)	14.7	(0.6)	2.6	(0.1)

Yearling and mature bulls were expected to breed an operation average of 15.2 and 22.0 females, respectively, during the last breeding season. The operation average number of females a yearling bull was expected to breed increased as herd size increased. Mature bulls were expected to breed a lower operation average number of females on small operations than on medium and large operations.

C.6.d. For the 99.4 percent of operations that used any yearling or mature bulls for breeding during the last breeding season (table C.6.a.), operation average number of females expected to be serviced per bull, by bull type and by herd size:

Operation Average Number of Females per Bull								
Herd Size (number of beef cows)								
Bull type	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error
Yearling (less than 2 yr of age)	13.9	(0.4)	16.9	(0.4)	19.8	(0.4)	15.2	(0.3)
Mature (2 yr of age or older)	20.3	(0.4)	26.5	(0.5)	27.7	(0.5)	22.0	(0.3)

Mature bulls were expected to breed more females on operations in the Central region than on operations in the West and East regions.

C.6.e. For the 99.4 percent of operations that used any yearling or mature bulls for breeding during the last breeding season (table C.6.a.), operation average number of females expected to be serviced per bull, by bull type and by region:

Operation Average Number of Females per Bull						
Region						
Bull type	West		Central		East	
	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error
Yearling (less than 2 yr of age)	14.9	(0.5)	16.5	(0.4)	14.2	(0.5)
Mature (2 yr of age or older)	20.7	(0.5)	24.9	(0.6)	21.3	(0.6)

New bull replacements are necessary as an operation's bulls age. In addition, if an operation keeps replacement heifers from within the herd, bulls might need to be replaced to avoid inbreeding.

As expected, the percentage of operations that purchased, leased, or borrowed bulls for the last breeding season increased as herd size increased, ranging from 23.1 percent of small operations to 61.3 percent of large operations.

C.6.f. For the 99.4 percent of operations that used any yearling or mature bulls for breeding during the last breeding season (table C.6.a.), percentage of operations that purchased, leased, or borrowed bulls for breeding, by herd size:

Percent Operations							
Herd Size (number of beef cows)							
Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
23.1	(1.7)	39.4	(2.4)	61.3	(3.1)	28.5	(1.3)

A higher percentage of operations in the Central region purchased, leased, or borrowed bulls during the last breeding season compared with operations in the West and East regions.

C.6.g. For the 99.4 percent of operations that used any yearling or mature bulls for breeding during the last breeding season (table C.6.a.), percentage of operations that purchased, leased, or borrowed bulls for breeding, by region:

Percent Operations					
Region					
West		Central		East	
Percent	Std. error	Percent	Std. error	Percent	Std. error
27.4	(2.3)	40.2	(2.8)	20.5	(2.0)

Any time a new bull is introduced to a herd there is the potential that it will introduce disease. For yearling bulls that have not yet performed any breeding, tests for venereal diseases such as trichomoniasis (“trich”) are not necessary. Newly purchased mature bulls, however, should be tested for diseases like trichomoniasis before being introduced to the herd, if they come from an area in the United States where trichomoniasis is present. Mature bulls that are leased or borrowed should also be tested for trichomoniasis each time they are introduced to the herd.

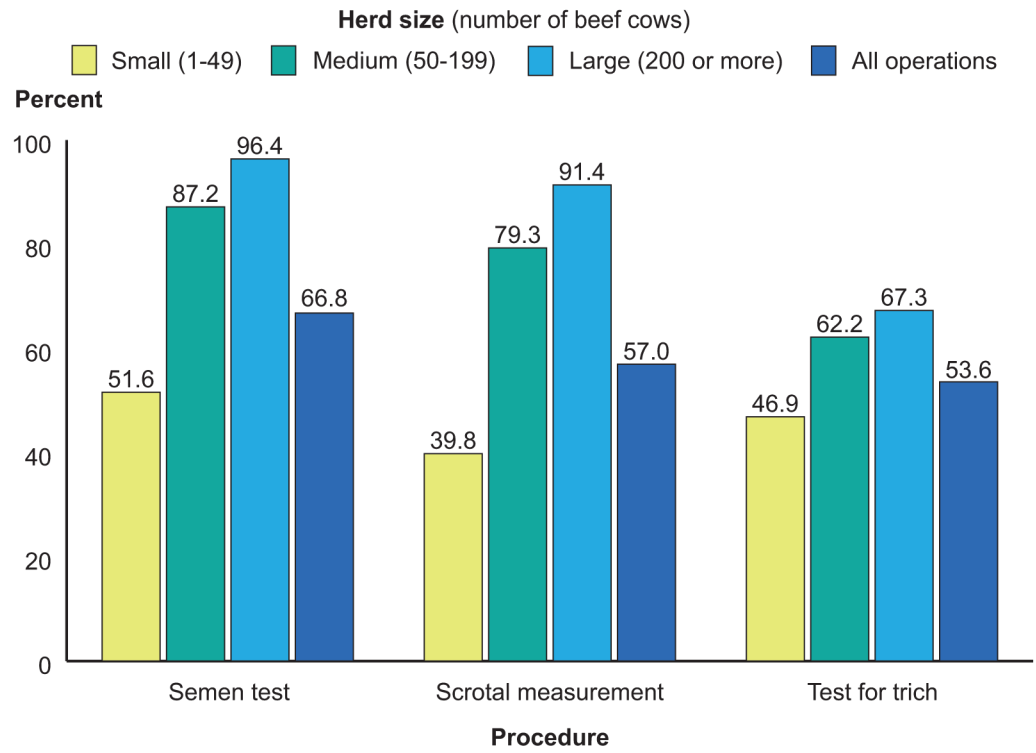
To ensure adequate fertility, purchased, leased, or borrowed bulls should have a breeding soundness exam before being introduced to the herd. A breeding soundness exam includes a semen test and scrotal measurement.

Of operations that purchased, leased, or borrowed bulls for breeding during the last breeding season, the percentage that performed a semen test or scrotal measurement before placing a new bull with the herd increased as herd size increased. A lower percentage of small operations than large operations tested new bulls for trichomoniasis. Overall, slightly over one-half of operations (53.6 percent) tested new bulls for trichomoniasis.

C.6.h. For the 28.5 percent of operations that purchased, leased, or borrowed bulls for breeding during the last breeding season (table C.6.f.), percentage of operations by reproductive examination procedure(s) performed on any of these bulls, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Procedure	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Semen test	51.6	(4.1)	87.2	(2.9)	96.4	(1.2)	66.8	(2.8)
Scrotal measurement	39.8	(4.0)	79.3	(3.1)	91.4	(1.9)	57.0	(2.8)
Test for trich (<i>Tritrichomonas foetus</i>)	46.9	(4.1)	62.2	(3.8)	67.3	(3.9)	53.6	(2.8)

For operations that purchased, leased, or borrowed bulls for breeding during the last breeding season, percentage of operations by reproductive examination procedure(s) performed on any of these bulls, by herd size



For operations that purchased, leased, or borrowed bulls for breeding during the last breeding season, a higher percentage in the Central region performed semen testing and scrotal measurements compared with operations in the West and East regions. A lower percentage of operations in the East region tested bulls for trichomoniasis compared with operations in the West and Central regions. *Tritrichomonas foetus* is a reportable disease in many Western States, which usually means that any positive cases need to be reported to the State Veterinarian. In the past, trichomoniasis was found mostly in Western States, but recently it has spread to States where it was not normally found.

C.6.i. For the 28.5 percent of operations that purchased, leased, or borrowed bulls for breeding during the last breeding season (table C.6.f.), percentage of operations by reproductive examination procedure(s) performed on any of these bulls, by region:

Procedure	Percent Operations					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Semen test	62.1	(4.9)	81.1	(3.7)	52.4	(5.5)
Scrotal measurement	49.9	(4.7)	72.9	(4.1)	44.4	(5.4)
Test for trich (<i>Tritrichomonas foetus</i>)	63.7	(4.7)	56.0	(4.3)	34.0	(5.0)

A higher percentage of small operations added bulls older than 18 months or no longer considered virgin compared with medium and large operations.

C.6.j. For the 28.5 percent of operations that purchased, leased, or borrowed bulls for breeding purposes during the last breeding season (table C.6.f.), percentage of operations that added bulls older than 18 months or no longer considered virgin, by herd size:

Percent Operations							
Herd Size (number of beef cows)							
Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
64.2	(3.9)	42.8	(4.0)	40.3	(4.1)	55.4	(2.7)

For operations that purchased, leased, or borrowed bulls for breeding during the last breeding season, there were no substantial regional differences in the percentage of operations that added bulls older than 18 months or that were no longer considered virgin.

C.6.k. For the 28.5 percent of operations that purchased, leased, or borrowed bulls for breeding during the last breeding season (table C.6.f.), percentage of operations that added bulls older than 18 months or that were no longer considered virgin, by region:

Percent Operations					
Region					
West		Central		East	
Percent	Std. error	Percent	Std. error	Percent	Std. error
54.9	(4.7)	49.1	(4.3)	65.9	(4.8)

For operations that introduced bulls older than 18 months or that were no longer considered virgin, 58.8 percent tested all of these newly introduced bulls for *Tritrichomonas foetus*. A lower percentage of small operations than medium or large operations tested these bulls for trichomoniasis.

C.6.l. For the operations that introduced bulls older than 18 months or that were no longer considered virgin, percentage of operations that tested all these bulls for *Tritrichomonas foetus*, by herd size:

Percent Operations							
Herd Size (number of beef cows)							
Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
52.5	(5.3)	73.6	(5.0)	73.5	(6.5)	58.8	(4.0)

For operations that introduced bulls older than 18 months or that were no longer considered virgin, a higher percentage in the Central region than in the East region tested all newly introduced bulls older than 18 months or no longer considered virgin for *Tritrichomonas foetus*.

C.6.m. For operations that introduced bulls older than 18 months or that were no longer considered virgin, percentage of operations that tested all these bulls for *Tritrichomonas foetus*, by region:

Percent Operations					
Region					
West		Central		East	
Percent	Std. error	Percent	Std. error	Percent	Std. error
64.0	(6.6)	70.2	(6.1)	39.2	(7.1)

Because bull fertility can change over time, a common recommendation for cow-calf operations is to have a breeding soundness exam on every bull prior to each breeding season. A breeding soundness exam includes a semen test and a scrotal measurement, among other things.

For bulls that had been on the operation for at least two breeding seasons, the percentage of operations that performed semen testing, scrotal measurement, and testing for trichomoniasis on these bulls in preparation for the last breeding season increased as herd size increased.

C.6.n. Percentage of operations by reproductive examination procedure(s) performed on bulls* in preparation for the last breeding season, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Procedure	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Semen test	24.2	(1.7)	48.1	(2.4)	67.2	(3.1)	31.4	(1.4)
Scrotal measurement	15.9	(1.4)	37.1	(2.3)	51.8	(3.3)	22.1	(1.2)
Test for trich (<i>Tritrichomonas foetus</i>)	17.6	(1.5)	26.5	(2.0)	43.3	(3.3)	20.8	(1.2)

*Bulls that had been on the operation at least two breeding seasons and excluding bulls purchased, leased, or borrowed for the last breeding season

For bulls that had been on the operation for at least two breeding seasons, a higher percentage of operations in the Central region than in the West and East regions tested the semen and measured the scrotums of these bulls in preparation for the last breeding season. In addition, a higher percentage of operations in the West region than in the East region performed these two procedures. A lower percentage of operations in the East region tested for trichomoniasis in these bulls compared with operations in the West and Central regions.

C.6.o. Percentage of operations by reproductive examination procedure(s) performed on bulls* in preparation for the last breeding season, and by region:

Procedure	Percent Operations					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Semen test	33.2	(2.5)	47.1	(2.8)	17.0	(1.6)
Scrotal measurement	22.5	(2.2)	34.1	(2.6)	12.4	(1.4)
Test for trich (<i>Trichomonas foetus</i>)	26.2	(2.4)	25.7	(2.4)	10.5	(1.3)

*Bulls that had been on the operation at least two breeding seasons and excluding bulls purchased, leased, or borrowed for the last breeding season

When multiple bulls are in the same pastures with cows, it is difficult to identify which bull bred which cow. Commercially available DNA testing markers for sire identification, however, can indicate which bull is the sire of each calf. Use of these markers enables producers to see how many calves each bull sires and how well calves from certain bulls perform.

Few operations (3.6 percent) used commercially available DNA testing markers for sire identification.

C.6.p. Percentage of operations that used commercially available DNA testing for markers for sire identification, by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Use of DNA testing markers	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Yes	2.6	(0.6)	5.6	(1.2)	10.6	(1.9)	3.6	(0.5)
NA (operation had only one bull)	20.8	(1.7)	8.8	(1.6)	1.4	(0.8)	17.3	(1.3)
No	76.6	(1.7)	85.6	(1.9)	88.0	(2.0)	79.0	(1.3)
Total	100.0		100.0		100.0		100.0	

D. Health Management

1. Veterinary consultation

Producers were asked if they consulted a veterinarian for any of the specific reasons presented in the following table. Producers, however, were not asked if they consulted a veterinarian for any reason during the previous 12 months. Some reasons for consulting a veterinarian, such as performing castrations and dehorning, do not appear in the following table. Thus, the estimates for “any of the above” in the following table might not represent the percentage of operations that consulted a veterinarian in the previous 12 months for any reason.

A lower percentage of small operations than medium and large operations consulted a veterinarian during the previous 12 months for each of the reasons listed in the following table, with the exception of production/financial analysis.

D.1.a. Percentage of operations that consulted a veterinarian during the previous 12 months for the reason(s) listed below, by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Reason	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Disease diagnosis or treatment	32.0	(1.9)	50.4	(2.4)	61.6	(3.3)	37.3	(1.5)
Disease prevention	28.1	(1.7)	49.6	(2.3)	58.6	(3.3)	34.0	(1.4)
Information on nutrition	10.9	(1.3)	20.8	(2.0)	30.8	(3.0)	13.9	(1.0)
Information on production management practices other than health	7.2	(1.0)	13.6	(1.7)	21.5	(2.5)	9.2	(0.9)
Production or financial analysis such as Standardized Performance Analysis (SPA)	1.1	(0.4)	2.7	(0.8)	3.2	(0.9)	1.5	(0.4)

Table cont'd →

D.1.a. (cont'd) Percentage of operations that consulted a veterinarian during the previous 12 months for the reason(s) listed below, by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Reason	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Obtaining a veterinary feed directive	7.1	(0.9)	17.5	(1.8)	20.2	(2.4)	9.9	(0.8)
Obtaining a veterinary prescription for antibiotics placed in drinking water	4.2	(0.8)	9.2	(1.5)	10.1	(1.9)	5.5	(0.6)
Any of the above	47.2	(1.9)	67.5	(2.2)	76.9	(3.0)	52.8	(1.5)

A higher percentage of operations in the Central region than in the West or East regions used a veterinarian during the previous 12 months for all of the reasons listed in the following table, with the exceptions of production/financial analysis and obtaining a prescription for use of antibiotics in drinking water. A much higher percentage of operations in the Central region (22.3 percent) consulted a veterinarian to obtain a veterinary feed directive compared with operations in the West (6.6 percent) and East (4.3 percent) regions.

D.1.b. Percentage of operations that consulted a veterinarian during the previous 12 months for the reason(s) listed below, by region:

Reason	Percent Operations					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Disease diagnosis or treatment	34.0	(2.6)	47.9	(2.9)	33.0	(2.2)
Disease prevention	32.0	(2.4)	54.3	(2.9)	20.9	(1.8)
Information on nutrition	12.9	(1.7)	22.2	(2.4)	8.7	(1.3)
Information on production management practices other than health	7.6	(1.4)	14.7	(2.1)	6.9	(1.1)
Production or financial analysis such as Standardized Performance Analysis (SPA)	1.5	(0.7)	2.2	(0.8)	1.1	(0.4)
Obtaining a veterinary feed directive	6.6	(1.2)	22.3	(2.2)	4.3	(0.8)
Obtaining a veterinary prescription for antibiotics placed in drinking water	5.7	(1.2)	7.1	(1.3)	3.9	(0.9)
Any of the above	51.9	(2.7)	69.6	(2.8)	41.0	(2.3)

2. Injections and implants

Available since the 1950s, growth implants for cattle are small pellets placed under the skin on the backside of an animal’s ear. Growth implants are available for nursing calves, stocker calves, and feedlot cattle. Growth implants increase the rate of gain, which can increase the prices received for calves due to heavier weights. Implants will not increase the rate of gain in bull calves, so male calves should not be implanted until they are castrated. In addition, there is no benefit to implanting heifer calves intended for replacements.

The percentage of operations that implanted any calves with a growth promotant prior to weaning increased as herd size increased. Almost one-third of large operations (31.4 percent) implanted calves prior to weaning.

D.2.a. Percentage of operations that implanted any calves with a growth promotant prior to weaning during the previous 12 months, by herd size:

Percent Operations							
Herd Size (number of beef cows)							
Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
3.9	(0.6)	19.1	(1.8)	31.4	(3.0)	8.4	(0.6)

Many products, such as antibiotics, vaccines, vitamins, minerals, anti-inflammatory drugs, and anthelmintics (dewormers) can be given as injections. Unless the product label specifies otherwise, all injections for cattle should be given in the neck.

The percentage of operations that gave any injections to cows was similar to the percentage of operations that gave any injections to calves. The percentage of operations that gave any injections to either cows or calves increased as herd size increased.

D.2.b. Percentage of operations that gave any injections to beef cattle during the previous 12 months, by animal type and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Animal type	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Cows	52.1	(2.0)	70.7	(2.2)	86.1	(2.3)	57.6	(1.6)
Unweaned calves	56.4	(2.0)	77.4	(2.0)	88.2	(2.3)	62.2	(1.5)
Either cows or unweaned calves	65.6	(1.9)	84.9	(1.7)	93.7	(1.9)	70.9	(1.4)

A lower percentage of operations in the East region (58.7 percent) gave any injections to either cows or calves compared with operations in the West (75.7 percent) and Central (79.5 percent) regions.

D.2.c. Percentage of operations that gave any injections to cattle during the previous 12 months, by animal type and by region:

Animal type	Percent Operations					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Cows	62.2	(2.7)	62.4	(2.9)	48.6	(2.4)
Unweaned calves	63.8	(2.7)	73.8	(2.7)	51.4	(2.4)
Either cows or unweaned calves	75.7	(2.5)	79.5	(2.5)	58.7	(2.4)

On operations that gave any injections to cattle, cows were given an operation average of 2.3 injections during the previous 12 months, and unweaned calves were given an operation average of 2.5 injections during the same period. The operation average number of injections given to unweaned calves increased as herd size increased, which could mean that more vaccines are being given by medium and large operations.

D.2.d. For the 70.9 percent of operations that gave any injections to cattle (table D.2.b.), operation average number of injections given during the previous 12 months, by animal type and by herd size:

Animal type	Operation Average							
	Herd Size (number of beef cows)							
	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error
Cows	2.1	(0.1)	2.6	(0.1)	2.5	(0.1)	2.3	(0.1)
Unweaned calves	2.2	(0.1)	2.8	(0.1)	3.4	(0.1)	2.5	(0.1)

For operations that gave any injections to beef cattle, operations in the Central region gave a higher operation average number of injections to unweaned calves than operations in the East region.

D.2.e. For the 70.9 percent of operations that gave injections to cattle (table D.2.b.), operation average number of injections given during the previous 12 months, by animal type and by region:

Animal type	Operation Average Number					
	Region					
	West		Central		East	
	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error
Cows	2.2	(0.1)	2.3	(0.1)	2.4	(0.1)
Unweaned calves	2.3	(0.2)	3.0	(0.2)	2.2	(0.1)

3. Pneumatic dart usage

Tranquilizer guns were developed in the 1950s to chemically immobilize wild game. The guns are powered by compressed air or gas and shoot pneumatic darts containing an immobilizing agent. Recently, pneumatic darts projected by a remote delivery device resembling a gun or rifle have been used to deliver injections, such as antibiotics, to cattle. The projecting devices look like pistols or rifles and have cartridge-, CO₂-, or air-fired options. Cartridge-fired rifles (using .22 caliber blank power loads) can be used at a longer distance than most of the dart guns using compressed air. However, gauged CO₂ rifles have a longer range than cartridge-fired rifles. Most disposable darts available on the market today have a capacity of up to 10 ml. For many older antibiotics, however, the appropriate dosage is larger than 10 ml, even for calves. Thus, many older antibiotics are not appropriate for use in remote-delivery darts because an appropriate dose cannot be administered in one dart, and there is no guarantee that a shooter will be able to hit the animal after the first dart.

Using remote-delivery darts to administer injections can eliminate the need to run animals through a chute or rope and immobilize them on the ground. While darts are more convenient in situations in which the nearest chute is more than a mile away, there are animal welfare and beef quality concerns about the use of pneumatic darts. For example, when injections are given to an animal immobilized in a chute, there is little possibility that

the injection will miss the intended target. When injections are given by remote-delivery dart, however, there is the possibility that the dart could miss its intended target and instead hit a location that could compromise an animal's welfare.

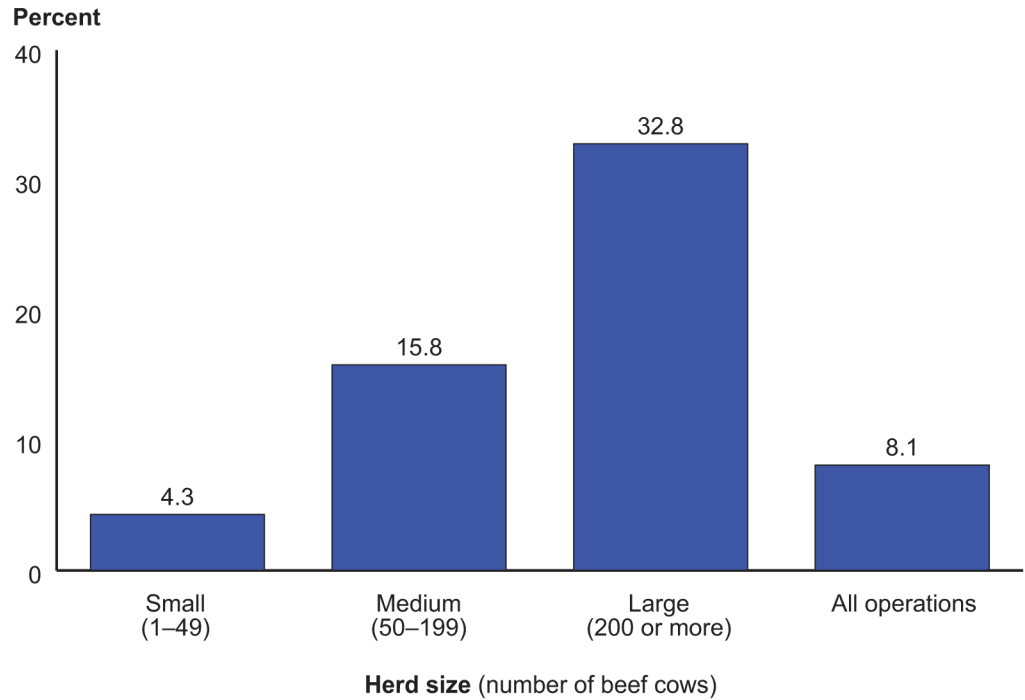
Since the 1990s, the Beef Quality Assurance (BQA) program has been educating producers on recommended injection-site locations in cattle. Unless the product label specifies otherwise, the neck is the recommended location for all injections given to cattle. Because the neck area is a relatively small, producers using darts might be tempted to aim for other locations that are easier to hit, such as the rump, which is a valuable cut of meat. Administering injections anywhere other than the neck creates a beef quality concern because injections cause lesions in tissue and muscle, which will be trimmed away at slaughter, resulting in product losses. One reason the BQA program recommends that all injections be administered in the neck rather than the rump or elsewhere is that muscles in the neck area are only used for trim and are not used for whole cuts of meat. For this and other reasons, BQA has an advisory statement against the use of pneumatic darts in cattle.

The percentage of operations that used pneumatic darts in any cattle increased as herd size increased, with 4.3 percent of small, 15.8 percent of medium, and 32.8 percent of large operations using at least one pneumatic dart to deliver injections during the previous 12 months. Overall, 8.1 percent of operations used at least one pneumatic dart for injecting any cattle during the previous 12 months.

D.3.a. Percentage of operations that used pneumatic darts to deliver injections to any cattle during the previous 12 months, by animal type and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Animal type	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Unweaned calves	2.2	(0.5)	9.7	(1.5)	21.0	(2.4)	4.7	(0.5)
Steers and heifers weaned and older	1.0	(0.4)	4.5	(1.0)	11.4	(1.7)	2.3	(0.4)
Cows	2.6	(0.5)	11.0	(1.6)	22.8	(2.5)	5.3	(0.5)
Bulls	0.9	(0.3)	5.4	(1.2)	16.0	(2.3)	2.6	(0.4)
Any	4.3	(0.7)	15.8	(1.8)	32.8	(2.8)	8.1	(0.7)

Percentage of operations that used pneumatic darts to deliver injections to any cattle during the previous 12 months, by animal type and by herd size



A higher percentage of operations in the Central region than in the West and East regions used at least one pneumatic dart to deliver injections to any cattle in the previous 12 months.

D.3.b. Percentage of operations that used pneumatic darts to deliver injections to any cattle during the previous 12 months, by animal type and by region:

	Percent Operations					
	Region					
	West		Central		East	
Animal type	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Unweaned calves	2.6	(0.5)	10.0	(1.5)	3.0	(0.7)
Steers and heifers weaned and older	1.8	(0.4)	4.1	(1.1)	1.4	(0.4)
Cows	4.3	(0.8)	10.7	(1.5)	2.3	(0.6)
Bulls	1.7	(0.4)	5.7	(1.1)	1.3	(0.4)
Any	5.9	(0.9)	16.3	(1.9)	4.5	(0.8)

There were no herd size differences in the percentages of any cattle injected with pneumatic darts. Overall, 1.1 percent of cattle were injected with a pneumatic dart in the previous 12 months.

D.3.c. Percentage of cattle injected with pneumatic darts during the previous 12 months, by animal type and by herd size:

Percent Cattle*								
Herd Size (number of beef cows)								
Animal type	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Unweaned calves	1.4	(0.5)	2.4	(0.6)	1.6	(0.3)	1.8	(0.3)
Steers and heifers weaned and older	0.6	(0.2)	0.9	(0.3)	2.3	(1.2)	1.3	(0.4)
Cows	0.4	(0.1)	0.9	(0.3)	0.7	(0.2)	0.7	(0.1)
Bulls	0.7	(0.2)	1.5	(0.4)	2.4	(0.4)	1.5	(0.2)
Any	0.7	(0.2)	1.3	(0.3)	1.3	(0.3)	1.1	(0.2)

*As a percentage of October 1, 2017, animal-type inventory.

There were no regional differences in the percentages of any cattle injected with pneumatic darts in the previous 12 months.

D.3.d. Percentage of cattle injected with pneumatic darts during the previous 12 months, by animal type and by region:

Animal type	Percent Cattle*					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Unweaned calves	1.0	(0.3)	2.1	(0.4)	2.7	(0.9)
Steers and heifers weaned and older	0.7	(0.3)	1.1	(0.5)	2.5	(1.6)
Cows	0.6	(0.2)	0.8	(0.2)	0.7	(0.4)
Bulls	1.1	(0.3)	2.5	(0.4)	0.8	(0.3)
Any	0.7	(0.2)	1.3	(0.2)	1.5	(0.5)

*As a percentage of October 1, 2017, animal-type inventory.

On operations that used pneumatic darts, the majority (58.1 percent) used darts for fewer than one-quarter of the injections delivered. There were no substantial differences across herd sizes in the percentage of operations that used darts for 100 percent of injections delivered.

D.3.e. For the 8.1 percent of operations that used pneumatic darts to deliver injections during the previous 12 months (table D.3.a.), percentage of operations by percentage of injections given by pneumatic darts, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Percent injections given by pneumatic darts	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
1-9	35.6	(8.5)	36.8	(5.9)	61.8	(5.5)	41.5	(4.3)
10-24	19.5	(6.6)	18.1	(5.3)	8.2	(2.6)	16.6	(3.4)
25-99	22.0	(7.8)	21.6	(5.5)	17.1	(4.3)	20.8	(3.9)
100	22.9	(6.9)	23.5	(6.3)	12.9	(4.5)	21.1	(3.8)
Total	100.0		100.0		100.0		100.0	

On operations that used pneumatic darts, there were no regional differences in the percentage of operations that used darts for 100 percent of injections delivered.

D.3.f. For the 8.1 percent of operations that used pneumatic darts to deliver injections during the previous 12 months (table D.3.a.), percentage of operations by percentage of injections given by pneumatic darts, and by region:

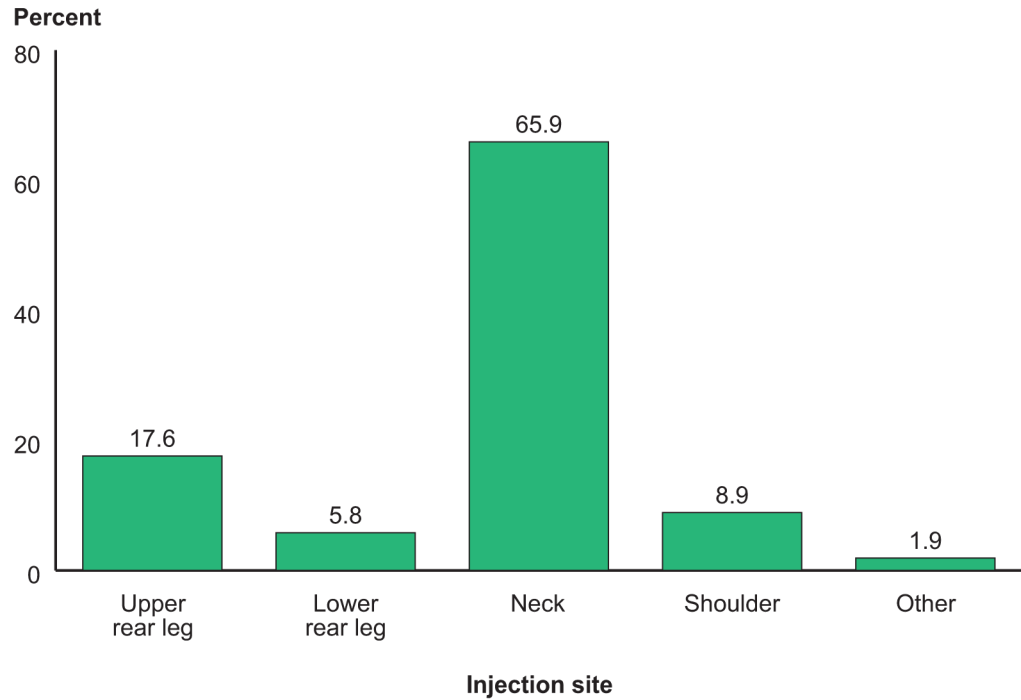
	Percent Operations					
	Region					
	West		Central		East	
Percent injections given by pneumatic darts	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
1-9	46.5	(7.8)	39.0	(5.9)	40.4	(9.1)
10-24	17.0	(5.4)	13.7	(4.6)	24.2	(9.0)
25-99	14.1	(4.8)	25.8	(6.2)	17.3	(7.0)
100	22.4	(6.3)	21.4	(5.9)	18.1	(6.6)
Total	100.0		100.0		100.0	

On operations that used pneumatic darts, 65.9 percent of injections delivered with darts were made in the neck. Of the approximate one-third of injections remaining, 17.6 percent were made in the upper rear leg (rump), 14.7 percent in the shoulder or lower rear leg, and 1.9 percent in “other” areas. However, given that the rear leg is easier to hit with a dart than the neck, it is possible that the 23.4 percent of injections given in the rear leg is an underestimation.

D.3.g. For the 8.1 percent of operations that used pneumatic darts to deliver injections during the previous 12 months (table D.3.a.), operation average percentage of pneumatic dart injections, by injection site and by herd size:

Operation Average Percent								
Herd Size (number of beef cows)								
Injection site	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Upper rear leg	12.9	(4.9)	20.6	(5.4)	20.9	(4.0)	17.6	(3.1)
Lower rear leg	3.0	(2.8)	8.6	(3.2)	5.6	(2.5)	5.8	(1.8)
Neck	75.7	(6.6)	55.1	(6.5)	67.6	(4.6)	65.9	(4.0)
Shoulder	8.3	(4.2)	10.9	(4.3)	6.0	(2.2)	8.9	(2.4)
Other	0.0	(—)	4.7	(3.5)	0.0	(—)	1.9	(1.4)
Total	100.0		100.0		100.0		100.0	

For operations that used pneumatic darts to deliver injections during the previous 12 months, operation average percentage of pneumatic dart injections, by injection site



On operations that used pneumatic darts, there were no regional differences in the operation average percentages of injections made in the neck, upper rear leg, or any of the other sites listed in the following table.

D.3.h. For the 8.1 percent of operations that used pneumatic darts to deliver injections during the previous 12 months (table D.3.a.), operation average percentage of pneumatic dart injections, by injection site and by region:

Injection site	Operation Average Percent					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Upper rear leg	20.2	(5.1)	18.2	(4.9)	11.9	(4.1)
Lower rear leg	3.6	(1.7)	7.4	(3.1)	4.8	(3.2)
Neck	69.3	(6.2)	62.8	(6.2)	69.2	(8.1)
Shoulder	6.2	(3.5)	8.4	(3.4)	14.2	(7.1)
Other	0.7	(0.7)	3.2	(2.6)	0.0	(—)
Total	100.0		100.0		100.0	

Most injections given to cattle are either given in a muscle (intramuscularly or IM) or under the skin (subcutaneously or SQ). Different needle lengths are used depending on whether the product is given IM or SQ, with IM injections generally requiring longer needles. Pneu-Dart, Inc., one of the manufacturers of remote delivery devices, recommends using ½-inch needles for SQ injections and ¾- to 1 ¼-inch needles for IM injections. In general, if the needle is longer than ½-inch, the injection will be given into a muscle.

Of the operations that used pneumatic darts, the majority (76.7 percent) used either ½- or ¾-inch needles for SQ injections. For IM injections, 62.0 percent of operations used needles between ¾- and 1 ¼-inch in length.

D.3.i. For the 8.1 percent of operations that used pneumatic darts to deliver injections during the previous 12 months (table D.3.a.), percentage of operations by length of needle usually used, and by intended route of injection:

Needle length (in)	Percent Operations			
	Intended Route			
	SQ		IM	
	Percent	Std. error	Percent	Std. error
¼	2.2	(1.6)	0.9	(0.6)
½	37.4	(5.3)	17.6	(4.2)
¾	39.3	(5.2)	23.6	(4.5)
1	14.3	(3.9)	28.7	(5.0)
1¼	1.4	(0.8)	9.7	(5.0)
1½ or longer	5.5	(1.8)	19.5	(4.5)
Total	100.0		100.0	

The gauge of a needle refers to the thickness of the needle. The higher the gauge number, the thinner the needle. For example, a 14-gauge needle is thicker than an 18-gauge needle. Most disposable syringes used for remote delivery devices come with 14-gauge needles.

Of operations that used pneumatic darts, 91.8 percent used either 14- or 16-gauge needles.

D.2.j. For the 8.1 percent of operations that used pneumatic darts to deliver injections during the previous 12 months (table D.3.a.), percentage of operations by gauge of needle usually used:

Gauge	Percent Operations	Std. error
10	0.3	(0.3)
12	3.2	(1.5)
14	48.0	(4.7)
16	43.8	(4.7)
18 or greater	4.6	(2.1)
Total	100.0	

Producers who used pneumatic darts were asked about the types of medications used in the darts. Choices in the study questionnaire included antibiotics, dewormers, anti-inflammatories, and “other” medications. Anti-inflammatory drugs such as flunixin meglumine (Banamine®) should not be administered alone in a dart because this drug is labeled for intravenous use only in cattle, and darts cannot be administered intravenously. However, Resflor Gold®—which contains both the antibiotic florfenicol and the anti-inflammatory flunixin meglumine—is labeled for subcutaneous administration in cattle, so this product can be given in a dart. For this reason, estimates in the following two tables do not sum to 100 percent.

With the exception of Resflor Gold, only one medication should be loaded into a pneumatic dart. Mixing anything with an FDA-approved medication not described in the medication’s labeling is considered compounding, and compounding can only be performed by a licensed pharmacist or veterinarian. In cases in which the medication

does not completely fill the pneumatic dart, manufacturers recommend that the darts be topped off with water so that the medication is dispensed correctly in the animal. Technically, however, adding water to an FDA-approved medication is considered illegal compounding, so it is advisable to use darts of an appropriate size so that water is not needed to fill the dart completely.

Of operations that used pneumatic darts, 92.5 percent administered antibiotics in at least one pneumatic dart injection. There were no differences by herd size in the percentages of operations by type of medications given in at least one pneumatic dart.

D.3.k. For the 8.1 percent of operations that used pneumatic darts to deliver injections during the previous 12 months (table D.3.a.), percentage of operations by type of medication(s) delivered in at least one pneumatic dart injection, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Medication type	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Antibiotic	87.2	(6.8)	95.9	(2.1)	96.5	(1.6)	92.5	(2.9)
Dewormer	1.6	(1.0)	3.1	(1.8)	3.0	(1.4)	2.5	(0.9)
Anti-inflammatory	2.1	(1.5)	11.7	(4.1)	9.8	(3.1)	7.5	(1.9)
Other	15.2	(7.0)	1.2	(0.9)	5.0	(2.0)	7.6	(3.0)

There were no regional differences in the percentages of operations by type of medications given in at least one pneumatic dart.

D.3.I. For the 8.1 percent of operations that used pneumatic darts to deliver injections during the previous 12 months (table D.3.a.), percentage of operations by type of medication(s) delivered in at least one pneumatic dart injection, and by region:

	Percent Operations					
	Region					
	West		Central		East	
Medication type	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Antibiotic	93.4	(3.0)	91.7	(5.0)	93.7	(4.9)
Dewormer	2.5	(1.7)	1.8	(1.1)	4.3	(2.3)
Anti-inflammatory	12.0	(4.4)	5.7	(2.4)	5.3	(3.0)
Other	3.4	(1.9)	8.2	(5.0)	12.1	(6.5)

Disposable pneumatic darts have a capacity of up to 10 ml (1 ml = 1 cc). Some reusable pneumatic darts, however, have a capacity up to 20 ml. Because of the limited capacity of pneumatic darts, a single dose of antibiotic—the quantity of which is determined by an animal's weight—might not fit into one dart. For example, the intramuscular dose of florfenicol is 20 mg/kg, which equates to 3 ml/100 lb. Thus, a steer weighing 500 lb would require 15 ml of florfenicol, which would not fit into a single disposable pneumatic dart. Tulathromycin has one of the lower volumes per dose among antibiotics, 1.1 ml per 100 lb. Thus, a single disposable dart with 10 ml of tulathromycin (Draxxin®) could treat up to a 900-lb animal.

For operations that used pneumatic darts to deliver antibiotic injections, tulathromycin was the antibiotic used by the highest percentage of operations: 62.5 percent of operations delivered at least one pneumatic dart containing tulathromycin. The majority of the “other” antibiotics reported were oxytetracycline products. For a 500-lb steer, a single dose of oxytetracycline 200 would be 22.5 ml, which would not fit in a disposable dart. As mentioned before, some reusable darts can hold up to 20 ml, but we did not ask producers whether they used disposable or reusable darts.

D.3.m. For operations that used pneumatic darts to deliver antibiotic injections during the previous 12 months (table D.3.k.), percentage of operations by antibiotic(s) used in at least one pneumatic dart injection:

Antibiotic	Percent operations	Std. error
Danofloxacin (Advocin [®])	2.3	(1.7)
Enrofloxacin (Baytril, [®] Enroflox [®])	10.0	(2.6)
Tulathromycin (Draxxin [®])	62.5	(4.5)
Ceftiofur (Excede, [®] Excenel, [®] Naxcel [®] /Ceftiflex [®])	8.7	(2.4)
Tilmicosin (Micotil [®])	19.1	(4.1)
Florfenicol (Nuflor, [®] Norfenicol [®])	9.1	(2.1)
Penicillin	5.9	(1.6)
Ampicillin (Polyflex [®])	1.0	(0.7)
Florfenicol + flunixin (Resflor Gold [®])	1.9	(1.1)
Gamithromycin (Zactran [®])	5.7	(2.3)
Tildipirosin (Zuprevo [™])	5.8	(1.5)
Other	13.8	(2.9)

Of antibiotic injections given by pneumatic dart, the highest operation average percentage of antibiotic injections given (49.2 percent) contained tulathromycin. Thus, about one-half of all antibiotic injections given with pneumatic darts contained tulathromycin, and about one-half (50.8 percent) contained a different antibiotic.

D.3.n. Of the antibiotic injections given by pneumatic dart, operation average percentage of injections, by antibiotic used:

Antibiotic	Operation average percent	Std. error
Danofloxacin (Advocin [®])	1.1	(0.9)
Enrofloxacin (Baytril, [®] Enroflox [®])	3.6	(1.0)
Tulathromycin (Draxxin [®])	49.2	(4.1)
Ceftiofur (Excede, [®] Excene, [®] Naxcel [®] /Ceftiflex [®])	5.9	(2.1)
Tilmicosin (Micotil [®])	12.9	(3.4)
Florfenicol (Nuflor, [®] Norfenicol [®])	4.7	(1.3)
Penicillin	2.9	(0.9)
Ampicillin (Polyflex [®])	0.7	(0.5)
Florfenicol + flunixin (Resflor Gold [®])	0.7	(0.4)
Gamithromycin (Zactran [®])	2.7	(1.1)
Tildipirosin (Zuprevo [™])	3.8	(1.2)
Other	11.9	(2.7)
Total	100.0	

4. Producer familiarity with disease

Early detection and response are critical to mitigating the adverse effects of animal disease outbreaks. The more familiar producers are with the various diseases that affect beef cattle, the better they will be able to recognize the clinical signs of a newly introduced disease. Once a newly introduced disease is discovered, producers, with assistance from their veterinarian, can implement steps to reduce the spread of the disease on the operation and to neighboring operations.

Producers were asked about their familiarity with a number of cattle diseases. Producers on the highest percentage of operations were most familiar with brucellosis: 31.4 percent said they were fairly knowledgeable about brucellosis. Producers were least familiar with vesicular stomatitis and bovine leukosis: producers on 59.0 and 57.9 percent of operations, respectively, reported that they had never heard of these diseases.

D.4.a. Percentage of operations by level of familiarity with the following diseases:

Disease	Percent Operations								Total
	Level of Familiarity								
	Never heard of it		Recognized the name, not much else		Know some basics		Fairly knowledgeable		
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error		
Foot-and-mouth	3.2	(0.5)	39.5	(1.5)	35.0	(1.5)	22.3	(1.3)	100.0
Bovine spongiform encephalopathy (BSE)	9.2	(0.9)	40.9	(1.6)	33.6	(1.5)	16.3	(1.1)	100.0
Johne's (paratuberculosis)	47.1	(1.6)	24.8	(1.4)	17.8	(1.2)	10.3	(0.8)	100.0
Bluetongue	32.4	(1.5)	40.5	(1.5)	18.1	(1.2)	9.0	(0.8)	100.0
Anthrax	13.9	(1.1)	46.3	(1.6)	26.9	(1.4)	12.9	(1.0)	100.0
Bovine viral diarrhea (BVD)	15.3	(1.2)	26.9	(1.4)	33.3	(1.5)	24.4	(1.3)	100.0
Brucellosis (Bang's)	9.2	(0.9)	25.1	(1.4)	34.3	(1.5)	31.4	(1.4)	100.0

Table cont'd →

D.4.a. (cont'd) Percentage of operations by level of familiarity with the following diseases:

Disease	Percent Operations								
	Level of Familiarity								
	Never heard of it		Recognized the name, not much else		Know some basics		Fairly knowledgeable		Total
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error		
Bovine tuberculosis	23.8	(1.3)	36.4	(1.5)	24.6	(1.4)	15.2	(1.1)	100.0
Vesicular stomatitis	59.0	(1.5)	23.3	(1.3)	12.1	(1.0)	5.6	(0.7)	100.0
Anaplasmosis	43.0	(1.5)	23.2	(1.3)	19.9	(1.2)	13.9	(0.9)	100.0
Trichomoniasis	24.3	(1.3)	29.6	(1.5)	26.2	(1.4)	19.9	(1.2)	100.0
Bovine leukosis	57.9	(1.6)	24.7	(1.4)	12.4	(1.0)	5.0	(0.6)	100.0

The percentages of operations in which producers were fairly knowledgeable or knew some basics about bovine viral diarrhea, brucellosis, bovine tuberculosis, and trichomoniasis increased as herd size increased.

D.4.b. Percentage of operations in which the producer was fairly knowledgeable or knew some basics about the following diseases, by herd size:

Disease	Percent Operations							
	Herd Size (number of beef cows)							
	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Foot-and-mouth	55.5	(2.0)	63.2	(2.3)	62.0	(3.3)	57.3	(1.5)
Bovine spongiform encephalopathy (BSE)	46.9	(2.0)	57.4	(2.4)	65.1	(3.2)	49.9	(1.6)
Johne's (paratuberculosis)	23.3	(1.6)	40.2	(2.4)	47.9	(3.3)	28.1	(1.3)
Bluetongue	24.4	(1.7)	33.0	(2.3)	42.0	(3.3)	27.1	(1.4)
Anthrax	37.5	(1.9)	44.4	(2.4)	53.9	(3.3)	39.8	(1.5)
Bovine viral diarrhea (BVD)	52.7	(2.0)	70.2	(2.2)	82.6	(2.5)	57.7	(1.6)
Brucellosis (Bang's)	61.7	(1.9)	75.8	(2.0)	85.6	(2.6)	65.7	(1.5)
Bovine tuberculosis	36.9	(1.9)	46.2	(2.4)	57.6	(3.2)	39.8	(1.5)
Vesicular stomatitis	15.2	(1.4)	23.7	(2.1)	28.6	(3.1)	17.7	(1.1)
Anaplasmosis	30.3	(1.7)	44.0	(2.3)	44.5	(3.1)	33.8	(1.4)
Trichomoniasis	40.8	(2.0)	57.6	(2.4)	77.3	(2.8)	46.1	(1.6)
Bovine leukosis	16.1	(1.4)	20.9	(2.0)	23.1	(2.7)	17.4	(1.2)

5. Information sources and reporting contacts during disease outbreaks

During a disease outbreak, it is critical that producers get reliable information regarding the outbreak. By knowing who producers will turn to for information during an emergency, responders are able to target the dissemination routes of information critical to the emergency response effort. In the event of an outbreak of foot-and-mouth disease (or other foreign animal disease), most operations (83.9 percent) were very likely to get information from a private veterinarian. The next most likely source of information was other beef producers (42.6 percent of operations).

D.5.a. Percentage of operations by likelihood of using the following sources to obtain information if an outbreak of foot-and-mouth disease (or other foreign animal disease) occurred in the United States:

Source	Percent Operations						Total
	Likelihood			Likelihood			
	Not			Somewhat		Very	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	
Other beef producers	26.1	(1.4)	31.4	(1.4)	42.6	(1.5)	100.0
Private veterinarian	5.4	(0.7)	10.7	(1.0)	83.9	(1.1)	100.0
Extension agent	47.0	(1.6)	28.1	(1.4)	24.9	(1.4)	100.0
Beef organization or cooperative	57.6	(1.5)	23.8	(1.3)	18.6	(1.2)	100.0
Magazines	59.2	(1.5)	27.1	(1.4)	13.7	(1.0)	100.0
Internet	47.2	(1.6)	22.2	(1.3)	30.6	(1.5)	100.0
State Veterinarian's office	64.0	(1.5)	18.9	(1.2)	17.2	(1.1)	100.0
U.S. Department of Agriculture	61.3	(1.5)	22.0	(1.3)	16.8	(1.1)	100.0
Television/newspapers	63.9	(1.5)	24.5	(1.3)	11.6	(1.0)	100.0
Other	97.3	(0.5)	0.7	(0.2)	2.0	(0.5)	100.0

If a foreign animal disease outbreak such as foot-and-mouth disease were to occur in the United States, early detection would be critical to mitigating the effects of the outbreak. Ensuring that those most likely to be contacted by producers are aware of the appropriate procedures for reporting a suspected outbreak will help speed diagnosis and response. Most operations (93.8 percent) would contact a private veterinarian if they had an animal suspected of having foot-and-mouth disease or another foreign animal disease.

D.5.b. Percentage of operations by resource(s) producers would contact if they had an animal suspected of having foot-and-mouth disease (or other foreign animal disease) on the operation:

Resource	Percent operations	Std. error
Extension agent/university	28.7	(1.4)
State Veterinarian’s office	26.3	(1.4)
U.S. Department of Agriculture	19.2	(1.2)
Private veterinarian	93.8	(0.8)
Other	3.7	(0.6)
Any	98.0	(0.4)

E. Contact with Beef Cattle by Other Animals

1. Fence-line contact or commingling

Disease agents can be brought onto an operation via animals newly introduced to the herd, through contact with animals that are not part of the operation, or via inanimate objects such as feed or borrowed equipment brought onto the operation. Assessing each of these exposure routes is part of developing an effective biosecurity plan.

The majority of operations reported that at least some of their beef cattle had fence-line contact or commingled with some type of animal in the previous 12 months. Only 9.5 percent of operations reported no fence-line contact of any kind, regardless of the species. Wild cervids and dogs had fence-line contact or commingled with beef cattle on the highest percentages of operations (73.1 and 69.3 percent, respectively). Feral pigs had fence-line contact or commingled with beef cattle on 22.0 percent of operations.

E.1.a. Percentage of operations by whether or not any of the following animals had fence-line contact (nose-to-nose) or commingled with any beef cattle during the previous 12 months:

Animal	Percent Operations Contact						Total
	Yes		Don't know		No		
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	
Wild cervids (e.g., elk, deer)	73.1	(1.4)	10.9	(1.0)	16.0	(1.2)	100.0
Captive cervids (e.g., elk, deer)	1.9	(0.4)	2.0	(0.4)	96.1	(0.5)	100.0
Captive bison	0.7	(0.3)	0.8	(0.2)	98.6	(0.3)	100.0
Cattle of Mexican origin	0.8	(0.3)	1.9	(0.4)	97.3	(0.5)	100.0
Dairy cattle	3.7	(0.6)	0.7	(0.2)	95.6	(0.6)	100.0
Domestic pigs	3.1	(0.6)	1.1	(0.3)	95.7	(0.7)	100.0
Feral/wild pigs	22.0	(1.2)	8.6	(0.9)	69.4	(1.2)	100.0

*In the "Any of the above" row, estimates for "Don't know" and "No" are actually for "All of the above," not "Any of the above," as is the case with the "Yes" estimates.

Table cont'd →

E.1.a. (cont'd) Percentage of operations by whether or not any of the following animals had fence-line contact (nose-to-nose) or commingled with any beef cattle during the previous 12 months:

Animal	Percent Operations						Total
	Contact						
	Yes		Don't know		No		
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	
Sheep	5.1	(0.7)	0.8	(0.2)	94.1	(0.7)	100.0
Goats	7.6	(0.9)	0.7	(0.2)	91.7	(0.9)	100.0
Horses or other equids (e.g., ponies, donkeys, mules, burros, etc.)	39.5	(1.5)	2.2	(0.5)	58.2	(1.5)	100.0
Camelids (e.g., llamas, alpacas, etc.)	1.6	(0.4)	1.1	(0.3)	97.3	(0.5)	100.0
Chickens, other poultry, or their litter	17.0	(1.2)	2.2	(0.5)	80.8	(1.3)	100.0
Dogs	69.3	(1.5)	7.4	(0.9)	23.2	(1.3)	100.0
Cats	51.2	(1.6)	9.8	(0.9)	39.0	(1.5)	100.0
Any of the above	90.3	(0.9)	0.1*	(0.1)	9.5*	(0.9)	100.0

*In the "Any of the above" row, estimates for "Don't know" and "No" are actually for "All of the above," not "Any of the above," as is the case with the "Yes" estimates.

Most beef cattle (91.8 percent) were on operations in which at least some beef cattle had fence-line contact or commingled with the animals listed in the table below. The highest percentages of beef cattle had fence-line contact or commingled with wild cervids and dogs (77.6 and 74.1 percent of cattle, respectively).

E.1.b. Percentage of beef cattle by whether or not cattle they had fence-line contact (nose-to-nose) or commingled with the following animals during the previous 12 months:

Animal	Percent Cattle Contact						Total
	Yes		Don't know		No		
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	
Wild cervids (e.g., elk, deer)	77.6	(1.3)	9.1	(0.8)	13.3	(1.1)	100.0
Captive cervids (e.g., elk, deer)	2.6	(0.5)	2.0	(0.4)	95.4	(0.7)	100.0
Captive bison	1.6	(0.5)	1.2	(0.3)	97.2	(0.6)	100.0
Cattle of Mexican origin	1.3	(0.4)	2.6	(0.5)	96.1	(0.7)	100.0
Dairy cattle	3.1	(0.5)	1.3	(0.4)	95.6	(0.6)	100.0
Domestic pigs	2.8	(0.6)	1.5	(0.4)	95.7	(0.7)	100.0
Feral/wild pigs	24.0	(1.4)	6.8	(0.7)	69.3	(1.4)	100.0
Sheep	7.7	(0.8)	1.0	(0.3)	91.3	(0.9)	100.0
Goats	7.4	(0.8)	1.1	(0.3)	91.6	(0.8)	100.0
Horses or other equids (e.g., ponies, donkeys, mules, burros, etc.)	53.5	(1.6)	2.2	(0.4)	44.3	(1.6)	100.0

*In the "Any of the above" row, estimates for "Don't know" and "No" are actually for "All of the above," not "Any of the above," as is the case with the "Yes" estimates.

Table cont'd →

E.1.b. (cont'd) Percentage of beef cattle by whether or not cattle they had fence-line contact (nose-to-nose) or commingled with the following animals during the previous 12 months:

Animal	Percent Cattle Contact						Total
	Yes		Don't know		No		
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	
Camelids (e.g., llamas, alpacas, etc.)	2.1	(0.4)	1.1	(0.3)	96.8	(0.5)	100.0
Chickens, other poultry, or their litter	14.4	(1.0)	1.9	(0.4)	83.7	(1.1)	100.0
Dogs	74.1	(1.4)	5.9	(0.6)	20.0	(1.3)	100.0
Cats	53.2	(1.7)	10.3	(1.4)	36.4	(1.6)	100.0
Any of the above	91.8	(0.8)	0.1	(0.0)	8.1	(0.8)	100.0

*In the "Any of the above" row, estimates for "Don't know" and "No" are actually for "All of the above," not "Any of the above," as is the case with the "Yes" estimates.

The percentage of operations in which beef cattle had fence-line contact or commingled with horses or other equids was higher on large operations than on small and medium operations.

E.1.c. Percentage of operations by animal(s) that had fence-line contact (nose-to-nose) or commingled with any beef cattle on the operation during the previous 12 months, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Animal	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Wild cervids (e.g., elk, deer)	71.9	(1.8)	75.9	(2.2)	79.5	(2.8)	73.1	(1.4)
Captive cervids (e.g., elk, deer)	1.5	(0.4)	3.2	(0.9)	3.3	(1.1)	1.9	(0.4)
Captive bison	0.5	(0.3)	0.9	(0.4)	2.1	(0.8)	0.7	(0.3)
Cattle of Mexican origin	0.6	(0.4)	1.1	(0.6)	0.8	(0.4)	0.8	(0.3)
Dairy cattle	3.8	(0.8)	3.5	(0.8)	4.0	(1.3)	3.7	(0.6)
Domestic pigs	3.5	(0.8)	1.9	(0.7)	3.0	(1.0)	3.1	(0.6)
Feral/wild pigs	22.1	(1.5)	22.1	(1.5)	20.6	(2.2)	22.0	(1.2)
Sheep	4.2	(0.8)	7.0	(1.2)	10.0	(1.7)	5.1	(0.7)
Goats	7.4	(1.1)	8.0	(1.3)	8.6	(1.9)	7.6	(0.9)
Horses or other equids (e.g., ponies, donkeys, mules, burros, etc.)	37.1	(1.9)	41.8	(2.3)	65.8	(3.1)	39.5	(1.5)
Camelids (e.g., llamas, alpacas, etc.)	1.3	(0.5)	2.6	(0.8)	2.9	(0.9)	1.6	(0.4)

Table cont'd →

E.1.c. (cont'd) Percentage of operations by animal(s) that had fence-line contact (nose-to-nose) or commingled with any beef cattle on the operation during the previous 12 months, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Animal	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Chickens, other poultry, or their litter	17.3	(1.5)	16.9	(1.8)	12.8	(2.3)	17.0	(1.2)
Dogs	68.5	(1.8)	70.3	(2.3)	77.1	(2.9)	69.3	(1.5)
Cats	50.3	(2.0)	53.8	(2.4)	54.6	(3.3)	51.2	(1.6)
Any of the above	90.6	(1.2)	89.4	(1.6)	89.6	(2.4)	90.3	(0.9)

The percentage of operations in which beef cattle had fence-line contact (nose to nose) or commingled with feral pigs was much higher in the West region (45.2 percent) than in the Central and East regions (1.2 and 10.7 percent, respectively). Texas has a large population of feral pigs, which might account for the relatively high percentage of operations in the West region reporting that their cattle had contact with feral pigs.

E.1.d. Percentage of operations by animal(s) that had fence-line contact (nose-to-nose) or commingled with any beef cattle on the operation during the previous 12 months, and by region:

Percent Operations						
Region						
Animal type	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Wild cervids (e.g., elk, deer)	68.6	(2.6)	74.4	(2.6)	77.4	(2.1)
Captive cervids (e.g., elk, deer)	1.5	(0.4)	2.7	(0.9)	1.8	(0.6)
Captive bison	1.0	(0.6)	0.7	(0.3)	0.2	(0.2)

Table cont'd →

E.1.d. (cont'd) Percentage of operations by animal(s) that had fence-line contact (nose-to-nose) or commingled with any beef cattle on the operation during the previous 12 months, and by region:

Animal type	Percent Operations					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Cattle of Mexican origin	1.8	(0.8)	0.2	(0.1)	0.0	(0.0)
Dairy cattle	3.2	(1.0)	5.5	(1.3)	3.0	(0.8)
Domestic pigs	5.1	(1.3)	1.9	(0.9)	1.8	(0.6)
Feral/wild pigs	45.2	(2.5)	1.2	(0.5)	10.7	(1.4)
Sheep	7.1	(1.3)	5.2	(1.3)	2.5	(0.7)
Goats	10.1	(1.8)	8.1	(1.7)	4.1	(0.8)
Horses or other equids (e.g., ponies, donkeys, mules, burros, etc.)	46.0	(2.7)	36.0	(2.8)	34.6	(2.3)
Camelids (e.g., llamas, alpacas, etc.)	2.8	(0.9)	1.7	(0.7)	0.3	(0.1)
Chickens, other poultry, or their litter	19.3	(2.2)	15.2	(2.2)	15.6	(1.7)
Dogs	70.3	(2.5)	72.0	(2.6)	66.1	(2.3)
Cats	45.4	(2.7)	66.1	(2.7)	46.7	(2.4)
Any of the above	90.7	(1.6)	91.0	(1.6)	89.4	(1.6)

During winter and spring of the preceding 3 years, 81.4 percent of operations reported seeing wild deer within 1 mile of their cattle at least once per month. Over 90 percent of operations never saw wild elk or wild bison within 1 mile of beef cattle on the operation. Over one-fourth of operations (27.1 percent) saw wild pigs within 1 mile of beef cattle on the operation.

E.1.e. Percentage of operations by frequency that the following wildlife species were seen within 1 mile of beef cattle on the operation during winter and spring of the previous 3 years:

Percent Operations								
Wildlife Species								
	Wild deer		Wild Elk		Wild bison		Wild pig	
Frequency	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Never	5.1	(0.8)	93.5	(0.7)	99.5	(0.2)	72.9	(1.1)
Less than once a month	13.5	(1.1)	3.3	(0.6)	0.0	(0.0)	9.3	(0.9)
About 1 to 4 times a month	24.3	(1.4)	1.1	(0.3)	0.2	(0.1)	7.5	(0.9)
More than 4 times a month	57.1	(1.6)	2.1	(0.4)	0.2	(0.1)	10.3	(1.0)
Total	100.0		100.0		100.0		100.0	

2. Access by other animals to beef cattle feed or minerals

Beef cattle can be exposed to disease agents through feedstuffs contaminated by other animals. Over three-quarters of operations (76.8 percent) reported that one or more of the animals in the following table had access to cattle feed or minerals. Wild cervids were the animals reported to have access to cattle feed or minerals by the highest percentage of operations (61.3 percent).

E.2.a. Percentage of operations by whether any of the following animals had access to beef cattle feed or minerals during the previous 12 months:

Animal	Percent Operations						Total
	Yes		Don't know		No		
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	
Wild cervids (e.g., elk, deer)	61.3	(1.6)	8.6	(0.9)	30.1	(1.5)	100.0
Captive cervids (e.g., elk, deer)	1.3	(0.3)	1.0	(0.3)	97.6	(0.4)	100.0
Captive bison	0.1	(0.1)	0.8	(0.3)	99.1	(0.3)	100.0
Cattle of Mexican origin	0.5	(0.3)	1.2	(0.3)	98.3	(0.4)	100.0
Dairy cattle	1.6	(0.4)	0.9	(0.3)	97.5	(0.5)	100.0
Domestic pigs	0.9	(0.3)	1.1	(0.3)	98.1	(0.4)	100.0
Feral/wild pigs	15.4	(1.1)	6.8	(0.8)	77.8	(1.2)	100.0
Sheep	2.1	(0.4)	1.0	(0.3)	96.9	(0.5)	100.0
Goats	5.1	(0.8)	0.9	(0.3)	93.9	(0.8)	100.0
Horses or other equids (e.g., ponies, donkeys, mules, burros, etc.)	24.8	(1.3)	1.7	(0.3)	73.6	(1.4)	100.0

*The estimates for "Don't know" and "No" are actually for "All of the above," not "Any of the above," as is the case with the "Yes" estimates.

Table cont'd →

E.2.a. (cont'd) Percentage of operations by whether any of the following animals had access to beef cattle feed or minerals during the previous 12 months:

Percent Operations							
Access to Feed or Minerals							
	Yes		Don't know		No		
Animal	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Total
Camelids (e.g., llamas, alpacas, etc.)	1.1	(0.3)	1.0	(0.3)	97.9	(0.5)	100.0
Chickens, other poultry, or their litter	9.4	(0.9)	2.2	(0.5)	88.4	(1.0)	100.0
Dogs	43.0	(1.6)	6.6	(0.8)	50.4	(1.6)	100.0
Cats	36.1	(1.5)	8.1	(0.9)	55.7	(1.6)	100.0
Any of the above	76.8	(1.4)	0.2	(0.1)	23.1	(1.4)	100.0

*The estimates for "Don't know" and "No" are actually for "All of the above," not "Any of the above," as is the case with the "Yes" estimates.

Wild cervids had access to beef cattle feed or minerals on a higher percentage of medium and large operations than on small operations. Equids had access to cattle feed or minerals on a higher percentage of large operations than small operations.

E.2.b. Percentage of operations by animal(s) that had access to beef cattle feed or minerals during the previous 12 months, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Animal	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Wild cervids (e.g., elk, deer)	57.4	(2.0)	72.9	(2.2)	73.7	(3.0)	61.3	(1.6)
Captive cervids (e.g., elk, deer)	1.2	(0.4)	2.0	(0.7)	0.6	(0.2)	1.3	(0.3)

Table cont'd →

E.2.b. (cont'd) Percentage of operations by animal(s) that had access to beef cattle feed or minerals during the previous 12 months, and by herd size:

Animal	Percent Operations							
	Herd Size (number of beef cows)							
	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Captive bison	0.0	(—)	0.3	(0.2)	1.3	(0.8)	0.1	(0.1)
Cattle of Mexican origin	0.4	(0.3)	1.0	(0.6)	0.9	(0.7)	0.5	(0.3)
Dairy cattle	1.8	(0.5)	1.0	(0.5)	2.4	(1.1)	1.6	(0.4)
Domestic pigs	0.8	(0.4)	1.0	(0.6)	1.3	(0.7)	0.9	(0.3)
Feral/wild pigs	15.1	(1.4)	16.2	(1.4)	17.0	(2.2)	15.4	(1.1)
Sheep	1.8	(0.5)	2.4	(0.7)	6.1	(1.4)	2.1	(0.4)
Goats	5.3	(1.0)	4.8	(1.1)	4.4	(1.3)	5.1	(0.8)
Horses or other equids (e.g., ponies, donkeys, mules, burros, etc.)	22.4	(1.7)	29.0	(2.1)	43.0	(3.3)	24.8	(1.3)
Camelids (e.g., llamas, alpacas, etc.)	0.8	(0.4)	2.1	(0.7)	1.4	(0.7)	1.1	(0.3)
Chickens, other poultry, or their litter	9.6	(1.2)	8.8	(1.4)	8.0	(2.1)	9.4	(0.9)
Dogs	41.6	(2.0)	46.4	(2.4)	49.3	(3.3)	43.0	(1.6)
Cats	35.4	(1.9)	37.8	(2.4)	40.2	(3.3)	36.1	(1.5)
Any of the above	74.7	(1.7)	82.5	(1.9)	84.0	(2.8)	76.8	(1.4)

Feral pigs had access to beef cattle feed or minerals on a much higher percentage of operations in the West region (31.9 percent) than operations in the Central (0.8 percent) or East regions (7.4 percent).

E.2.c. Percentage of operations by animal(s) that had access to beef cattle feed or minerals during the previous 12 months, and by region:

	Percent Operations					
	Region					
	West		Central		East	
Animal	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Wild cervids (e.g., elk, deer)	56.9	(2.8)	66.9	(2.8)	62.3	(2.4)
Captive cervids (e.g., elk, deer)	0.7	(0.3)	2.1	(0.8)	1.6	(0.6)
Captive bison	0.1	(0.1)	0.3	(0.2)	0.0	(—)
Cattle of Mexican origin	1.3	(0.6)	0.0	(0.0)	0.0	(0.0)
Dairy cattle	1.6	(0.7)	1.9	(0.9)	1.5	(0.6)
Domestic pigs	1.3	(0.7)	0.4	(0.4)	0.7	(0.4)
Feral/wild pigs	31.9	(2.4)	0.8	(0.5)	7.4	(1.3)
Sheep	3.8	(0.9)	1.8	(0.7)	0.5	(0.3)
Goats	7.7	(1.6)	4.5	(1.3)	2.7	(0.7)
Horses or other equids (e.g., ponies, donkeys, mules, burros, etc.)	29.4	(2.4)	22.2	(2.4)	21.3	(2.0)
Camelids (e.g., llamas, alpacas, etc.)	1.9	(0.8)	0.9	(0.5)	0.2	(0.1)

Table cont'd →

E.2.c. (cont'd) Percentage of operations by animal(s) that had access to beef cattle feed or minerals during the previous 12 months, and by region:

	Percent Operations					
	Region					
	West		Central		East	
Animal	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Chickens, other poultry, or their litter	11.7	(1.8)	8.6	(1.7)	7.3	(1.2)
Dogs	43.9	(2.8)	46.5	(3.0)	39.3	(2.3)
Cats	32.3	(2.5)	48.4	(3.0)	31.2	(2.2)
Any of the above	79.7	(2.3)	78.2	(2.5)	72.2	(2.2)

F. General Management

1. Water sources

The highest percentage of operations used a pond as a source of cattle drinking water, overall and within each herd size category. A higher percentage of medium and large operations (82.6 and 87.6 percent, respectively) used a pond as a source for drinking water compared with small operations (70.6 percent). Only 5.4 percent of operations used a cistern, which is a tank or other receptacle for holding water and is typically used for collecting rainwater. A higher percentage of large operations (70.1 percent) used a stream as a water source for drinking water compared with small operations (44.5 percent).

F.1.a. Percentage of operations by source(s) of cattle drinking water and by herd size:

Source	Percent Operations							
	Herd Size (number of beef cows)							
	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	
Cistern	4.2	(0.8)	8.3	(1.4)	10.9	(2.3)	5.4	(0.7)
Deep well (101 ft or more)	39.9	(1.9)	49.7	(2.3)	59.9	(3.1)	42.9	(1.5)
Shallow well (up to 100 ft)	15.9	(1.5)	30.4	(2.1)	38.1	(3.1)	20.0	(1.2)
Municipal source	22.5	(1.6)	24.1	(1.9)	30.0	(3.0)	23.2	(1.3)
Pond	70.7	(1.7)	82.6	(1.8)	87.6	(2.0)	74.0	(1.3)
Stream	44.5	(1.9)	63.9	(2.3)	70.1	(3.4)	49.7	(1.5)
Pond or stream	81.4	(1.6)	91.4	(1.4)	94.4	(1.3)	84.1	(1.2)

A higher percentage of operations in the West region (80.3 percent) used a pond as a water source for cattle drinking water compared with operations in the East region (68.6 percent). A higher percentage of operations in the Central region used a deep well of 101 feet or more as a water source for cattle compared with operations in the West or East regions.

F.1.b. Percentage of operations by source(s) of cattle drinking water, and by region:

Source	Percent Operations					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Cistern	7.4	(1.4)	3.6	(1.0)	4.4	(1.1)
Deep well (101 ft or more)	44.0	(2.7)	58.6	(2.8)	29.6	(1.9)
Shallow well (up to 100 ft)	23.4	(2.3)	28.4	(2.5)	9.7	(1.4)
Municipal source	18.8	(2.1)	23.3	(2.3)	28.3	(2.1)
Pond	80.3	(2.1)	71.4	(2.6)	68.6	(2.3)
Stream	43.0	(2.6)	52.4	(2.9)	55.5	(2.4)
Pond or stream	85.8	(2.0)	81.3	(2.4)	84.4	(2.0)

For operations that used a pond or stream as sources for cattle drinking water, 79.5 percent allowed cattle to drink directly from a pond or stream. There were no differences by herd size in the percentage of operations that allowed cattle to drink directly from a pond or stream.

F.1.c. For the 84.1 percent of operations that used a pond or stream as sources for cattle drinking water (table F.1.a.), percentage of operations that ever allowed cattle to drink directly from a pond or stream, by herd size:

Percent Operations							
Herd Size (number of beef cows)							
Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
78.5	(1.8)	81.8	(1.9)	83.8	(3.1)	79.5	(1.4)

There were no regional differences in the percentage of operations that allowed cattle to drink directly from the pond or stream.

F.1.d. For the 84.1 percent of operations that used a pond or stream as water sources for cattle drinking water (table F.1.a.), percentage of operations that ever allowed cattle to drink directly from a pond or stream, by region:

Percent Operations					
Region					
West		Central		East	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
78.8	(2.5)	80.6	(2.5)	79.6	(2.0)

The percentage of operations that used a trough or other separate container as sources for cattle drinking water increased as herd size increased. Overall, 72.2 percent of operations used a trough or other separate container for drinking water.

F.1.e. Percentage of operations that used a trough or other separate container as sources for cattle drinking water, by herd size:

Percent Operations							
Herd Size (number of beef cows)							
Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
69.3	(1.7)	78.8	(1.9)	88.1	(2.0)	72.2	(1.4)

A higher percentage of operations in the Central region used a trough or other separate container as sources for cattle drinking water compared with operations in the West and East regions.

F.1.f. Percentage of operations that used a trough or other separate container as sources for cattle drinking water, by region:

Percent Operations					
Region					
West		Central		East	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
70.8	(2.5)	85.8	(2.1)	63.5	(2.1)

For operations that used a trough or other separate container as sources for cattle drinking water, there were no differences by herd size in how often (number of weeks) water troughs or other separate containers were cleaned.

F.1.g. For the 72.2 percent of operations that used a trough or other separate container as sources for cattle drinking water (table F.1.e.), percentage of operations by number of weeks between cleaning these water sources, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Number of weeks between cleaning	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
<3	16.8	(1.8)	13.6	(1.9)	11.9	(2.5)	15.8	(1.4)
3–7	22.9	(2.1)	19.6	(2.3)	18.8	(2.8)	21.9	(1.6)
8–14	10.4	(1.5)	9.9	(1.6)	6.4	(1.6)	10.0	(1.1)
15–29	16.8	(1.9)	14.0	(2.0)	16.8	(3.0)	16.2	(1.4)
30 or more	9.2	(1.4)	11.7	(1.7)	16.7	(2.5)	10.2	(1.1)
Not routinely cleaned	24.0	(2.1)	31.1	(2.5)	29.4	(3.2)	25.9	(1.6)
Total	100.0		100.0		100.0		100.0	

For the operations that used a trough or other separate container as sources for cattle drinking water, there were no notable regional differences in the number of weeks between cleanings.

F.1.h. For the 72.2 percent of operations that used a trough or other separate container as sources for cattle drinking water (table F.1.e.), percentage of operations by number of weeks between cleaning these water sources, and by region:

	Percent Operations					
	Region					
	West		Central		East	
Number of weeks between cleaning	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
<3	11.1	(2.1)	17.9	(2.6)	19.7	(2.7)
3–7	19.4	(2.7)	22.6	(2.6)	24.6	(2.6)
8–14	11.1	(2.1)	11.9	(2.2)	6.7	(1.3)
15–29	17.8	(2.5)	16.1	(2.5)	14.2	(2.3)
30 or more	12.7	(2.1)	11.7	(2.0)	5.5	(1.1)
Not routinely cleaned	27.9	(2.9)	19.9	(2.4)	29.3	(2.9)
Total	100.0		100.0		100.0	

2. Grazing

Placing beef cows on pasture is generally the cheapest way to feed them. Some land, due to excessive slope or other factors, is not good for much else other than growing grass for pasture, and cattle are a popular way to utilize pasture land. In some areas of the United States, cattle have to be fed hay or silage during winter months, which increases an operation’s workload and adds to the expense of raising cattle.

Almost all operations (96.1 percent) expected grazing pasture to make up at least 50 percent of the herd’s complete diet during the growing season.

F.2.a. Percentage of operations in which grazing pasture was expected to make up at least 50 percent of the herd’s complete diet during the growing season, by herd size:

Percent Operations							
Herd Size (number of beef cows)							
Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
95.8	(0.9)	96.5	(1.0)	99.0	(0.6)	96.1	(0.7)

There were no regional differences in the percentage of operations that expected grazing pasture to make up at least 50 percent of the herd’s complete diet during the growing season.

F.2.b. Percentage of operations in which grazing pasture was expected to make up at least 50 percent of the herd’s complete diet during the growing season, by region:

Percent Operations					
Region					
West		Central		East	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
96.6	(1.2)	95.0	(1.4)	96.3	(1.0)

Producers on operations in which grazing pasture was expected to make up at least 50 percent of the herd's complete diet during the growing season were asked if they had a written grazing management plan that outlines goals, tactics, and metrics. For example, grazing management goals might include things like meeting the nutritional needs of cattle, improving forage yield, improving production cost efficiency, preventing or reducing erosion, maintaining or improving water quality, or maintaining or improving wildlife habitat. A grazing management plan will assess predicted forage yields for pasture or rangeland and apply a stocking rate appropriate to the carrying capacity of the land. Producers can obtain help in developing a grazing management plan by consulting their local USDA Natural Resources Conservation Service (NRCS) office.

Of the operations in which grazing pasture was expected to make up at least 50 percent of the herd's complete diet during the growing season, 7.6 percent had a grazing management plan. A higher percentage of large operations (19.8 percent) had a grazing management plan compared with small operations (5.2 percent).

F.2.c. For the 96.1 percent of operations in which grazing pasture was expected to make up at least 50 percent of the herd's complete diet during the growing season (table F.2.a.), percentage of operations that had a written grazing management plan that outlines goals, tactics, and metrics to gauge the plan's progress, by herd size:

Percent Operations							
Herd Size (number of beef cows)							
Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
5.2	(0.9)	13.4	(1.7)	19.8	(2.5)	7.6	(0.8)

For operations in which grazing pasture was expected to make up at least 50 percent of the herd’s complete diet during the growing season, a slightly higher percentage of operations in the Central region than in the East region had a grazing management plan.

F.2.d. For the 96.1 percent of operations in which grazing pasture was expected to make up at least 50 percent of the herd’s complete diet during the growing season (table F.2.a.), percentage of operations that had a written grazing management plan that outlines goals, tactics, and metrics to gauge the plan’s progress, by region:

Percent Operations					
Region					
West		Central		East	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
7.1	(1.2)	11.7	(1.8)	5.3	(1.1)

The vast majority of operations (93.1 percent) grazed cattle on their own land. Some operations (30.9 percent) grazed cattle on leased private land. Few operations grazed cattle on State or Federal public land (3.0 percent) or grazing association land (0.8 percent).

Commingling cattle with cattle from other operations presents a risk of spreading diseases like trichomoniasis. Of the 3.0 percent of operations that grazed cattle on State or Federal public land, 24.5 percent commingled their cattle with cattle from other operations. Commingling cattle with cattle from other operations on private land, either leased or owned, was not common: only 12.4 percent of operations commingled cattle on leased land, and just 8.4 percent of operations commingled cattle on land they owned.

F.2.e. Percentage of operations by type of grazing land used during the previous 12 months, and percentage of these operations that commingled their cattle with cattle from other operations:

Grazing land type	Percent operations		Percent operations that commingled cattle	
		Std. error		Std. error
Public land (State or Federal)	3.0	(0.4)	24.5	(6.2)
Grazing association land	0.8	(0.2)	80.8	(8.4)
Leased, private land	30.9	(1.4)	12.4	(1.8)
Own land	93.1	(0.8)	8.4	(0.9)

There were no differences by herd size in the percentage of operations that grazed cattle on their own land. The percentage of operations that grazed cattle on leased private land increased as herd size increased. A much higher percentage of large operations (26.8 percent) grazed cattle on State or Federal public land compared with medium (6.0 percent) and small (0.6 percent) operations.

F.2.f. Percentage of operations by type of grazing land used during the previous 12 months, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Grazing type	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Public land (State or Federal)	0.6	(0.3)	6.0	(1.1)	26.8	(2.4)	3.0	(0.4)
Grazing association land	0.4	(0.3)	1.1	(0.4)	5.5	(1.4)	0.8	(0.2)
Leased, private land	22.7	(1.7)	51.5	(2.4)	69.1	(3.1)	30.9	(1.4)
Own land	92.9	(1.0)	93.1	(1.4)	95.5	(1.3)	93.1	(0.8)

There were no regional differences in the percentage of operations that grazed cattle on their own land. A higher percentage of operations in the Central region (40.8 percent) grazed cattle on leased private land compared with operations in the East region (19.5 percent). A higher percentage of operations in the West region (4.7 percent) grazed cattle on State or Federal public land compared with operations in the East region (0.5 percent).

F.2.g. Percentage of operations by type of grazing land used during the previous 12 months, and by region:

	Percent Operations					
	Region					
	West		Central		East	
Grazing type	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Public land (State or Federal)	4.7	(0.7)	3.8	(0.8)	0.5	(0.3)
Grazing association land	1.2	(0.5)	0.9	(0.3)	0.2	(0.2)
Leased, private land	34.1	(2.5)	40.8	(2.7)	19.5	(1.8)
Own land	95.3	(1.2)	90.9	(1.7)	92.1	(1.5)

The percentage of operations that moved cattle to grazing areas that did not border the operation increased as herd size increased. Overall, 17.4 percent of operations moved cattle to grazing areas that did not border the operation.

F.2.h. Percentage of operations that, during the previous 12 months, moved cattle to grazing areas that did not border the operation, by herd size:

Percent Operations							
Herd Size (number of beef cows)							
Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
12.7	(1.3)	29.0	(2.2)	40.6	(3.2)	17.4	(1.1)

A higher percentage of operations in the Central and West regions moved cattle to grazing areas that did not border the operation compared with operations in the East region.

F.2.i. Percentage of operations that, during the previous 12 months, moved cattle to grazing areas that did not border the operation, by region:

Percent Operations					
Region					
West		Central		East	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
18.2	(2.0)	27.1	(2.4)	9.1	(1.4)

3. Natural resource management

Producers on operations with flowing water sources such as streams or rivers were asked if they restricted cattle access to these water sources. As cattle make their way down a stream bank to a water source, they can trample vegetation, which can lead to soil erosion on the stream bank. There are potential advantages of restricting cattle access to these water sources. For example, footing around flowing water sources is not as good as footing around a trough or other structure, and water quality is not usually as good in flowing water sources as it is in troughs or other structures.

Producers on operations with timber were asked if they restricted cattle access to the timber. Running cattle in timber can have repercussions, such as trampling young tree seedlings. Operations were also asked if they kept written, electronic (via computer), or pictorial records of natural resource conditions, which could include written descriptions or pictures of areas on the operation where water does not drain well or areas where grass does not grow well.

There were no differences by herd size in the percentage of operations that restricted cattle access to flowing water sources. Almost 1 of 5 operations (19.6 percent) restricted cattle access to flowing water sources. There were also no differences by herd size in the percentage of operations that restricted cattle access to timber. Overall, 13.6 percent of operations restricted cattle access to timber. A higher percentage of large operations (15.4 percent) kept written, electronic (via computer), or pictorial records of natural resource conditions compared with small operations (5.6 percent).

F.3.a. Percentage of operations by natural resource management practice(s) used, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Management practice	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Restrict access of cattle to flowing water sources*	19.2	(1.6)	21.2	(2.1)	17.2	(2.4)	19.6	(1.3)
Restrict access of cattle to timber*	13.4	(1.3)	14.8	(1.8)	10.8	(2.0)	13.6	(1.1)
Keep written, computer, or pictorial records of natural resource conditions	5.6	(1.0)	10.2	(1.3)	15.4	(2.1)	7.0	(0.8)

*Limited to operations with these resources.

A higher percentage of operations in the Central and East regions restricted cattle access to flowing water sources and to timber compared with operations in the West region. There were no regional differences in the percentage of operations that kept written, electronic (via computer) or pictorial records of natural resource conditions.

F.3.b. Percentage of operations by natural resource management practice(s) used, and by region:

	Percent Operations					
	Region					
	West		Central		East	
Management practice	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Restrict access of cattle to flowing water sources*	13.5	(2.0)	23.6	(2.7)	22.8	(2.1)
Restrict access of cattle to timber*	6.4	(1.5)	16.8	(2.3)	18.0	(1.8)
Keep written, computer, or pictorial records of natural resource conditions	7.6	(1.3)	6.4	(1.3)	6.9	(1.3)

*Limited to operations with these resources.

4. Fly control

Producers were asked about the methods they used to control flies. Flies can cause economic losses due to cattle blood loss and reduced weight gains, which can occur when cattle spend time avoiding or trying to remove flies instead of grazing. Flies can also spread diseases such as anaplasmosis and pinkeye (infectious bovine keratoconjunctivitis). Types of flies that affect cattle include horn flies, face flies, stable flies, horse flies, house flies, and deer flies, among others. There are several methods of fly control:

Environmental—Includes fly sprays or foggers sprayed into the air, but not directly on cattle; and bug zappers, fly traps, fly tape, or fly strips.

Topical products—Includes products administered on the skin of cattle. Topical products include hanging dust bags, which cattle brush against as they walk under them; insecticide, administered on the animal's back; pour-ons, a liquid administered on the animal's back; backrubbers or back oilers, which are soaked with insecticide and applied to the animal's back; products administered by spraying directly on the animal's skin; and dips, which are usually tanks of water mixed with insecticide that cattle must swim through.

Treated ear tags—These tags contain insecticide and help control flies. It is recommended that these ear tags be removed at the end of fly season and that new tags be applied to each ear when fly numbers reach a recommended threshold during spring.

Biological control—This can include fly control methods such as use of predator wasps. These control methods generally involve the predators interfering with the life cycle of flies by preventing them from maturing into adult flies.

Oral products—These are generally insect growth regulators, which are products that are mixed in cattle feed or minerals and are called “feed throughs” because they pass through the animal's GI tract with minimal absorption. The products remain present in cattle manure, which is where flies lay their eggs. While these products are present in manure, they interfere with the life cycle of flies by preventing them from maturing into adult flies.

Most operations (83.9 percent) used some type of fly control. There were no differences across herd sizes in the percentages of operations by type of fly control method used. The highest percentage of operations (55.2 percent) used topical products for fly control.

F.4.a. Percentage of operations by fly control method(s) used during the previous 12 months, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Fly control method	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Environmental fly control (sprays, foggers, strips, zippers)	37.5	(1.9)	39.0	(2.3)	35.2	(3.0)	37.7	(1.5)
Topical products (dust bags, dips, sprays, backrubs)	53.3	(2.0)	60.5	(2.3)	61.1	(3.3)	55.2	(1.6)
Treated ear tags	23.7	(1.7)	30.8	(2.2)	29.2	(2.9)	25.4	(1.3)
Biological control (e.g., predator wasps)	1.3	(0.5)	1.4	(0.5)	2.2	(0.7)	1.4	(0.4)
Oral products (e.g., feed throughs)	20.7	(1.6)	25.6	(2.1)	28.7	(3.0)	22.1	(1.2)
Other	2.3	(0.6)	2.9	(0.9)	2.0	(0.6)	2.4	(0.5)
Any	82.5	(1.5)	88.6	(1.5)	85.8	(2.5)	83.9	(1.2)

A higher percentage of operations in the Central and East regions used oral products (feed throughs) for fly control compared with operations in the West region. There were no other regional differences in the percentages of operations by type of fly control methods used.

F.4.b. Percentage of operations by fly control method(s) used during the previous 12 months, and by region:

	Percent Operations					
	Region					
	West		Central		East	
Fly control method	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Environmental fly control (sprays, foggers, strips, zippers)	33.0	(2.6)	41.0	(2.9)	40.7	(2.4)
Topical products (dust bags, dips, sprays, backrubs)	56.5	(2.8)	58.5	(2.9)	51.1	(2.5)
Treated ear tags	22.1	(2.3)	31.3	(2.6)	24.9	(2.0)
Biological control (e.g., predator wasps)	1.9	(0.8)	0.9	(0.4)	1.1	(0.5)
Oral products (e.g., feed throughs)	14.4	(1.8)	32.5	(2.8)	23.3	(2.1)
Other	2.5	(0.9)	2.7	(0.9)	2.2	(0.8)
Any	82.6	(2.1)	88.8	(2.0)	81.8	(1.9)

5. Rodent control

Rats and mice can transmit disease to cattle and can also consume and contaminate cattle feed, such as grain. On beef cow-calf operations, where cows spend much of their time on pasture, rodent control is not as important as it is on feedlots or other livestock enterprises where large amounts of grain are stored and fed.

About two-thirds of operations (66.4 percent) used some type of rodent control. About one-half of operations (48.5 percent) used cats to control rodents. A higher percentage of medium and large operations used chemicals/bait for rodent control compared with small operations. There were no other herd size differences in the percentages of operations by rodent control methods used.

F.5.a. Percentage of operations by rodent control method(s) used routinely during the previous 12 months, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Rodent control method	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Chemicals/bait	29.3	(1.8)	40.5	(2.4)	41.8	(3.2)	32.2	(1.5)
Traps	17.7	(1.6)	18.4	(1.8)	22.4	(2.5)	18.1	(1.2)
Cats	46.8	(1.9)	52.5	(2.4)	56.8	(3.2)	48.5	(1.5)
Other	1.7	(0.5)	0.9	(0.4)	0.8	(0.5)	1.5	(0.4)
Any	64.8	(1.9)	70.4	(2.1)	72.7	(3.1)	66.4	(1.5)

A higher percentage of operations in the Central region used some method of rodent control compared with operations in the West and East regions. A higher percentage of operations in the Central region used chemicals/bait and cats to control rodents compared with operations in the East region.

F.5.b. Percentage of operations by rodent control method(s) used routinely during the previous 12 months, and by region:

Rodent control method	Percent Operations					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Chemicals/bait	32.8	(2.6)	40.9	(2.8)	24.8	(2.0)
Traps	21.8	(2.3)	20.8	(2.3)	11.8	(1.7)
Cats	43.8	(2.6)	65.5	(2.7)	41.1	(2.4)
Other	1.8	(0.8)	2.1	(0.9)	0.7	(0.3)
Any	64.6	(2.6)	81.6	(2.1)	56.8	(2.4)

6. Manure disposal

A 1,000 lb beef cow can produce close to 60 lb of manure per day. Manure is a valuable fertilizer and can reduce or eliminate the need for commercial (inorganic) fertilizers on land used to grow crops or forage. For cows in confinement, such as in a dry lot used as a winter feeding pen, most manure produced is recoverable, meaning it can be scooped up using equipment such as a tractor with a loader bucket. The manure is typically emptied into a manure spreader, which is used to disperse the manure onto a field.

For cows on pasture or rangeland, however, most manure produced is not easily recoverable. One option to make better use of manure on pasture is to drag or harrow the pasture, which spreads manure evenly across the pasture. A drag or harrow is pulled by a tractor and has tines or teeth that contact the soil surface as it is pulled along. Dragging or harrowing a pasture helps to break up manure piles, which accelerates manure decomposition.

Slightly more than one-half of operations (57.4 percent) used any manure disposal method listed in the following table. A higher percentage of medium and large operations used any manure disposal method compared with small operations. Overall, 39.7 percent of operations dragged or harrowed pastures as a way to dispose of manure. There were no herd size differences in the percentage of operations that dragged or harrowed pastures. The percentage of operations that hauled and spread manure onto land used for grazing or forage production increased as herd size increased.

F.6.a. Percentage of operations by method(s) used to dispose of manure, by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Disposal method	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Drag or harrow pastures	39.4	(1.8)	41.0	(2.2)	39.2	(2.9)	39.7	(1.4)
Haul and spread onto land used for grazing or forage production for the operation	18.3	(1.5)	28.4	(2.1)	41.0	(3.2)	21.5	(1.2)
Haul and spread onto other land	12.2	(1.2)	23.0	(1.8)	27.9	(2.9)	15.2	(1.0)
Other	2.1	(0.6)	1.8	(0.6)	4.1	(1.4)	2.2	(0.5)
Any disposal	54.9	(1.8)	64.0	(2.0)	69.1	(3.0)	57.4	(1.4)

A higher percentage of operations in the Central (78.3 percent) and East (57.0 percent) regions used any method to dispose of manure compared with operations in the West region (44.2 percent). There were no regional differences in the percentage of operations that dragged or harrowed pastures. A higher percentage of operations in the Central region than in the West or East regions hauled and spread manure onto land used for grazing or forage production.

F.6.b. Percentage of operations by method(s) used to dispose of manure, by region:

	Percent Operations					
	Region					
	West		Central		East	
Disposal method	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Drag or harrow pastures	36.0	(2.4)	40.0	(2.9)	43.9	(2.1)
Haul and spread onto land used for grazing or forage production for the operation	15.1	(1.8)	38.3	(2.8)	16.1	(1.7)
Haul and spread onto other land	5.8	(1.2)	35.7	(2.5)	10.5	(1.4)
Other	3.5	(0.9)	2.5	(0.9)	0.3	(0.1)
Any disposal	44.2	(2.4)	78.3	(2.3)	57.0	(2.2)

G. Biosecurity

1. Possible contact with other animals at events

Cattle that leave the operation and return represent a possible avenue for disease introduction. Overall, 4.4 percent of operations had any cattle that left the operation to go to a show, fair, rodeo, or other event and then return to the operation. There were no herd size differences in the percentage of operations that had any cattle leave the operation to go to a show, fair, rodeo, or other event and then return.

G.1.a. Percentage of operations that, during the previous 12 months, had any cattle leave the operation* to attend a show, fair, rodeo, or other event and then return to the operation, by herd size:

Percent Operations							
Herd Size (number of beef cows)							
Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
3.8	(0.8)	5.6	(1.1)	8.9	(2.2)	4.4	(0.6)

*Excluding cattle that left the operation to graze.

For the operations that had any cattle leave the operation to attend a show, fair, rodeo, or other event and then return to the operation, the highest percentage (88.6 percent) sent the cattle to a show or fair.

G.1.b. For the 4.4 percent of operations that, during the previous 12 months, had any cattle leave the operation* to attend a show, fair, or rodeo, or other event and then return to the operation (table G.1.a.), percentage of operations by type of event attended:

Event type	Percent Operations	Std. error
Show or fair	88.6	(5.2)
Rodeo	6.5	(3.0)
Other	5.3	(4.5)

*Excluding cattle that left the operation to graze.

For the operations that had any cattle leave the operation to attend a show, fair, rodeo, or other event and then return to the operation, 61.5 percent sent cattle less than 100 miles one way.

G.1.c. For the 4.4 percent of operations that, during the previous 12 months, had any cattle leave the operation to attend a show, fair, rodeo, or other event and then return to the operation (table G.1.a.), percentage of operations by maximum one-way distance traveled:

One-way distance traveled (mi)	Percent Operations	Std. error
1–14	10.6	(3.6)
15–49	26.2	(6.2)
50–99	24.7	(7.1)
100–199	22.9	(6.2)
200 or more	15.6	(5.4)
Total	100.0	

For the operations that had any cattle leave the operation for a show, fair, rodeo, or other event and then return to the operation, almost all (98.8 percent) attended events within their State.

G.1.d. For the 4.4 percent of operations that, during the previous 12 months, had any cattle leave the operation to attend a show, fair, rodeo, or other event and then return to the operation (table G.1.a.), percentage of operations by destination:

Percent Operations							
Destination							
Within state		Adjacent state		Beyond adjacent state		International	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
98.8	(0.8)	9.6	(3.3)	2.7	(1.5)	1.6	(1.4)

Isolating cattle when they return from events is one method of mitigating some of the risk of introducing disease to the operation. For operations that had any cattle leave the operation for a show, fair, rodeo, or other event and then return to the operation, about one-half (54.3 percent) routinely isolated cattle upon their return.

G.1.e. For the 4.4 percent of operations that, during the previous 12 months, had any cattle leave the operation to attend a show, fair, rodeo, or other event and then return to the operation (table G.1.a.), percentage of operations by isolation practice used for returning cattle:

Isolation practice	Percent Operations	Std. error
Routinely isolate after return to the operation	54.3	(7.1)
Routinely isolate before return to the operation	8.2	(3.7)
Only isolate for a specific reason (e.g., disease, known exposure to disease)	13.2	(4.1)
Never isolate returning cattle	24.4	(5.8)
Total	100.0	

2. Equipment cleaning and sharing

Using the same equipment, such as a tractor with a loader bucket, to handle manure and feed presents a risk of spreading disease agents such as *Salmonella* to cattle through their feed. Most operations (83.1 percent) never used the same equipment to handle both manure and feed. A higher percentage of small operations (85.9 percent) never used the same equipment to handle both manure and feed compared with medium (76.0 percent) and large operations (70.4 percent).

G.2.a. Percentage of operations by frequency that equipment used to handle manure was also used to handle feed on the operation, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Frequency	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
At least once per week	2.6	(0.7)	4.3	(1.0)	5.8	(1.7)	3.1	(0.5)
Less frequently than once per week	11.4	(1.2)	19.6	(1.9)	23.8	(2.7)	13.7	(1.0)
Never	85.9	(1.3)	76.0	(2.0)	70.4	(2.9)	83.1	(1.1)
Total	100.0		100.0		100.0		100.0	

A lower percentage of operations in the Central region (68.1 percent) never used the same equipment to handle both manure and feed compared with operations in the West (89.3 percent) and East (87.4 percent) regions.

G.2.b. Percentage of operations by frequency that equipment used to handle manure was also used to handle feed on the operation, and by region:

	Percent Operations					
	Region					
	West		Central		East	
Frequency	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
At least once per week	2.8	(0.9)	6.3	(1.4)	1.2	(0.5)
Less frequently than once per week	8.0	(1.3)	25.7	(2.4)	11.4	(1.5)
Never	89.3	(1.5)	68.1	(2.6)	87.4	(1.5)
Total	100.0		100.0		100.0	

Sharing heavy equipment such as tractors, livestock trailers, manure spreaders, etc., presents a risk of spreading disease between operations. Producers were asked if they shared any heavy equipment with other livestock operations. Questionnaire administrators were instructed to focus on equipment that came into contact with cattle manure. For example, if a round baler was borrowed from a neighbor to bale a field of alfalfa on which cows never grazed, this would not count as “shared heavy equipment.” Conversely, if a livestock trailer was borrowed to haul cattle, this would count as shared heavy equipment.

A small percentage of operations (10.0 percent) shared heavy equipment with other livestock operations. There were no herd size differences in the percentage of operations that shared heavy equipment with other livestock operations.

G.2.c. Percentage of operations that shared any heavy equipment (e.g., tractors, feeding equipment, manure spreaders, trailers, etc.) with other livestock operations during the previous 12 months, by herd size:

Percent Operations							
Herd Size (number of beef cows)							
Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
9.7	(1.2)	11.3	(1.6)	9.0	(1.8)	10.0	(1.0)

A slightly higher percentage of operations in the Central region (13.6 percent) shared heavy equipment with other livestock operations compared with operations in the East region (6.8 percent).

G.2.d. Percentage of operations that shared any heavy equipment (e.g., tractors, feeding equipment, manure spreaders, trailers, etc.) with other livestock operations during the previous 12 months, by region:

Percent Operations					
Herd Size (number of beef cows)					
West		Central		East	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
10.3	(1.8)	13.6	(2.1)	6.8	(1.2)

For operations that shared heavy equipment during the previous 12 months, 73.7 percent did so only one to four times.

G.2.e. For the 10.0 percent of operations that shared any heavy equipment with other livestock operations during the previous 12 months (table G.2.c.), percentage of operations by number of times equipment was shared:

Number of times	Percent Operations	Std. error
1-4	73.7	(4.3)
5-9	11.3	(3.2)
10 or more	14.9	(3.3)
Total	100.0	

For operations that shared heavy equipment, 40.9 percent cleaned the shared the equipment prior to use.

G.2.f. For the 10.0 percent of operations that shared any heavy equipment with other livestock operations during the previous 12 months (table G.2.c.), percentage of operations that cleaned shared equipment prior to use:

Percent Operations	Std. error
40.9	5.1

For operations that cleaned shared heavy equipment before using it, the majority (62.7 percent) used water only for cleaning the equipment.

G.2.g. For the operations that cleaned shared heavy equipment before using it, percentage of operations by primary cleaning procedure used for the equipment:

Primary cleaning procedure	Percent Operations	Std. error
Wash equipment with water or steam only	62.7	(8.5)
Chemically disinfect only	1.2	(1.0)
Wash equipment and chemically disinfect	18.2	(6.8)
Other	17.9	(6.8)
Total	100.0	

H. Cattle Movement

1. Any cattle permanently removed

Information about cattle movement patterns on and off of beef operations can help researchers and government agencies prepare for potential disease outbreaks and better understand how diseases spread across the United States. To gain this type of information, producers were asked for the number of cattle moved onto and off of the operation, as well as the distances these cattle traveled.

For many beef cow-calf operations, weaned calves are the main product they sell each year. These cattle might go to a stocker/backgrounder operation or to a feedlot. Some cow-calf operations are also a stocker/backgrounder operation or a feedlot. Seedstock operations primarily sell heifers and bulls to be used for breeding, but these operations are also likely to have cattle that end up in feedlots.

Most operations (86.6 percent) permanently removed any cattle and calves during the previous 12 months. A higher percentage of medium and large operations permanently removed any cattle and calves compared with small operations. The majority of operations (59.1 percent) permanently removed weaned beef steers, heifers, or bulls intended for a stocker/backgrounder operation or a feedlot. A higher percentage of large operations (73.4 percent) permanently removed weaned beef steers, heifers, or bulls

intended for a stocker/backgrounder operation or a feedlot compared with small operations (55.9 percent). The percentage of operations that permanently removed any beef cows and beef bulls used for breeding increased as herd size increased.

At least one weaned beef steer, heifer, or bull intended for a stocker/backgrounder operation or a feedlot was permanently removed on 59.1 percent of operations, an unexpectedly low percentage. Other than seedstock operations, almost all operations should be removing calves for a stocker/backgrounder operation or for feeding, unless they feed out their calves themselves and sell them as fed market-weight cattle. Fed market-weight beef cattle, however, were permanently removed on only 5.0 percent of operations, so the percentage of operations that feed out their calves appears to be relatively low. It is possible that in some instances study respondents were unsure as to which cattle class to choose when filling out the questionnaire. For example, it might not have been clear how to answer the question about cattle permanently removed from the operation if the operation retained ownership of their calves after they were sent to a feedlot; in this case, these calves were still technically part of the operation. In addition, if an operation kept their calves as stockers up to yearling age, they may not have known what category was most appropriate for these cattle when they left the operation.

H.1.a. Percentage of operations that permanently removed* any beef cattle, dairy cattle, or calves during the previous 12 months, by cattle class and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Cattle class	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Unweaned beef calves with dam	6.9	(1.1)	4.9	(1.0)	8.6	(1.7)	6.6	(0.8)
Weaned beef heifers bred or intended for breeding	17.2	(1.5)	20.1	(1.9)	21.7	(2.7)	18.0	(1.2)
Beef cows	26.3	(1.8)	45.8	(2.4)	61.7	(3.3)	32.0	(1.4)
Beef bulls, weaned or older, for breeding or culled from breeding	16.5	(1.5)	25.5	(2.1)	38.8	(3.1)	19.4	(1.2)

*Excluding cattle that died on the operation.

Table cont'd →

H.1.a. (cont'd) Percentage of operations that permanently removed* any beef cattle, dairy cattle, or calves during the previous 12 months, by cattle class and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Cattle class	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Weaned beef steers, heifers, or bulls intended for backgrounding or feeding	55.9	(2.0)	67.3	(2.3)	73.4	(2.9)	59.1	(1.6)
Fed market-weight beef cattle	4.6	(0.8)	5.9	(1.0)	7.6	(1.4)	5.0	(0.7)
Any dairy cattle	0.3	(0.1)	0.1	(0.0)	0.2	(0.2)	0.2	(0.1)
Any cattle or calves	84.2	(1.5)	93.4	(1.3)	95.0	(1.5)	86.6	(1.1)

*Excluding cattle that died on the operation.

A slightly higher percentage of operations in the West region (22.1 percent) permanently removed any weaned beef heifers bred or intended for breeding compared with operations in the East region (14.1 percent). A higher percentage of operations in the Central region (8.3 percent) permanently removed fed market-weight cattle compared with operations in the East region (2.9 percent).

H.1.b. Percentage of operations that permanently removed* any beef cattle, dairy cattle, or calves during the previous 12 months, by cattle class and by region:

Percent Operations						
Region						
Cattle class	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Unweaned beef calves with dam	8.8	(1.7)	5.7	(1.3)	4.8	(0.9)
Weaned beef heifers bred or intended for breeding	22.1	(2.3)	16.8	(2.1)	14.1	(1.6)

*Excluding cattle that died on the operation.

H.1.b. (cont'd) Percentage of operations that permanently removed* any beef cattle, dairy cattle, or calves during the previous 12 months, by cattle class and by region:

Cattle class	Percent Operations					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Beef cows	30.7	(2.5)	39.2	(2.9)	28.2	(2.2)
Beef bulls, weaned or older, for breeding or culled from breeding	19.8	(2.1)	22.6	(2.4)	16.5	(1.8)
Weaned beef steers, heifers, or bulls intended for backgrounding or feeding	56.3	(2.8)	64.9	(2.8)	57.8	(2.3)
Fed market-weight beef cattle	4.6	(1.1)	8.3	(1.6)	2.9	(0.8)
Any dairy cattle	0.1	(0.0)	0.7	(0.3)	0.1	(0.1)
Any cattle or calves	87.3	(2.0)	90.1	(1.8)	83.0	(2.0)

*Excluding cattle that died on the operation.

As expected, of cattle and calves permanently removed from the operation, the majority (71.3 percent) were weaned beef steers, heifers, or bulls intended for backgrounding or feeding. With the exception of dairy cattle, there were no herd size differences in the percentages of any class of cattle permanently removed from the operation.

H.1.c. For the 86.6 percent of operations that permanently removed any cattle or calves during the previous 12 months (table H.1.a.), percentage of cattle and calves removed, by cattle class and by herd size:

Percent Cattle and Calves								
Herd Size (number of beef cows)								
	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Cattle class	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Unweaned beef calves with dam	5.7	(1.1)	2.2	(0.9)	5.5	(1.4)	4.1	(0.8)
Weaned beef heifers bred or intended for breeding	11.8	(1.5)	7.0	(2.5)	6.9	(1.4)	8.1	(1.4)
Beef cows	8.9	(1.0)	6.0	(2.1)	8.5	(0.8)	7.5	(1.2)
Beef bulls, weaned or older, for breeding or culled from breeding	4.4	(0.7)	2.2	(0.8)	2.8	(0.8)	2.9	(0.5)
Weaned beef steers, heifers, or bulls intended for backgrounding or feeding	64.5	(2.3)	77.5	(7.7)	67.9	(2.7)	71.3	(4.4)
Fed market-weight beef cattle	4.0	(0.8)	5.0	(2.3)	8.3	(2.0)	5.9	(1.3)
Any dairy cattle	0.8	(0.3)	0.1	(0.1)	0.0	(0.0)	0.2	(0.1)
Total	100.0		100.0		100.0		100.0	

On operations in which any cattle or calves were permanently removed from the operation, there were no regional differences in the percentages of any class of cattle removed.

H.1.d. For the 86.6 percent of operations that permanently removed any cattle or calves during the previous 12 months (table H.1.a.), percentage of cattle and calves removed, by cattle class and by region:

	Percent Cattle and Calves					
	Region					
	West		Central		East	
Cattle class	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Unweaned beef calves with dam	6.1	(1.2)	2.7	(1.2)	4.1	(0.9)
Weaned beef heifers bred or intended for breeding	8.5	(0.9)	7.0	(2.4)	10.5	(1.4)
Beef cows	9.3	(0.9)	5.5	(1.7)	9.4	(1.4)
Beef bulls, weaned or older, for breeding or culled from breeding	3.7	(0.5)	1.8	(0.7)	4.4	(0.7)
Weaned beef steers, heifers, or bulls intended for backgrounding or feeding	68.3	(1.8)	75.0	(7.9)	66.9	(2.3)
Fed market-weight beef cattle	3.8	(0.9)	7.8	(2.9)	4.5	(1.4)
Any dairy cattle	0.3	(0.1)	0.2	(0.1)	0.3	(0.2)
Total	100.0		100.0		100.0	

The ratio of the number of cattle permanently removed from the operation to the number of beef cows in inventory gives some indication of turnover in the cattle population. For operations that permanently removed any cattle or calves during the previous 12 months, the highest percentage (47.6 percent) permanently removed from 0.5 and 0.99 cattle per beef cow in inventory on October 1, 2017. Almost a one-quarter of operations (23.8 percent) permanently removed at least as many cattle as there were beef cows in inventory, which suggests that these operations sold all of their calves. A higher percentage of medium and large operations permanently removed from 0.5 and 0.99 cattle per beef cow in inventory compared with small operations. For an operation with 200 cows, a ratio of 0.5 to 0.99 means that from 100 to 198 cattle or calves were removed from the operation.

H.1.e. For the 86.6 percent of operations that permanently removed any cattle or calves during the previous 12 months (table H.1.a.), percentage of operations by ratio of cattle and calves removed relative to October 1, 2017, beef cow inventory, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Ratio of cattle and calves removed*	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Less than 0.05	0.9	(0.3)	2.0	(0.8)	2.5	(1.0)	1.2	(0.3)
0.05 to <0.5	29.1	(2.0)	25.4	(2.3)	12.2	(2.0)	27.4	(1.6)
0.5 to <1.0	44.5	(2.2)	55.1	(2.5)	59.4	(3.4)	47.6	(1.7)
1.0 or more	25.6	(1.9)	17.6	(1.9)	25.8	(3.3)	23.8	(1.5)
Total	100.0		100.0		100.0		100.0	

*(Number of cattle and calves removed / October 1, 2017, beef cow inventory).

There were no regional differences in the percentages of operations by ratio of cattle permanently removed relative to the October 1, 2017, beef cow inventory.

H.1.f. For the 86.6 percent of operations that permanently removed any cattle or calves during the previous 12 months (table H.1.a.), percentage of operations by ratio of cattle and calves removed relative to the October 1, 2017, beef cow inventory, and by region:

Ratio of cattle and calves removed*	Percent Operations					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Less than 0.05	1.5	(0.5)	1.4	(0.7)	0.8	(0.3)
0.05 to <0.5	30.1	(2.8)	25.6	(2.9)	25.5	(2.3)
0.5 to <1.0	47.2	(2.9)	44.6	(3.1)	50.4	(2.6)
1.0 or more	21.2	(2.4)	28.4	(2.8)	23.4	(2.3)
Total	100.0		100.0		100.0	

*(Number of cattle and calves removed / October 1, 2017, beef cow inventory).

For operations that permanently removed any cattle or calves during the previous 12 months, the ratio of cattle permanently removed relative to the October 1, 2017, beef cow inventory was 0.908, which means that a slightly smaller number of cattle permanently left the operation compared with the number of beef cows in inventory. The ratio of cattle that permanently left the operation relative to beef cows in inventory was slightly higher on large operations than on small operations.

H.1.g. For the 86.6 percent of operations that permanently removed any cattle or calves during the previous 12 months (table H.1.a.), ratio of cattle and calves removed relative to the October 1, 2017, beef cow inventory, by herd size:

Ratio of Cattle and Calves*							
Herd Size (number of beef cows)							
Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
0.701	(0.024)	1.131	(0.375)	0.864	(0.038)	0.908	(0.133)

*(Number of cattle and calves removed / October 1, 2017, beef cow inventory).

There were no regional differences in the ratio of cattle or calves that permanently left the operation relative to the October 1, 2017, beef cow inventory.

H.1.h. For the 86.6 percent of operations that permanently removed any cattle or calves during the previous 12 months (table H.1.a.), ratio of cattle and calves that permanently left the operation relative to the October 1, 2017, beef cow inventory, by region:

Ratio of Cattle and Calves*					
Region					
West		Central		East	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
0.723	(0.019)	1.239	(0.370)	0.724	(0.041)

*(Number of cattle and calves removed / October 1, 2017, beef cow inventory).

The term “culling rate” usually refers to the number of cows removed each year as a percentage of cow inventory, excluding cows that died. Dairy operations have a typical culling rate of about 30 percent. Culling rates are much lower on beef operations. Only 32.0 percent of beef operations permanently removed any beef cows, and, on these operations, the ratio of cows removed relative to the October 1, 2017, beef cow inventory was 0.129, or about 13 percent. Small operations had a higher ratio of cows permanently removed relative to the beef cow inventory compared with large operations.

H.1.i. For the 32.0 percent of operations that permanently removed any **beef cows** during the previous 12 months (table H.1.a), ratio of beef cows that left the operation relative to the October 1, 2017, beef cow inventory, by herd size:

Ratio of Beef Cows*							
Herd Size (number of beef cows)							
Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
0.176	(0.018)	0.135	(0.017)	0.103	(0.008)	0.129	(0.008)

*(Number of beef cows removed / October 1, 2017, beef cow inventory).

There were no regional differences in the ratio of beef cows permanently removed relative to the October 1, 2017, beef cow inventory.

H.1.j. For the 32.0 percent of operations that permanently removed any **beef cows** during the previous 12 months (table H.1.a), ratio of beef cows that left the operation relative to the October 1, 2017, beef cow inventory, by region:

Ratio of Beef Cows*					
Region					
West		Central		East	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
0.131	(0.012)	0.118	(0.012)	0.144	(0.019)

*(Number of beef cows removed / October 1, 2017, beef cow inventory).

For operations that permanently removed any cattle or calves during the previous 12 months, the vast majority (86.3 percent) sent these cattle to a sale barn or auction facility. A higher percentage of large operations sent cattle directly to slaughter compared with small operations. In addition, a higher percentage of large operations sent cattle directly to a stocker/backgrounder or feedlot compared with medium and small operations.

H.1.k. For the 86.6 percent of operations that permanently removed any cattle or calves during the previous 12 months (table H.1.a.), percentage of operations by destination of cattle and calves, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Destination	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Slaughter	9.9	(1.3)	13.3	(1.7)	17.8	(2.3)	11.1	(1.0)
Sale barn/auction	85.0	(1.5)	90.1	(1.5)	88.7	(1.8)	86.3	(1.2)
Feedlot	2.8	(0.7)	6.3	(1.0)	20.5	(2.4)	4.5	(0.6)

Table cont'd →

H.1.k. (cont'd) For the 86.6 percent of operations that permanently removed any cattle or calves during the previous 12 months (table H.1.a.), percentage of operations by destination of cattle and calves, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Destination	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Stocker/backgrounder	1.7	(0.5)	2.2	(0.7)	10.2	(2.4)	2.3	(0.4)
Another cow-calf operation	8.5	(1.2)	7.3	(1.1)	13.6	(2.2)	8.5	(0.9)
Order buyer/dealer	3.9	(0.9)	5.1	(1.1)	8.8	(1.6)	4.4	(0.7)
Other	0.3	(0.2)	0.3	(0.2)	0.7	(0.5)	0.4	(0.2)

On operations that permanently removed any cattle or calves, there were no regional differences in the percentages of operations by destination of removed cattle.

H.1.l. For the 86.6 percent of operations that permanently removed any cattle or calves during the previous 12 months (table H.1.a.), percentage of operations by destination of cattle and calves, and by region:

Percent Operations						
Herd Size (number of beef cows)						
	West		Central		East	
Destination	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Slaughter	11.8	(1.7)	14.0	(2.2)	7.7	(1.3)
Sale barn/auction	83.9	(2.2)	89.5	(2.0)	86.6	(1.7)
Feedlot	4.4	(0.7)	6.1	(1.4)	3.3	(0.9)
Stocker/backgrounder	1.5	(0.4)	3.0	(0.9)	2.7	(0.7)
Another cow-calf operation	11.3	(1.8)	6.5	(1.6)	6.8	(1.2)
Order buyer/dealer	5.5	(1.4)	3.4	(1.1)	3.9	(0.9)
Other	0.1	(0.1)	0.7	(0.5)	0.3	(0.3)

On operations that permanently removed cattle and calves, a higher percentage of cattle from small operations (82.3 percent) went to a sale barn or auction facility compared with cattle from large operations (52.1 percent). A higher percentage of cattle and calves from large operations went directly to a feedlot or stocker/backgrounder compared with cattle and calves from small operations.

H.1.m. For the 86.6 percent of operations that permanently removed any cattle or calves during the previous 12 months (table H.1.a.), percentage of cattle and calves removed, by destination and by herd size:

Percent Cattle and Calves								
Herd Size (number of beef cows)								
Destination	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Slaughter	3.8	(0.7)	4.6	(2.1)	7.8	(1.4)	5.4	(1.1)
Sale barn/auction	82.3	(2.1)	50.6	(16.8)	52.1	(3.2)	58.6	(8.6)
Feedlot	3.5	(1.0)	37.5	(20.8)	19.4	(2.4)	23.6	(11.2)
Stocker/backgrounder	2.0	(0.6)	1.4	(0.7)	8.7	(1.9)	3.9	(0.9)
Another cow-calf operation	4.5	(1.1)	2.3	(0.9)	3.9	(0.7)	3.3	(0.6)
Order buyer/dealer	3.6	(1.3)	3.4	(1.4)	8.0	(2.2)	4.9	(1.1)
Other	0.3	(0.2)	0.2	(0.2)	0.0	(0.0)	0.2	(0.1)
Total	100.0		100.0		100.0		100.0	

Of cattle and calves that permanently left the operation, a slightly higher percentage of cattle in the West region left for another cow-calf operation compared with cattle in the Central region. There were no other regional differences by destination of removed cattle.

H.1.n. For the 86.6 percent of operations that permanently removed any cattle or calves during the previous 12 months (table H.1.a.), percentage of cattle and calves removed, by destination and by region:

Destination	Percent Cattle and Calves					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Slaughter	3.3	(0.7)	6.8	(2.5)	5.6	(1.5)
Sale barn/auction	64.8	(2.1)	50.1	(15.0)	70.5	(4.2)
Feedlot	15.2	(1.7)	33.9	(19.7)	10.9	(3.3)
Stocker/backgrounder	4.4	(1.0)	4.0	(1.7)	2.9	(0.8)
Another cow-calf operation	5.8	(0.9)	1.5	(0.6)	3.9	(0.9)
Order buyer/dealer	6.5	(1.1)	3.6	(1.8)	5.9	(1.4)
Other	0.1	(0.1)	0.2	(0.2)	0.3	(0.2)
Total	100.0		100.0		100.0	

Information about cattle movement on and off the operation can help researchers and government agencies prepare for potential disease outbreaks and provide a better understanding about how diseases spread across the United States. The distance cattle travel is also an important piece of information related to potential disease spread.

For this report, a shipment was defined as a group of cattle moved all at once, regardless of the number of cattle in the shipment or the number of vehicles used to move the group. More than one-half of all shipments (60.4 percent) traveled an average distance of 10 to 49 miles from the operation to the destination. A higher percentage of cattle shipments from small operations traveled an average of 1 to 9 miles or 10 to 49 miles compared with cattle shipments from large operations. In addition, a higher percentage of cattle shipments from large operations (29.0 percent) traveled 100 miles or more compared with cattle shipments from medium or small operations (11.0 and 5.1 percent, respectively).

H.1.o. For the 86.6 percent of operations that permanently removed any cattle or calves during the previous 12 months (table H.1.a.), percentage of shipments by average distance traveled from the operation to the destination, and by herd size:

Percent Shipments								
Herd Size (number of beef cows)								
	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Average distance (mi)	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
1–9	9.9	(1.3)	7.2	(1.3)	4.1	(1.2)	8.3	(0.8)
10–49	66.8	(2.3)	58.9	(2.8)	37.1	(3.9)	60.4	(1.7)
50–99	18.1	(1.9)	22.9	(2.6)	29.7	(4.4)	21.1	(1.5)
100–249	4.4	(1.2)	7.1	(1.3)	18.7	(2.8)	7.1	(0.9)
250–499	0.5	(0.3)	3.2	(1.1)	5.4	(1.3)	2.0	(0.4)
500 or more	0.2	(0.2)	0.7	(0.2)	4.9	(1.1)	1.0	(0.2)
Total	100.0		100.0		100.0		100.0	

A slightly higher percentage of cattle shipments from operations in the West region traveled an average distance of 500 or more miles compared with shipments from the Central region.

H.1.p. For the 86.6 percent of operations that permanently removed any cattle or calves during the previous 12 months (table H.1.a.), percentage of shipments by average distance traveled from the operation to the destination, and by region:

	Percent Shipments					
	Region					
	West		Central		East	
Average distance (mi)	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
1–9	7.1	(1.2)	8.5	(1.8)	9.8	(1.4)
10–49	58.5	(2.8)	59.4	(3.1)	63.7	(2.7)
50–99	20.5	(2.3)	21.8	(2.9)	21.3	(2.5)
100–249	9.8	(1.8)	8.6	(1.5)	2.3	(0.7)
250–499	2.6	(0.8)	1.5	(0.4)	1.7	(0.7)
500 or more	1.5	(0.3)	0.3	(0.2)	1.1	(0.4)
Total	100.0		100.0		100.0	

On average, 2.5 shipments were made to a sale barn/auction, and 3.3 shipments were made to all destinations.

H.1.q. For the 86.6 percent of operations that permanently removed any cattle or calves during the previous 12 months (table H.1.a.), average number of shipments per operation, by destination and by herd size:

Average Number of Shipments								
Herd Size (number of beef cows)								
Destination	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error
Slaughter	0.2	(0.0)	0.3	(0.1)	0.9	(0.2)	0.2	(0.0)
Sale barn/auction	2.0	(0.1)	3.6	(0.2)	5.0	(0.3)	2.5	(0.1)
Feedlot	0.0	(0.0)	0.1	(0.0)	0.7	(0.1)	0.1	(0.0)
Stocker/backgrounder	0.0	(0.0)	0.1	(0.0)	0.3	(0.1)	0.1	(0.0)
Another cow-calf operation	0.2	(0.0)	0.3	(0.1)	1.5	(0.4)	0.3	(0.0)
Order buyer/dealer	0.1	(0.0)	0.1	(0.0)	0.2	(0.1)	0.1	(0.0)
Other	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)
All destinations	2.5	(0.1)	4.6	(0.2)	8.6	(0.6)	3.3	(0.1)

There were no regional differences in the percentages of shipments that went directly to a sale barn/auction or to all destinations.

H.1.r. For the 86.6 percent of operations that permanently removed any cattle or calves during the previous 12 months (table H.1.a.), average number of shipments per operation, by destination and by region:

Destination	Average Number of Shipments					
	Region					
	West		Central		East	
	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error
Slaughter	0.2	(0.0)	0.4	(0.1)	0.2	(0.0)
Sale barn/auction	2.5	(0.1)	2.8	(0.1)	2.4	(0.1)
Feedlot	0.1	(0.0)	0.1	(0.0)	0.1	(0.0)
Stocker/backgrounder	0.0	(0.0)	0.1	(0.0)	0.1	(0.0)
Another cow-calf operation	0.3	(0.1)	0.3	(0.1)	0.2	(0.0)
Order buyer/dealer	0.1	(0.0)	0.1	(0.0)	0.1	(0.0)
Other	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)
All destinations	3.2	(0.1)	3.7	(0.2)	3.1	(0.1)

2. Destination of weaned beef calves intended for feedlot, backgrounder, or stocker operations

For many beef cow-calf operations, weaned calves are the main product they sell each year. These calves might go to a feedlot or stocker/backgrounder operation. Some cow-calf operations are also stocker/backgrounder operations, and some also operate a feedlot. The tables in this section provide information on the destinations of weaned beef steers, heifers, or bulls permanently removed from the operation and intended for stocker/backgrounder operations or a feedlot.

Of operations that permanently removed any weaned beef steers, heifers, or bulls intended for a feedlot or backgrounding (stockers or backgrounders), the highest percentage (89.7 percent) sent these cattle to a sale barn/auction. There were no herd size differences in the percentage of operations that sent these cattle to a sale barn or auction facility. A higher percentage of large operations sent these cattle directly to a feedlot or to a stocker/backgrounder operation compared with medium and small operations.

H.2.a. For the 59.1 percent of operations that permanently removed any weaned beef steers, heifers, or bulls intended for backgrounding or feeding (feeders or stockers) during the previous 12 months (table H.1.a.), percentage of operations by destination of animals removed, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Destination	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Sale barn/auction	88.9	(1.7)	91.2	(1.7)	92.8	(1.8)	89.7	(1.3)
Feedlot	3.4	(1.0)	6.7	(1.2)	24.0	(3.0)	5.4	(0.8)
Stocker/backgrounder	2.2	(0.7)	2.1	(0.8)	11.7	(3.0)	2.8	(0.5)
Another cow-calf operation	6.3	(1.3)	7.0	(1.3)	13.2	(2.5)	6.9	(1.0)
Order buyer/dealer	3.5	(1.0)	5.5	(1.2)	9.4	(2.0)	4.3	(0.8)
Other	0.5	(0.3)	0.5	(0.3)	0.9	(0.7)	0.5	(0.3)

There were no regional differences in the percentages of operations by destination of weaned beef steers, heifers, or bulls intended for a feedlot or backgrounding.

H.2.b. For the 59.1 percent of operations that permanently removed any weaned beef steers, heifers, or bulls intended for backgrounding or feeding (feeders or stockers) during the previous 12 months (table H.1.a), percentage of operations by destination of animals removed, and by region:

Destination	Percent Operations					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Sale barn/auction	89.6	(2.3)	92.1	(2.2)	87.7	(2.0)
Feedlot	5.6	(0.9)	6.7	(1.9)	4.1	(1.3)
Stocker/backgrounder	1.9	(0.6)	3.6	(1.3)	3.0	(0.9)
Another cow-calf operation	8.5	(1.8)	5.8	(1.8)	6.0	(1.3)
Order buyer/dealer	6.2	(1.8)	2.0	(0.9)	4.2	(1.0)
Other	0.2	(0.1)	1.0	(0.7)	0.5	(0.4)

There was no substantial difference in the percentage of weaned beef steers, heifers, or bulls intended for a feedlot or backgrounding that went to a sale barn or auction facility compared with the percentage that went directly to a feedlot. Cattle that went to a sale barn or auction facility most likely went either to a feedlot or stocker/backgrounder after purchase.

H.2.c. For the 59.1 percent of operations that permanently removed any weaned beef steers, heifers, or bulls intended for backgrounding or feeding (stockers or feeders) during the previous 12 months (table H.1.a), percentage of cattle by destination of animals removed:

Destination	Percent Cattle	Std. error
Sale barn/auction	59.4	(11.2)
Feedlot	28.8	(13.3)
Stocker/backgrounder	3.6	(1.0)
Another cow-calf operation	2.9	(0.7)
Order buyer/dealer	5.1	(1.4)
Other	0.2	(0.1)
Total	100.0	

3. Cattle brought onto the operation

Cattle are brought onto operations for various reasons. For example, new bulls might be brought onto the operation to replace bulls that were culled to prevent inbreeding. Some cows are usually culled each year for various reasons, and in order to maintain the same herd size, these cows need to be replaced. Many operations raise their own heifers to replace culled cows, while some operations buy replacement heifers.

The percentage of operations that brought a new bull onto the operation increased as herd size increased. Overall, 18.8 percent of operations brought on beef bulls intended for breeding. About a one-third of operations (32.9 percent) brought on any new cattle or calves in the previous 12 months.

H.3.a. Percentage of operations that brought any cattle or calves onto the operation during the previous 12 months, by cattle class and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Cattle class	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Unweaned beef calves with dam	1.6	(0.4)	2.1	(0.6)	2.5	(0.8)	1.7	(0.4)
Weaned beef heifers, bred or intended for breeding	8.4	(1.2)	6.8	(1.2)	10.4	(1.8)	8.2	(0.9)
Beef cows	6.4	(1.0)	8.8	(1.3)	11.6	(2.1)	7.1	(0.8)
Beef bulls, weaned or older, for breeding	14.5	(1.4)	28.8	(2.2)	42.8	(3.3)	18.8	(1.2)
Weaned beef steers, heifers, or bulls intended for backgrounding or feeding	2.1	(0.6)	4.1	(0.9)	6.2	(1.9)	2.7	(0.5)
Any dairy cattle	0.3	(0.1)	0.1	(0.1)	0.3	(0.2)	0.2	(0.1)

*Includes dams with calves, breeding heifers, and beef cows.

Table cont'd →

H.3.a. (cont'd) Percentage of operations that brought any cattle or calves onto the operation during the previous 12 months, by cattle class and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Cattle class	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Any cattle or calves	28.2	(1.8)	43.5	(2.4)	60.1	(3.2)	32.9	(1.5)
Any beef breeding females*	15.1	(1.5)	16.0	(1.7)	20.9	(2.5)	15.6	(1.2)

*Includes dams with calves, breeding heifers, and beef cows.

A lower percentage of operations in the East region brought on any cattle or calves (24.5 percent) and any bulls intended for breeding (12.1 percent) compared with operations in the West and Central regions.

H.3.b. Percentage of operations that brought on any cattle or calves onto the operation during the previous 12 months, by cattle class and by region:

Percent Operations						
Region						
Cattle class	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Unweaned beef calves with dam	1.7	(0.5)	2.3	(0.8)	1.4	(0.6)
Weaned beef heifers, bred or intended for breeding	9.1	(1.7)	9.0	(1.8)	6.4	(1.3)
Beef cows	7.7	(1.4)	6.6	(1.3)	6.8	(1.3)
Beef bulls, weaned or older, for breeding	20.2	(2.1)	25.5	(2.4)	12.1	(1.5)
Weaned beef steers, heifers, or bulls intended for backgrounding or feeding	3.2	(0.9)	2.7	(0.7)	2.2	(0.7)

*Includes dams with calves, breeding heifers, and beef cows.

Table cont'd →

H.3.b. (cont'd) Percentage of operations that brought on any cattle or calves onto the operation during the previous 12 months, by cattle class and by region:

Cattle class	Percent Operations					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Any dairy cattle	0.1	(0.1)	0.1	(0.1)	0.5	(0.3)
Any cattle or calves	35.1	(2.6)	40.6	(2.8)	24.5	(2.1)
Any beef breeding females*	17.3	(2.1)	16.1	(2.1)	13.1	(1.7)

*Includes dams with calves, breeding heifers, and beef cows.

For operations that brought on any cattle or calves, about one-third (34.0 percent) brought on cattle and calves at a ratio of 0.05 to less than 0.25 of their October 1, 2017, beef cow inventory. For an operation with 200 beef cows, a ratio of 0.05 to less than 0.25 indicates that the operation brought on 10 to 50 cattle or calves. Likewise, for an operation with 200 cows, a ratio of 1.0 or more indicates that the operation brought on at least 200 cattle or calves.

Of operations that brought on any cattle or calves, the percentage that brought on a ratio of cattle and calves relative to the October 1, 2017, beef cow inventory of less than 0.02 increased as herd size increased. More than one-half of large operations (54.7 percent) brought on a ratio of less than 0.02 cattle and calves. A higher percentage of small operations than medium and large operations brought on cattle and calves equivalent to 0.25 to less than 1.0 of their October 1, 2017, beef cow inventory.

H.3.c. For the 32.9 percent of operations that brought any cattle or calves onto the operation during the previous 12 months (table H.3.a), percentage of operations by ratio of new cattle and calves relative to the October 1, 2017, beef cow inventory, and by herd size:

Ratio of cattle and calves brought on*	Percent Operations							
	Herd Size (number of beef cows)							
	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Less than 0.02	3.1	(1.2)	34.8	(3.7)	54.7	(4.3)	16.2	(1.5)
0.02 to <0.05	15.4	(2.6)	22.7	(3.1)	9.4	(2.4)	16.8	(1.9)
0.05 to <0.25	39.9	(3.8)	24.6	(3.4)	19.7	(3.3)	34.0	(2.6)
0.25 to <1.0	31.7	(3.7)	13.5	(2.5)	9.8	(2.2)	24.8	(2.5)
1.0 or more	10.0	(2.3)	4.4	(1.1)	6.5	(2.8)	8.2	(1.5)
Total	100.0		100.0		100.0		100.0	

*(Number of cattle and calves brought on / October 1, 2017, beef cow inventory).

For the operations that brought any cattle or calves onto the operation during the previous 12 months, a higher percentage of operations in the Central region (26.6 percent) brought on a ratio of less than 0.02 cattle and calves relative to the October 1, 2017, beef cow inventory than operations in the West and East regions (12.9 and 9.2 percent, respectively). A higher percentage of operations in the West region (31.5 percent) brought on a ratio of 0.25 to less than 1.0 cattle and calves relative to the October 1, 2017, beef cow inventory than operations in the Central region (15.5 percent).

H.3.d. For the 32.9 percent of operations that brought any cattle or calves onto the operation during the previous 12 months (table H.3.a.), percentage of operations by ratio of new cattle and calves relative to October 1, 2017, beef cow inventory, and by region:

	Percent Operations					
	Region					
	West		Central		East	
Ratio of cattle and calves brought on*	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Less than 0.02	12.9	(2.1)	26.6	(3.4)	9.2	(1.9)
0.02 to <0.05	17.3	(3.0)	17.3	(3.6)	15.4	(2.7)
0.05 to <0.25	30.2	(4.2)	33.9	(4.5)	40.6	(4.9)
0.25 to <1.0	31.5	(4.5)	15.5	(3.2)	24.8	(4.5)
1.0 or more	8.1	(2.7)	6.8	(1.8)	10.0	(3.0)
Total	100.0		100.0		100.0	

*(Number of cattle and calves brought on / October 1, 2017, beef cow inventory).

For the operations that brought any cattle or calves onto the operation during the previous 12 months, the overall ratio of cattle and calves brought on the operation to the number of beef cows in inventory on October 1, 2017, was about 0.3. In other words, about one-third the number of cattle came onto the operation compared with the number of beef cows in inventory. There were no differences by herd size.

H.3.e. For the 32.9 percent of operations that brought any cattle or calves onto the operation during the previous 12 months (table H.3.a.), ratio of cattle and calves brought onto the operation relative to the October 1, 2017, beef cow inventory, by herd size:

Ratio of Cattle and Calves*							
Herd Size (number of beef cows)							
Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
0.342	(0.049)	0.378	(0.115)	0.219	(0.047)	0.298	(0.046)

*(Number of cattle and calves brought on / October 1, 2017, beef cow inventory).

On operations that brought on any cattle or calves, 51.4 percent of cattle or calves brought on were weaned beef steers, heifers, or bulls intended for backgrounding or feeding. Medium operations brought on a higher percentage of weaned beef steers, heifers, or bulls intended for backgrounding or feeding (68.9 percent) than small operations (30.9 percent). In interpreting these percentages, however, one should keep in mind that only 4.1 percent of medium operations and 2.7 percent of all operations brought on any weaned beef steers, heifers, or bulls intended for backgrounding or feeding. Thus, a relatively small percentage of operations brought on weaned beef steers, heifers, or bulls intended for backgrounding or feeding, but operations that do are bringing on large numbers of animals.

Small operations brought on a higher percentage of weaned beef heifers that were already bred or were intended for breeding (32.9 percent) than medium and large operations (7.9 percent and 13.9 percent, respectively).

H.3.f. For the 32.9 percent of operations that brought any cattle or calves onto the operation during the previous 12 months (table H.3.a.), percentage of cattle and calves brought on, by cattle class and by herd size:

Percent Cattle and Calves								
Herd Size (number of beef cows)								
Cattle class	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Unweaned beef calves with dam	2.8	(1.0)	9.8	(6.3)	8.1	(3.6)	7.6	(2.9)
Weaned beef heifers, bred or intended for breeding	32.9	(5.7)	7.9	(3.1)	13.9	(3.9)	15.9	(3.0)
Beef cows	21.8	(5.3)	8.2	(2.9)	27.7	(12.0)	18.0	(5.2)
Beef bulls, weaned or older, for breeding	8.4	(1.8)	3.6	(1.2)	5.5	(0.9)	5.4	(0.9)
Weaned beef steers, heifers, or bulls intended for backgrounding or feeding	30.9	(8.1)	68.9	(10.5)	43.8	(9.9)	51.4	(7.5)
Any dairy cattle	3.2	(2.2)	1.7	(1.3)	0.9	(0.9)	1.8	(0.8)
Total	100.0		100.0		100.0		100.0	

For operations that brought on any cattle or calves, 58.9 percent sourced these animals from a beef cattle operation. Over one-fourth of operations (27.5 percent) brought on cattle or calves sourced from a sale barn/auction. There were no differences by herd size in the percentages of operations by source of animals.

H.3.g. For the 32.9 percent of operations that brought any cattle or calves onto the operation during the previous 12 months (table H.3.a.), percentage of operations by source of cattle and calves, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Source	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Beef cattle operation	62.1	(3.8)	52.7	(3.8)	54.6	(4.4)	58.9	(2.6)
Dairy cattle operation	2.4	(1.1)	2.5	(1.1)	1.6	(1.1)	2.4	(0.8)
Sale barn/auction	24.0	(3.2)	33.8	(3.6)	33.9	(4.0)	27.5	(2.3)
Livestock dealer	8.3	(2.2)	13.7	(2.5)	16.3	(3.8)	10.5	(1.6)
Other	9.9	(2.3)	7.8	(2.0)	8.6	(2.2)	9.2	(1.6)

For operations that brought on any cattle or calves, over one-half in each region sourced cattle and calves from other beef cattle operations. There were no regional differences in the percentages of operations by source of cattle and calves.

H.3.h. For the 32.9 percent of operations that brought any cattle or calves onto the operation during the previous 12 months (table H.3.a.), percentage of operations by source of cattle and calves, and by region:

Source	Percent Operations					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Beef cattle operation	61.0	(4.4)	57.0	(4.3)	57.8	(4.8)
Dairy cattle operation	1.2	(0.6)	1.5	(0.9)	5.5	(2.7)
Sale barn/auction	23.7	(3.9)	31.2	(3.8)	29.5	(4.4)
Livestock dealer	10.6	(2.8)	13.1	(2.9)	7.1	(2.2)
Other	11.3	(2.9)	8.7	(2.7)	6.2	(1.9)

On operations that brought on any cattle or calves, 45.3 percent of cattle and calves brought on were sourced from beef cattle operations. The percentage of cattle or calves sourced from sale barns/auctions (37.2 percent) was similar to the percentage of cattle or calves sourced from beef cattle operations. There were no substantial differences by herd size in the percentages of cattle by source.

H.3.i. For the 32.9 percent of operations that brought any cattle or calves onto the operation during the previous 12 months (table H.3.a.), percentage of cattle and calves by source of animals, and by herd size:

Percent Cattle and Calves								
Herd Size (number of beef cows)								
Source	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Beef cattle operation	38.8	(6.7)	50.2	(14.9)	43.6	(11.4)	45.3	(8.0)
Dairy cattle operation	2.8	(1.7)	1.9	(1.2)	0.6	(0.4)	1.7	(0.7)
Sale barn/auction	46.4	(7.5)	29.2	(9.8)	40.9	(9.9)	37.2	(6.3)
Livestock dealer	8.5	(3.5)	17.0	(9.1)	12.4	(5.2)	13.5	(4.3)
Other	3.5	(1.4)	1.7	(0.9)	2.5	(1.4)	2.4	(0.7)
Total	100.0		100.0		100.0		100.0	

On operations that brought on any cattle and calves, a higher percentage of cattle and calves in the West region than in the Central region were sourced from beef cattle operations (59.5 and 22.1 percent, respectively) In the Central region, 54.2 percent of cattle and calves brought on came from sale barns/auctions, but this percentage is not substantially different than the percentage of cattle sourced from sale barns/auctions in the Central and East regions.

H.3.j. For the 32.9 percent of operations that brought any cattle or calves onto the operation during the previous 12 months (table H.3.a.), percentage of cattle and calves, by source of animals and by region:

Source	Percent Cattle and Calves					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Beef cattle operation	59.5	(12.1)	22.1	(5.8)	57.7	(15.1)
Dairy cattle operation	0.5	(0.3)	1.6	(1.1)	5.2	(3.1)
Sale barn/auction	26.0	(8.9)	54.2	(7.6)	30.1	(11.6)
Livestock dealer	11.9	(6.8)	19.2	(7.3)	5.2	(2.5)
Other	2.2	(1.0)	2.8	(1.4)	1.9	(1.0)
Total	100.0		100.0		100.0	

Information on cattle movement, such as the distance cattle travel, is important to researchers working on topics such as modeling the potential spread of foot-and-mouth disease.

On operations that brought on any cattle or calves, 44.5 percent of cattle shipments traveled an average distance of 10 to 49 miles. A higher percentage of shipments on small operations (15.2 percent) traveled 1 to 9 miles compared with medium and large herds (6.7 percent and 4.7 percent, respectively). A higher percentage of cattle shipments from small operations (53.3 percent) traveled 10 to 49 miles compared with shipments from large operations (22.7 percent).

H.3.k. For the 32.9 percent of operations that brought any cattle or calves onto the operation during the previous 12 months (table H.3.a.), percentage of cattle shipments by average distance traveled from the source of animals to the operation, and by herd size:

Percent Shipments								
Herd Size (number of beef cows)								
Average distance (mi)	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
1–9	15.2	(2.4)	6.7	(1.8)	4.7	(1.4)	11.0	(1.4)
10–49	53.3	(4.2)	39.8	(4.5)	22.7	(4.4)	44.5	(2.9)
50–99	17.2	(2.7)	24.6	(3.7)	25.8	(5.4)	20.7	(2.1)
100–249	8.9	(3.0)	15.1	(3.1)	18.7	(3.2)	12.3	(1.9)
250–499	3.6	(1.3)	11.8	(3.6)	13.0	(4.0)	7.5	(1.5)
500 or more	1.7	(1.3)	2.1	(0.9)	15.2	(5.4)	3.9	(1.2)
Total	100.0		100.0		100.0		100.0	

For operations that brought on any cattle or calves, a higher percentage of shipments in the West region (17.3 percent) than in the East region (5.4 percent) traveled 100 to 249 miles.

H.3.I. For the 32.9 percent of operations that brought any cattle or calves onto the operation during the previous 12 months (table H.3.a.), percentage of shipments by average distance traveled from the source of animals to the operation, and by region:

	Percent Shipments					
	Region					
	West		Central		East	
Distance (mi)	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
1–9	11.4	(2.2)	9.2	(2.3)	12.5	(2.9)
10–49	39.4	(4.2)	40.5	(5.1)	56.8	(5.9)
50–99	20.6	(3.1)	24.2	(4.0)	16.9	(3.7)
100–249	17.3	(4.0)	11.8	(2.2)	5.4	(1.5)
250–499	6.2	(1.7)	11.5	(3.4)	4.8	(2.5)
500 or more	5.0	(2.1)	2.9	(2.0)	3.6	(2.2)
Total	100.0		100.0		100.0	

Overall, operations that brought on any cattle or calves averaged 1.8 shipments for all sources. There were no differences by herd size in the average number of shipments per operation, regardless of animal source.

H.3.m. For the 32.9 percent of operations that brought any cattle or calves onto the operation during the previous 12 months (table H.3.a.), average number of shipments per operation, by source of animals and by herd size:

Average Number of Shipments								
Herd Size (number of beef cows)								
Source	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error
Beef cattle operation	0.8	(0.1)	0.9	(0.1)	1.4	(0.3)	0.9	(0.1)
Dairy cattle operation	0.1	(0.0)	0.0	(0.0)	0.0	(0.0)	0.1	(0.0)
Sale barn/auction	0.5	(0.1)	0.8	(0.1)	1.0	(0.2)	0.6	(0.1)
Livestock dealer	0.1	(0.0)	0.3	(0.1)	0.5	(0.2)	0.2	(0.0)
Other	0.1	(0.0)	0.1	(0.0)	0.1	(0.0)	0.1	(0.0)
All sources	1.5	(0.1)	2.1	(0.1)	3.1	(0.4)	1.8	(0.1)

Of operations that brought on any cattle or calves, 21.5 percent brought on animals shipped from across State lines. The highest percentage of operations (12.8 percent) sourced weaned or older beef bulls intended for breeding from across State lines. A higher percentage of large operations (28.0 percent) than small operations (8.4 percent) brought on weaned or older beef bulls for breeding from across State lines, and a higher percentage of large operations (38.3 percent) than small operations (17.0 percent) received any cattle shipped from across State lines.

H.3.o. For the 32.9 percent of operations that brought any cattle or calves onto the operation during the previous 12 months (table H.3.a.), percentage of operations that received cattle or calves shipped from across State lines, by cattle class and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Cattle class	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Unweaned beef calves with dam	1.2	(0.7)	0.5	(0.3)	0.6	(0.4)	1.0	(0.5)
Weaned beef heifers, bred or intended for breeding	5.6	(1.8)	4.7	(1.8)	5.2	(1.7)	5.3	(1.2)
Beef cows	3.4	(1.3)	4.2	(1.3)	6.5	(2.0)	3.9	(0.9)
Beef bulls, weaned or older, for breeding	8.4	(2.0)	18.2	(2.9)	28.0	(4.0)	12.8	(1.6)
Weaned beef steers, heifers, or bulls intended for backgrounding or feeding	0.2	(0.1)	1.6	(0.6)	2.9	(1.1)	0.8	(0.2)
Any dairy cattle	0.2	(0.2)	0.0	(0.0)	0.0	(0.0)	0.1	(0.1)
Any cattle or calves	17.0	(2.7)	26.5	(3.3)	38.3	(4.3)	21.5	(2.0)

Of operations that brought on any cattle or calves, 0.4 percent brought on animals shipped from outside the United States. On average, these operations received 1.7 shipments from outside the United States, with an operation average of 15.2 cattle per shipment.

H.3.p. For the 32.9 percent of operations that brought any cattle and calves onto the operation during the previous 12 months (table H.3.a.), percentage of operations that brought on any cattle and calves from outside the United States, operation average number of shipments these operations received from outside the United States, and operation average number of cattle received per shipment:

Percent operations that brought on any cattle and calves from outside the United States		Operation average number of shipments		Operation average number of cattle per shipment	
Percent	Std. error	Average	Std. error	Average	Std. error
0.4	(0.2)	1.7	(0.5)	15.2	(13.3)

4. Source of female beef breeding cattle brought onto the operation

Female beef breeding cattle were brought on by 15.6 percent of operations. Of these operations, 49.8 percent brought on female breeding cattle from other beef cattle operations, and 38.6 percent brought on female breeding cattle from sale barns/auctions. There were no substantial differences by herd size in the percentages of operations by source of female breeding cattle.

H.4.a. For the 15.6 percent of operations that brought any female beef breeding cattle onto the operation during the previous 12 months (table H.3.a.), percentage of operations by source(s) of female breeding cattle, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
Source	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Beef cattle operation	54.5	(5.3)	35.3	(5.6)	43.8	(6.4)	49.8	(4.1)
Dairy cattle operation	4.1	(2.0)	3.7	(2.5)	4.5	(3.1)	4.0	(1.6)
Sale barn/auction	33.0	(5.0)	54.2	(5.8)	49.8	(6.6)	38.6	(3.9)
Livestock dealer	7.1	(2.9)	5.5	(2.0)	8.2	(3.5)	6.8	(2.1)
Other	3.8	(2.0)	6.7	(2.6)	2.7	(1.8)	4.4	(1.6)

There were no regional differences in the percentages of operations by source of female beef breeding cattle.

H.4.b. For the 15.6 percent of operations that brought any female beef breeding cattle onto the operation during the previous 12 months (table H.3.a.), percentage of operations by source(s) of female breeding cattle, and by region:

Source	Percent Operations					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Beef cattle operation	56.0	(6.6)	40.1	(7.3)	49.2	(7.1)
Dairy cattle operation	2.3	(1.3)	1.8	(1.8)	8.9	(4.7)
Sale barn/auction	33.2	(6.3)	48.8	(7.2)	37.5	(6.7)
Livestock dealer	7.7	(3.6)	7.1	(4.1)	5.2	(3.0)
Other	3.9	(1.9)	7.5	(4.7)	2.1	(1.2)

On operations that brought on female breeding cattle, 50.2 percent of cattle brought on came from other beef operations, and 38.4 percent came from sale barns/auctions. There were no substantial differences by herd size in the percentages of female beef breeding cattle by source.

H.4.c. For the 15.6 percent of operations that brought any female beef breeding cattle onto the operation during the previous 12 months (table H.3.a.), percentage of female breeding cattle brought on, by source(s) of female breeding cattle, and by herd size:

Percent Female Beef Breeding Cattle*								
Herd Size (number of beef cows)								
Source	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Beef cattle operation	56.9	(7.8)	34.0	(8.6)	55.3	(14.4)	50.2	(7.6)
Dairy cattle operation	1.4	(0.8)	0.9	(0.7)	0.8	(0.6)	1.0	(0.4)
Sale barn/auction	37.3	(7.5)	48.9	(12.1)	32.8	(10.4)	38.4	(6.4)
Livestock dealer	2.0	(1.1)	10.0	(5.7)	8.6	(5.7)	7.0	(2.9)
Other	2.3	(1.4)	6.2	(3.1)	2.4	(2.1)	3.4	(1.3)
Total	100.0		100.0		100.0		100.0	

*Includes (unweaned beef calves with dam)/2, weaned beef heifers bred or intended for breeding, and beef cows.

A higher percentage of female beef breeding cattle brought onto operations in the West region (64.5 percent) were sourced from beef cattle operations compared with female breeding cattle brought onto operations in the Central region (28.5 percent). A higher percentage of female breeding cattle brought onto operations in the Central region (60.8 percent) than the West (21.3 percent) and East (18.2 percent) regions were sourced from sale barns/auctions.

H.4.d. For the 15.6 percent of operations that brought any female beef breeding cattle onto the operation during the previous 12 months (table H.3.a.), percentage of female breeding cattle brought on, by source(s) and by region:

Source	Percent Female Beef Breeding Cattle*					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Beef cattle operation	64.5	(6.1)	28.5	(7.4)	73.5	(15.2)
Dairy cattle operation	0.9	(0.5)	0.4	(0.4)	2.7	(2.0)
Sale barn/auction	21.3	(5.0)	60.8	(6.9)	18.2	(10.8)
Livestock dealer	8.4	(4.3)	7.6	(5.3)	3.3	(2.5)
Other	4.9	(2.3)	2.7	(2.0)	2.2	(1.7)
Total	100.0		100.0		100.0	

*Includes (unweaned beef calves with dam)/2, weaned beef heifers bred or intended for breeding, and beef cows.

I. Visitors

Visitors to an operation provide needed services such as artificial insemination and veterinary care. Because visitors can be potential sources of disease, however, it is important to keep track of them and to implement biosecurity protocols, such as requiring visitors to wear clean boots .

1. Types of visitors, number of visits, and animal contact by visitors

Nearly 7 of 10 operations (68.3 percent) had at least one type of visitor listed in the following table. The percentage of operations that had at least one of the visitor types increased as herd size increased, ranging from 63.9 percent of small operations to 89.8 percent of large operations. Veterinarians/animal health professionals was the visitor type reported by the highest percentage of operations (42.4 percent).

The percentage of operations that received visits from veterinarians or other animal health professionals, feed haulers, livestock buyers/dealers, livestock haulers, or nutritionists or feed company consultants increased as herd size increased. A lower percentage of small operations (21.2 percent) than medium (36.2 percent) or large (45.2 percent) operations were visited by other livestock producers. Similarly, a lower percentage of small operations (15.6 percent) than medium (27.7 percent) or large (31.6 percent) operations hosted recreational visitors.

I.1.a. Percentage of operations by type of visitors that came onto on the operation during the previous 12 months, and by herd size:

Visitor type	Percent Operations							
	Herd Size (number of beef cows)							
	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Agricultural tours	3.2	(0.7)	3.6	(0.7)	7.3	(1.6)	3.5	(0.5)
Artificial insemination technicians	3.5	(0.7)	7.9	(1.3)	13.3	(2.0)	4.9	(0.6)
Extension agents	5.3	(0.9)	9.0	(1.3)	11.3	(1.8)	6.4	(0.7)
Feed haulers	18.1	(1.5)	27.9	(2.2)	39.4	(3.1)	21.2	(1.2)

Table cont'd →

I.1.a. (cont'd) Percentage of operations by type of visitors that came onto the operation during the previous 12 months, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Visitor type	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Hoof trimmers	4.3	(0.8)	7.6	(1.3)	12.2	(1.9)	5.4	(0.7)
Livestock buyer/dealer	10.2	(1.2)	20.6	(1.9)	36.8	(3.1)	13.6	(1.0)
Livestock haulers	16.1	(1.4)	33.8	(2.3)	54.2	(3.4)	21.6	(1.2)
Manure haulers	3.4	(0.7)	5.4	(1.0)	12.4	(2.3)	4.3	(0.6)
Mobile slaughter teams	1.8	(0.5)	2.6	(0.7)	3.6	(0.9)	2.0	(0.4)
Nutritionist or feed company consultant	4.6	(0.7)	14.1	(1.7)	24.0	(2.6)	7.5	(0.7)
Other livestock producers	21.2	(1.6)	36.2	(2.4)	45.2	(3.2)	25.5	(1.3)
Recreational visitors	15.6	(1.5)	27.7	(2.2)	31.6	(2.9)	18.9	(1.2)
Renderers	1.5	(0.5)	4.3	(1.0)	2.6	(0.8)	2.1	(0.4)
Veterinarians or other animal health professional	36.7	(1.9)	55.5	(2.3)	74.0	(3.1)	42.4	(1.5)
Video auction representative	1.4	(0.5)	3.7	(0.8)	14.0	(1.8)	2.5	(0.4)
Any of the above	63.9	(1.9)	79.1	(2.0)	89.8	(2.6)	68.3	(1.5)

Operations that had visitors during the previous 12 months had an average of 17.1 visits of any type.

I.1.b. For the 68.3 percent of operations that had visitors during the previous 12 months (table I.1.a.), average number of visits, by type of visitor:

Visitor type	Average Number of Visits*	Std. error
Agricultural tours	29.8	(9.9)
Artificial insemination technicians	4.1	(0.6)
Extension agents	2.1	(0.2)
Feed haulers	6.9	(0.8)
Hoof trimmers	2.9	(0.3)
Livestock buyer/dealer	3.6	(0.4)
Livestock haulers	3.3	(0.3)
Manure haulers	2.6	(0.6)
Mobile slaughter teams	2.3	(0.3)
Nutritionist or feed company consultant	4.5	(0.9)
Other livestock producers	7.3	(0.8)
Recreational visitors	21.3	(6.5)
Renderers	2.6	(0.2)
Veterinarians or other animal health professional	2.4	(0.1)
Video auction representative	1.9	(0.2)
Any type of visitor	17.1	(2.4)

*Each entry by each person counted separately.

If operations had a specific type of visitor, they were asked if the visitor typically had contact with cattle on the operation. “Contact” was described as touching an animal or walking through pens where cattle were housed. For operations that had visitors during the previous 12 months, 90.7 percent had visitors that had contact with cattle on the operation.

I.1.c. For the 68.3 percent of operations that had visitors during the previous 12 months (table I.1.a.), percentage of operations in which visitors typically had any contact with animals on the operation, by type of visitor:

Visitor type	Percent Operations	Std. error
Agricultural tours	43.8	(7.6)
Artificial insemination technicians	83.0	(4.6)
Extension agents	55.3	(6.0)
Feed haulers	48.3	(3.2)
Hoof trimmers	53.5	(6.3)
Livestock buyer/dealer	86.2	(2.4)
Livestock haulers	93.9	(1.5)
Manure haulers	47.1	(7.1)
Mobile slaughter teams	60.0	(10.0)
Nutritionist or feed company consultant	69.7	(4.2)
Other livestock producers	77.8	(2.6)
Recreational visitors	56.5	(3.4)
Renderers	37.0	(8.9)
Veterinarians or other animal health professional	97.0	(0.9)
Video auction representative	57.3	(8.3)
Any type of visitor	90.7	(1.2)

2. Number of visits during an average month by employees and neighbors

Higher percentages of large operations than small operations had visits from employees, neighbors, other visitors, or any visitors in a typical month.

I.2.a. Percentage of operations by type of visitor(s) on the operation during a typical month, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Visitor type	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Employee	13.7	(1.3)	28.9	(2.0)	52.4	(3.3)	18.8	(1.1)
Neighbors	43.4	(1.9)	51.2	(2.4)	56.2	(3.2)	45.6	(1.5)
Other	29.0	(1.8)	38.7	(2.3)	45.2	(3.2)	31.8	(1.4)
Any	56.9	(2.0)	71.1	(2.2)	78.9	(3.0)	60.9	(1.5)

On operations that had employees, neighbors, or other visitors, employees made an average of 6.3 visits to the operation per month, and 83.9 percent of operations reported that these visits involved contact with animals on the operation. Overall, any visitors made an average of 11.7 visits per month, and 94.3 percent of operations reported that these visits involved contact with animals.

I.2.b. For the 60.9 percent of operations that had any of the following types of visitors during a typical month (table I.2.a.), average number of visits during a typical month, and percentage of operations in which these visits typically involved contact with animals on the operation:

Visitor type	Average number of visits* during a typical month		Percent operations by visits that normally involve animal contact	
	Number	Std. error	Percent	Std. error
Employee	6.3	(0.9)	83.9	(2.5)
Neighbors	2.9	(0.2)	42.8	(3.1)
Other	2.5	(0.2)	29.2	(2.5)
Any	11.7	(0.9)	94.3	(0.9)

*Each entry by each person counted separately.

J. Information Sources and Identification

1. Sources of information

Producers were asked to rate the usefulness of various information sources for making decisions about breeding and genetics. Although all information sources proved extremely useful to producers on at least some operations, producers on more than one-half of operations did not consider salespersons or company representatives, consultants, radio, TV, newspapers, or the Internet to be at all useful.

J.1.a. Percentage of operations by usefulness of the following information sources for making decisions about breeding and genetics on the operation:

Information source	Percent Operations										
	Usefulness										
	Not at all		Slightly		Moderately		Very		Extremely		Total
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error		
Extension service, university, or VoAg instructors	47.8	(1.6)	21.5	(1.3)	17.4	(1.2)	7.6	(0.8)	5.6	(0.8)	100.0
Veterinarians	26.1	(1.4)	15.8	(1.2)	17.9	(1.2)	22.6	(1.3)	17.5	(1.2)	100.0
Beef or agricultural magazines or journals	38.3	(1.6)	22.8	(1.3)	21.9	(1.3)	13.4	(1.1)	3.6	(0.5)	100.0
Producer/breed associations	47.1	(1.6)	19.8	(1.3)	15.6	(1.1)	12.4	(1.0)	5.2	(0.6)	100.0
Other producers	28.3	(1.5)	16.5	(1.2)	20.2	(1.2)	23.6	(1.3)	11.4	(1.0)	100.0
Salespersons or company representatives	63.3	(1.5)	16.1	(1.1)	12.0	(1.0)	6.3	(0.7)	2.3	(0.5)	100.0
Consultants	92.1	(0.8)	5.4	(0.7)	1.3	(0.3)	0.9	(0.3)	0.3	(0.1)	100.0
Radio, TV, or newspaper	72.4	(1.4)	17.8	(1.2)	6.9	(0.7)	1.7	(0.4)	1.2	(0.3)	100.0

Table cont'd →

J.1.a. (cont'd) Percentage of operations by usefulness of the following information sources for making decisions about breeding and genetics on the operation:

Percent Operations											
Usefulness											
Information source	Not at all		Slightly		Moderately		Very		Extremely		Total
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	
Internet	57.1	(1.6)	15.1	(1.2)	13.3	(1.0)	9.4	(0.9)	5.1	(0.7)	100.0
Other	97.7	(0.5)	0.6	(0.3)	0.4	(0.2)	0.3	(0.1)	1.0	(0.3)	100.0

Producers were asked to rate the usefulness of information sources for making decisions on topics other than those related to breeding and genetics. Although all information sources proved extremely useful to producers on at least some operations, producers on more than one-half of operations did not consider salespersons or company representatives, consultants, radio, TV, newspapers, or the Internet to be at all useful.

J.1.b. Percentage of operations by usefulness of the following information sources for making decisions other than those related to breeding and genetics on the operation:

Information source	Percent Operations										Total
	Usefulness										
	Not at all		Slightly		Moderately		Very		Extremely		
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	
Extension service, university, or VoAg instructors	40.9	(1.6)	23.8	(1.4)	19.3	(1.2)	9.8	(0.8)	6.3	(0.8)	100.0
Veterinarians	14.9	(1.2)	14.5	(1.2)	23.0	(1.4)	26.3	(1.3)	21.3	(1.3)	100.0
Beef or agricultural magazines or journals	34.2	(1.5)	24.6	(1.4)	23.6	(1.3)	13.6	(1.1)	3.9	(0.5)	100.0
Producer/breed associations	47.1	(1.6)	21.0	(1.3)	17.9	(1.2)	10.0	(0.9)	4.0	(0.6)	100.0
Other producers	25.6	(1.4)	17.7	(1.2)	21.9	(1.3)	23.3	(1.3)	11.5	(1.0)	100.0
Salespersons or company representatives	59.7	(1.5)	19.1	(1.2)	12.6	(0.9)	6.5	(0.7)	2.0	(0.4)	100.0
Consultants	90.7	(0.9)	6.1	(0.7)	2.1	(0.4)	0.9	(0.2)	0.3	(0.1)	100.0
Radio, TV, or newspaper	68.6	(1.5)	19.6	(1.3)	8.9	(0.9)	1.8	(0.4)	1.1	(0.3)	100.0
Internet	56.0	(1.6)	14.4	(1.1)	14.4	(1.1)	8.5	(0.9)	6.6	(0.8)	100.0
Other	97.8	(0.5)	0.7	(0.3)	0.6	(0.3)	0.3	(0.2)	0.5	(0.2)	100.0

Overall, the highest percentages of operations reported that veterinarians (40.1 percent) and other producers (35.0 percent) were very or extremely useful for making decisions related to breeding and genetics on the operation. Higher percentages of medium and large operations than small operations reported that producer/breed associations and salespersons or company representatives were very or extremely useful for making decisions concerning breeding and genetics on the operation.

J.1.c. Percentage of operations by source(s) considered very or extremely useful for making decisions about breeding and genetics on the operation, and by herd size:

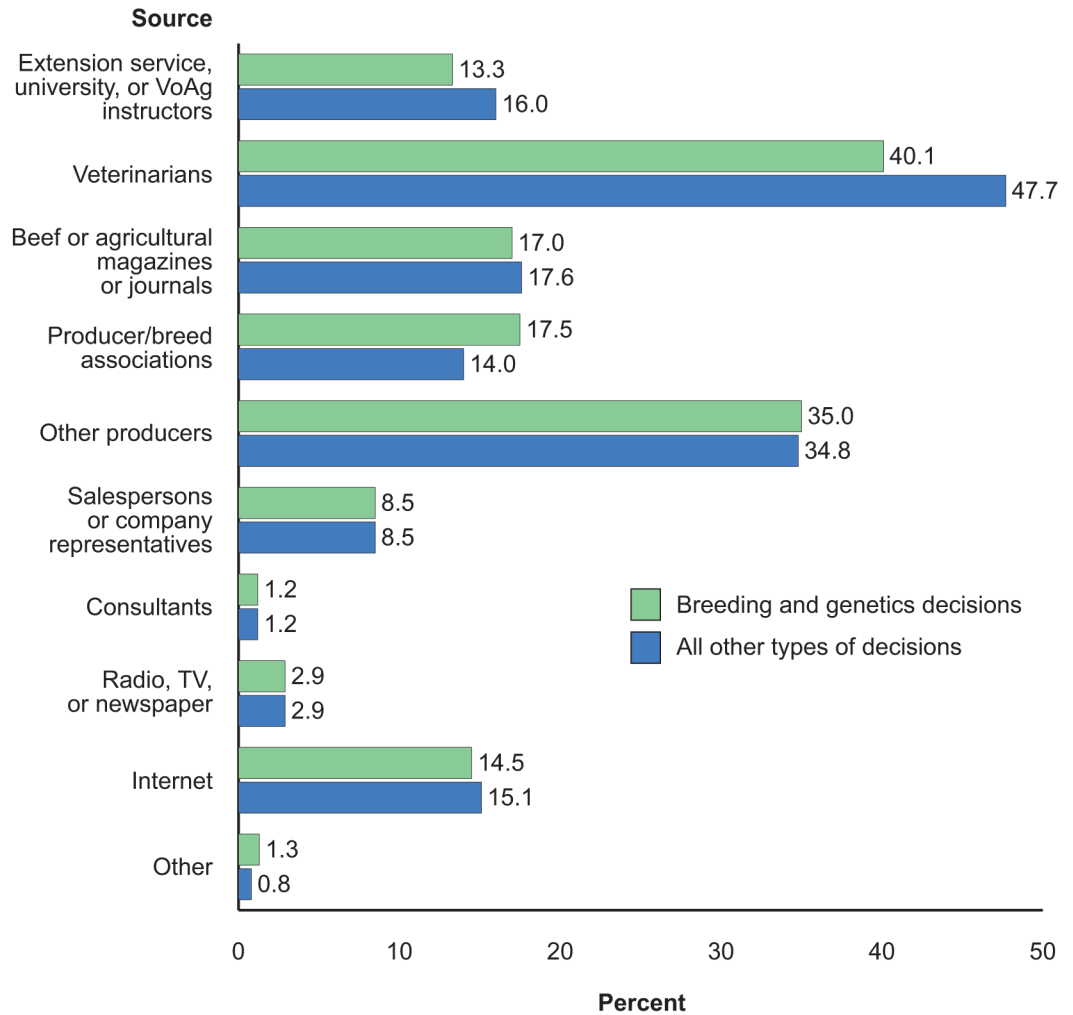
Percent Operations								
Herd Size (number of beef cows)								
Information source	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Extension service, university, or VoAg instructors	12.7	(1.3)	15.9	(1.7)	11.6	(1.9)	13.2	(1.0)
Veterinarians	39.2	(2.0)	42.9	(2.4)	42.3	(3.3)	40.1	(1.6)
Beef or agricultural magazines or journals	16.2	(1.5)	18.7	(1.8)	22.2	(2.8)	17.0	(1.2)
Producer/breed associations	15.1	(1.4)	23.4	(2.0)	30.1	(2.8)	17.6	(1.1)
Other producers	34.2	(1.9)	36.0	(2.3)	42.8	(3.4)	35.0	(1.5)
Salespersons or company representatives	6.8	(1.0)	12.5	(1.6)	18.5	(2.3)	8.6	(0.8)
Consultants	1.1	(0.4)	1.8	(0.6)	1.2	(0.4)	1.2	(0.3)
Radio, TV, or newspaper	2.7	(0.6)	2.8	(0.7)	5.5	(1.5)	2.9	(0.5)
Internet	14.3	(1.4)	14.4	(1.7)	18.2	(2.7)	14.5	(1.1)
Other	1.1	(0.4)	1.9	(0.7)	2.2	(0.9)	1.3	(0.3)

Overall, the highest percentages of operations reported that veterinarians (47.7 percent) and other producers (34.8 percent) were very or extremely useful for making decisions other than those related to breeding and genetics. Higher percentages of medium and large operations than small operations reported that veterinarians and salespersons or company representatives were very or extremely useful for making decisions on topics other than breeding and genetics.

J.1.d. Percentage of operations by information source(s) considered very useful or extremely useful for making decisions other than those related to breeding and genetics on the operation, and by herd size:

Information source	Percent Operations							
	Herd Size (number of beef cows)							
	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Extension service, university, or VoAg instructors	14.9	(1.4)	20.9	(2.0)	12.6	(2.0)	16.1	(1.1)
Veterinarians	44.8	(2.0)	55.8	(2.4)	57.8	(3.3)	47.6	(1.6)
Beef or agricultural magazines or journals	16.4	(1.5)	21.4	(1.9)	19.4	(2.4)	17.5	(1.2)
Producer/breed associations	12.3	(1.3)	18.5	(1.8)	20.6	(2.5)	14.0	(1.0)
Other producers	34.3	(1.9)	36.0	(2.3)	37.8	(3.4)	34.8	(1.5)
Salespersons or company representatives	6.7	(1.0)	13.0	(1.6)	18.4	(2.3)	8.5	(0.8)
Consultants	0.9	(0.3)	1.7	(0.6)	3.7	(1.1)	1.2	(0.3)
Radio, TV, or newspaper	2.6	(0.5)	3.4	(0.8)	5.5	(1.5)	2.9	(0.5)
Internet	15.1	(1.4)	14.5	(1.7)	17.2	(2.3)	15.1	(1.1)
Other	0.8	(0.4)	1.0	(0.5)	0.5	(0.3)	0.8	(0.3)

Percentage of operations by information source(s) considered very useful or extremely useful for making decisions related to breeding and genetics on the operation, and percentage of operations by information source(s) considered very useful or extremely useful for making decisions on all other types of decisions



2. Premises ID

The USDA's Animal Disease Traceability (ADT) program is designed to improve methods of tracing livestock during disease investigations. Part of the ADT program involves assigning a premises identification number (PIN) or location identifier (LID) to livestock operations. A PIN or LID is a unique code permanently assigned to a single physical location and is required to purchase official animal identification tags. Each State administers PIN or LID registration. A PIN or LID is assigned permanently to the geophysical location, not to the livestock owner. Thus, if an owner moves to a new location, his former premises ID does not move with him. A premises ID is useful for identifying an operation during disease traceback activities, e.g., to identify where a diseased animal originated.

Overall, 20.7 percent of operations had a unique premises ID assigned by a State or Federal authority. A higher percentage of medium (29.5 percent) and large (30.5 percent) operations than small operations (17.7 percent) had a unique premises ID.

J.2.a. Percentage of operations that had a unique premises ID assigned by their State Department of Agriculture or a Federal Office, by herd size:

Percent Operations							
Herd Size (number of beef cows)							
Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
17.7	(1.5)	29.5	(2.2)	30.5	(2.9)	20.7	(1.2)

A higher percentage of operations in the East region (26.3 percent) than in the West region (16.1 percent) had a unique premises ID.

J.2.b. Percentage of operations that had a unique premises ID assigned by their State Department of Agriculture or a Federal Office, by region:

Percent Operations					
Region					
West		Central		East	
Percent	Std. error	Percent	Std. error	Percent	Std. error
16.1	(1.9)	20.6	(2.3)	26.3	(2.1)

3. Identification for cows

Identifying cows using tags or other methods can be used for individual-animal ID or herd identification. Individual-animal identification refers to a unique ID for each animal in a herd. Herd ID designates the animals as belonging to a particular farm or ranch, and this ID is the same for every animal on the farm or ranch.

Individual-animal ID can be official or unofficial. Official ID is recognized by USDA and State agencies and will have a PIN or LID associated with it. Official ID is used for official animal testing or interstate movement. Types of official eartags include brucellosis vaccination eartags; National Uniform Eartagging System (NUES) eartags; and Animal Identification Number (AIN) or “840”-prefixed eartags. Registered brands and breed-association tattoos can be considered official ID for interstate movement, but only if the sending and receiving State Veterinarians agree to accept them as official ID. Unofficial ID is used to manage animals on an operation. Unofficial IDs include bangle eartags, ear notches, and names, and these unofficial IDs might or might not have a PIN, LID, or farm name associated with them.

Individual-animal ID is important for disease traceback purposes. For example, if an animal is not properly identified before arriving at slaughter and turns out to be positive for an important disease such as tuberculosis, it can be difficult or impossible to identify where that animal originated, which might allow the disease to persist in the herd of origin.

Identification Types

Animal Identification Number (AIN) 840 prefixed electronic ID—An official eartag with a microchip responder, which can be easily read with a wand or other device and be uploaded to a data storage device or database. These are also known as Radio Frequency Identification (RFID) eartags. This ID must start with the number 840, which indicates that the United States is the country of origin.

Animal Identification Number (AIN) 840 prefixed nonelectronic ID—An official eartag without a microchip responder. This ID must start with the number 840, which indicates that the United States is the country of origin. These nonelectronic tags must be read visually, and its numbers must be written down by hand.

900 series prefixed electronic ID—An ID with a microchip responder, which can be easily read with a wand or other device and be uploaded into a data storage device. The tag number for this ID starts with a number from 900 to 999, and this number represents the manufacturer of the tag. This ID type is considered official only if it was applied to an animal before March 11, 2015.

Brucellosis vaccination ear tag—Also known as a Bang’s tag, this official ID is orange, usually made of metal, and is attached to an animal’s right ear, indicating that the animal has been vaccinated for brucellosis. In some States, orange RFID tags are used to indicate cattle have been vaccinated for brucellosis. In addition to the Bang’s tag, animals vaccinated for brucellosis receive a brucellosis vaccination tattoo on the inside of the right ear to ensure that they can still be identified as being vaccinated in case the eartag is lost. A Bang’s tattoo will have a shield with a “V” in the middle.

Other USDA or State-issued tag, e.g., National Uniform Eartagging System (NUES) tag— An official eartag made of metal and often referred to as a “silver” or “brite” tag because of its color. These official IDs are marked with the “U.S.” symbol. Metal brucellosis vaccination eartags are a type of NUES tag, but these tags are orange.

Breed registration tattoo—Tattoos can appear on an animal’s left or right ear, and they might or might not be registered with a breed association. In order to be considered official ID for interstate movement, a tattoo must be registered with a breed association, and the animal must be accompanied by a breed registration certificate. In addition, both the shipping and receiving State Veterinarians must agree to accept the tattoos as official ID. A breed registration tattoo is different from a Bangs vaccination tattoo, which appears only in the right ear of a vaccinated animal and will have a shield with a “V” in the middle.

Plastic ear tag—Often used for herd management practices, any plastic ear tag that does not have an 840 or 900 prefix. This unofficial ID is often referred to as a bangle tag or ranch tag, and it can be any color.

Brands—There are different types of brands (e.g., hot-iron or freeze) and they might or might not be registered. In order to be considered official ID for interstate movement, a brand must be registered with a recognized brand inspection authority, and the animal must be accompanied by an official brand inspection certificate. In addition, both the shipping and receiving State Veterinarians must agree to accept the brands as official ID.

Hot-iron brand—Any marking created by a hot iron. The location of the brand might vary from operation to operation. A hot-iron brand can be used for herd identification if all cattle in the herd have the same brand. It can also be used to give each animal a unique ID number.

Freeze brand—Any marking created by freezing. The brand will be white, due to discoloration of the animal’s hair. A freeze brand can be used for herd identification if all cattle in the herd have the same brand. It might also be used to give each animal a unique ID number.

Ear notch—A small piece of an animal’s ear is removed to make an identification system. This ID type is considered unofficial.

The percentages of operations that used brucellosis vaccination ear tags (Bang's tags), hot-iron brands, or ear notches on at least some cows increased as herd size increased. Higher percentages of medium and large operations than small operations used other plastic ear tags (e.g., bangle tags), freeze brands, or any types of ID on at least some cows. A higher percentage of large operations than small operations used 840-prefixed electronic IDs, or breed registration ear tattoos as ID on at least some cows.

Overall, 62.9 percent of operations used plastic ear tags (e.g., bangle tags or plastic tags other than 840- or 900-series plastic tags) as a form of ID on at least some cows. About one-fourth of operations used brucellosis vaccination ear tags (26.1 percent) or hot-iron brands (26.6 percent) on at least some cows.

J.3.a. Percentage of operations by type(s) of ID used on at least some cows, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
ID type	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
840 prefixed electronic ID or microchip responder	0.5	(0.2)	1.3	(0.5)	3.5	(1.0)	0.8	(0.2)
840 prefixed nonelectronic ear tags	7.5	(1.1)	7.7	(1.3)	6.2	(1.3)	7.5	(0.9)
900 or other prefixed electronic ID or microchip responder	0.3	(0.2)	0.5	(0.3)	1.4	(0.6)	0.4	(0.2)
Brucellosis vaccination ear tag (Bang's tag)	21.1	(1.6)	35.7	(2.2)	59.6	(3.1)	26.1	(1.3)
Other USDA or State-issued metal ear tag (e.g., NUES tag, Brite tag)	2.1	(0.6)	5.3	(1.1)	4.4	(1.0)	2.9	(0.5)
Breed registration ear tattoo	7.3	(1.1)	12.2	(1.6)	15.3	(2.3)	8.7	(0.9)
Other plastic ear tag (e.g., bangle tag)	58.9	(2.0)	74.1	(2.1)	76.0	(2.9)	62.9	(1.5)
Hot-iron brand	19.2	(1.5)	41.2	(2.0)	75.5	(2.5)	26.6	(1.2)

Table cont'd →

J.3.a. (cont'd) Percentage of operations by type(s) of ID used on at least some cows, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
ID type	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Freeze brand	3.3	(0.6)	9.1	(1.4)	14.0	(2.4)	5.0	(0.6)
Ear notch	7.1	(1.1)	12.4	(1.6)	23.6	(2.7)	9.0	(0.9)
Other method	0.6	(0.3)	0.1	(0.1)	2.9	(1.0)	0.6	(0.2)
Any ID	76.4	(1.7)	91.6	(1.5)	94.9	(1.9)	80.4	(1.3)

A higher percentage of operations in the West (36.4 percent) and Central (33.5 percent) regions than in the East region (7.8 percent) used brucellosis vaccination ear tags (Bang's tags) on at least some cows. A higher percentage of operations in the Central region (77.5 percent) than in the West (58.3 percent) or East (57.0 percent) regions used other plastic ear tags (e.g., a bangle tag) on at least some cows. A higher percentage of operations in the West region (45.7 percent) than in the Central (28.1 percent) or East regions (2.4 percent) used a hot-iron brand on some cows. Overall, a higher percentage of operations in the West (86.1 percent) and Central (89.5 percent) regions than in the East region (66.5 percent) used any type of ID on at least some cows.

J.3.b. Percentage of operations by type(s) of ID used on at least some cows, and by region:

Percent Operations						
Region						
ID type	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
840 prefixed electronic ID or microchip responder	0.8	(0.3)	0.9	(0.4)	0.8	(0.3)

Table cont'd →

J.3.b. (cont'd) Percentage of operations by type(s) of ID used on at least some cows, and by region:

ID type	Percent Operations					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
840 prefixed nonelectronic ear tags	8.2	(1.5)	7.4	(1.7)	6.6	(1.4)
900 or other prefixed electronic ID or microchip responder	0.5	(0.3)	0.6	(0.5)	0.1	(0.1)
Brucellosis vaccination ear tag (Bang's tag)	36.4	(2.6)	33.5	(2.6)	7.8	(1.2)
Other USDA or State-issued metal ear tag (e.g., NUES tag, Brite tag)	2.9	(0.9)	4.0	(0.9)	2.0	(0.8)
Breed registration ear tattoo	8.2	(1.5)	13.0	(2.0)	6.0	(1.2)
Other plastic ear tag (e.g., bangle tag)	58.3	(2.8)	77.5	(2.5)	57.0	(2.5)
Hot-iron brand	45.7	(2.6)	28.1	(2.1)	2.4	(0.5)
Freeze brand	4.1	(0.8)	9.6	(1.5)	2.6	(0.7)
Ear notch	12.7	(1.7)	8.9	(1.7)	4.6	(1.0)
Other method	0.5	(0.2)	1.2	(0.8)	0.4	(0.3)
Any ID	86.1	(2.1)	89.5	(1.9)	66.5	(2.4)

Overall, 71.6 percent of cows had other plastic ear tags (e.g., bangle tags). Almost one-half of cows (48.1 percent) were branded with hot irons, and 37.5 percent had brucellosis vaccination ear tags (Bang's tags). Overall, 79.2 percent of cows had at least one type of ID.

The percentage of cows that had brucellosis vaccination ear tags or hot-iron brands increased as herd size increased. Ear notching was used on a higher percentage of cows on large operations (26.7 percent) than medium (12.0 percent) and small (8.3 percent) operations.

J.3.c. Percentage of cows by type(s) of ID used, and by herd size:

ID type	Percent Cows							
	Herd Size (number of beef cows)							
	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
840 prefixed electronic ID or microchip responder	0.2	(0.1)	0.7	(0.3)	3.4	(0.9)	1.4	(0.3)
840 prefixed nonelectronic ear tags	5.8	(1.1)	7.6	(1.4)	7.1	(1.6)	6.8	(0.8)
900 or other prefixed electronic ID or microchip responder	0.5	(0.4)	0.7	(0.5)	1.5	(0.7)	0.9	(0.3)
Brucellosis vaccination ear tag (Bang's tag)	18.2	(1.9)	34.8	(2.5)	58.4	(2.7)	37.5	(1.5)
Other USDA or State-issued metal ear tag (e.g., NUES tag, Brite tag)	5.0	(3.7)	2.4	(0.7)	4.6	(1.2)	4.0	(1.3)
Breed registration ear tattoo	4.3	(0.9)	10.2	(2.4)	12.9	(2.1)	9.2	(1.1)
Other plastic ear tag (e.g., bangle tag)	67.3	(2.5)	73.1	(2.3)	74.2	(2.4)	71.6	(1.4)
Hot-iron brand	19.8	(1.9)	44.6	(2.4)	78.3	(1.9)	48.1	(1.4)

Table cont'd →

J.3.c. (cont'd) Percentage of cows by type(s) of ID used, and by herd size:

Percent Cows								
Herd Size (number of beef cows)								
ID type	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Freeze brand	2.8	(0.7)	6.2	(1.2)	12.9	(2.2)	7.4	(0.9)
Ear notch	8.3	(1.6)	12.0	(1.6)	26.7	(2.5)	15.8	(1.1)
Other method	0.5	(0.3)	0.1	(0.0)	3.5	(1.2)	1.4	(0.4)
Any ID	75.0	(2.0)	79.3	(1.8)	83.1	(2.1)	79.2	(1.1)

A higher percentage of cows on operations in the West and Central regions had brucellosis vaccination ear tags compared with cows on operations in the East region. A higher percentage of cows in the Central region than in the other two regions had other plastic ear tags, breed registration ear tattoos, or freeze brands. A higher percentage of cows in the West region (65.1 percent) than in the Central region (54.6 percent) had hot iron brands, and these percentages were both higher than that for the East region (10.4 percent). A higher percentage of cows in the West region (23.3 percent) than in the Central (10.5 percent) or East (11.0 percent) regions had ear notching.

J.3.d. Percentage of cows by type(s) of ID used, and by region:

Percent Cows						
Region						
ID type	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
840 prefixed electronic ID or microchip responder	1.9	(0.5)	1.4	(0.7)	0.6	(0.3)
840 prefixed nonelectronic ear tags	7.1	(1.1)	6.0	(1.4)	7.7	(1.8)

Table cont'd →

J.3.d. (cont'd) Percentage of cows by type(s) of ID used, and by region:

ID type	Percent Cows					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
900 or other prefixed electronic ID or microchip responder	1.0	(0.5)	1.3	(0.7)	0.3	(0.2)
Brucellosis vaccination ear tag (Bang's tag)	45.6	(1.9)	47.4	(2.9)	9.7	(1.7)
Other USDA or State-issued metal ear tag (e.g., NUES tag, Brite tag)	2.3	(0.5)	4.1	(1.2)	6.6	(4.8)
Breed registration ear tattoo	6.0	(0.9)	15.9	(2.8)	5.0	(1.1)
Other plastic ear tag (e.g., bangle tag)	67.3	(2.0)	81.4	(2.4)	64.5	(2.9)
Hot-iron brand	65.1	(1.8)	54.6	(2.5)	10.4	(1.9)
Freeze brand	4.7	(0.8)	13.7	(2.2)	2.5	(0.8)
Ear notch	23.3	(1.9)	10.5	(2.0)	11.0	(2.0)
Other method	2.2	(0.8)	1.2	(0.7)	0.3	(0.2)
Any ID	81.4	(1.5)	82.7	(2.2)	70.6	(2.4)

For operations that used any of the ID types listed in the following table on at least some cows, those that used other plastic ear tags (e.g., bangle tag) and freeze brands used these ID types primarily for individual-cow ID. Operations that used hot-iron brands and ear notches primarily used these ID types for herd ID (i.e., the herd ID identifies the farm or ranch, and this ID is the same for every animal on the farm or ranch).

J.3.e. For operations that used any of the following types of ID on at least some cows, percentage of operations by information included on ID:

ID type	Percent Operations Information on ID						
	Individual-cow		Farm/ranch name		Both individual-cow and farm/ranch		Total
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	
Other plastic ear tag (e.g., bangle tag)	83.7	(1.5)	2.2	(0.5)	14.1	(1.4)	100.0
Hot-iron brand	5.1	(1.2)	87.7	(1.7)	7.3	(1.3)	100.0
Freeze brand	62.7	(5.9)	18.1	(4.7)	19.2	(4.8)	100.0
Ear notch	26.4	(4.8)	65.3	(5.1)	8.3	(2.5)	100.0

4. ID used for calves

Overall, 50.5 percent of operations used other plastic ear tags (e.g., bangle tags) for ID on at least some calves. About two-thirds of operations (65.8 percent) used any type of ID on at least some calves. Any ID was used on 80.4 percent of operations for at least some cows (table J.3.a.), so identifying calves does not seem to be as common as identifying cows.

The percentages of operations that used a hot-iron brand, ear notching, or any type of ID increased as herd size increased. Higher percentages of medium (63.4 percent) and large (66.9 percent) operations than small operations (45.8 percent) used other plastic ear tags on at least some calves. A higher percentage of large operations (25.8 percent) used brucellosis vaccination ear tags (Bang's tags) than small (9.3 percent) or medium (13.9 percent) operations.

J.4.a. Percentage of operations by type of ID used on at least some calves, and by herd size:

Percent Operations								
Herd Size (number of beef cows)								
ID type	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
840 prefixed electronic ID or microchip responder	0.5	(0.3)	0.3	(0.2)	2.5	(0.8)	0.5	(0.2)
840 prefixed nonelectronic ear tags	5.6	(1.0)	6.9	(1.3)	2.9	(0.7)	5.8	(0.8)
900 or other prefixed electronic ID or microchip responder	0.6	(0.4)	0.3	(0.2)	0.8	(0.5)	0.5	(0.3)
Brucellosis vaccination ear tag (Bang's tag)	9.3	(1.3)	13.9	(1.7)	25.8	(2.8)	11.1	(1.0)
Other USDA or State-issued metal ear tag (e.g., NUES tag, Brite tag)	1.3	(0.5)	1.3	(0.5)	2.9	(1.2)	1.4	(0.4)
Breed registration ear tattoo	3.9	(0.8)	5.3	(1.1)	7.0	(1.4)	4.4	(0.7)
Other plastic ear tag (e.g., bangle tag)	45.8	(2.0)	63.4	(2.2)	66.9	(3.0)	50.5	(1.6)
Hot-iron brand	10.4	(1.2)	25.9	(1.9)	58.8	(3.0)	16.1	(1.0)
Freeze brand	1.0	(0.3)	2.6	(0.8)	4.2	(1.8)	1.5	(0.3)
Ear notch	7.4	(1.1)	13.6	(1.6)	27.3	(3.0)	9.7	(0.9)
Other method	0.5	(0.2)	0.0	(—)	0.4	(0.2)	0.4	(0.2)
Any ID	60.0	(1.9)	80.2	(2.0)	90.6	(1.7)	65.8	(1.5)

Higher percentages of operations in the West and Central regions than in the East region used brucellosis vaccination ear tags, hot-iron brands, or ear notching on at least some calves. A higher percentage of operations in the Central region (72.5 percent) than in the West (42.5 percent) and East (43.0 percent) regions used other plastic ear tags on at least some calves.

J.4.b. Percentage of operations by type of ID used on at least some calves, and by region:

ID type	Percent Operations					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
840 prefixed electronic ID or microchip responder	0.8	(0.5)	0.1	(0.1)	0.5	(0.3)
840 prefixed nonelectronic ear tags	6.1	(1.3)	6.4	(1.6)	4.8	(1.2)
900 or other prefixed electronic ID or microchip responder	0.5	(0.3)	0.6	(0.5)	0.6	(0.6)
Brucellosis vaccination ear tag (Bang's tag)	16.6	(2.0)	14.3	(2.1)	1.8	(0.5)
Other USDA or State-issued metal ear tag (e.g., NUES tag, Brite tag)	2.4	(1.0)	1.1	(0.4)	0.4	(0.2)
Breed registration ear tattoo	4.3	(1.2)	5.8	(1.3)	3.4	(0.9)
Other plastic ear tag (e.g., bangle tag)	42.5	(2.7)	72.5	(2.7)	43.0	(2.4)
Hot-iron brand	25.3	(2.1)	21.2	(1.9)	0.7	(0.2)
Freeze brand	1.0	(0.4)	3.2	(0.9)	0.7	(0.4)
Ear notch	15.2	(1.8)	8.7	(1.6)	3.6	(0.8)
Other method	0.1	(0.1)	0.7	(0.5)	0.4	(0.3)
Any ID	65.6	(2.7)	85.1	(2.2)	50.8	(2.5)

Overall, other plastic ear tags (e.g., bangle tags) was the type of ID used on the highest percentage of calves (65.9 percent), followed by hot-iron brands (41.7 percent); 22.7 percent of calves had no type of ID.

The percentage of calves with hot-iron brands increased as herd size increased, ranging from 13.9 percent of calves on small operations to 69.1 percent of calves on large operations. A higher percentage of calves on large operations (21.9 percent) than on medium (10.5 percent) and small (7.8 percent) operations were identified using brucellosis vaccination ear tags. A higher percentage of calves on large operations (25.8 percent) had ear notching compared with calves on small operations (8.7 percent).

J.4.c. Percentage of calves by type of ID used, and by herd size:

ID type	Percent Calves							
	Herd Size (number of beef cows)							
	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
840 prefixed electronic ID or microchip responder	0.3	(0.3)	0.3	(0.2)	3.7	(1.1)	1.5	(0.4)
840 prefixed nonelectronic ear tags	4.4	(1.0)	6.0	(1.4)	3.8	(1.1)	4.8	(0.7)
900 or other prefixed electronic ID or microchip responder	0.4	(0.4)	0.8	(0.7)	1.6	(1.0)	1.0	(0.4)
Brucellosis vaccination ear tag (Bang's tag)	7.8	(1.3)	10.5	(1.6)	21.9	(2.4)	13.8	(1.1)
Other USDA or State-issued metal ear tag (e.g., NUES tag, Brite tag)	0.4	(0.2)	1.5	(0.8)	2.2	(0.8)	1.4	(0.4)
Breed registration ear tattoo	3.0	(0.8)	3.9	(1.1)	6.7	(1.6)	4.6	(0.7)
Other plastic ear tag (e.g., bangle tag)	57.9	(2.5)	69.6	(3.0)	68.6	(2.8)	65.9	(1.7)
Hot-iron brand	13.9	(1.8)	37.0	(4.7)	69.1	(2.5)	41.7	(2.0)

Table cont'd →

J.4.c. (cont'd) Percentage of calves by type of ID used, and by herd size:

Percent Calves								
Herd Size (number of beef cows)								
ID type	Small (1-49)		Medium (50-199)		Large (200 or more)		All operations	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Freeze brand	1.5	(0.6)	3.1	(1.2)	5.6	(1.6)	3.5	(0.7)
Ear notch	8.7	(1.5)	19.4	(5.4)	25.8	(2.6)	18.6	(2.2)
Other method	0.6	(0.4)	0.0	(—)	1.0	(0.7)	0.5	(0.3)
No method	33.4	(2.5)	20.2	(2.4)	16.6	(1.9)	22.7	(1.3)
Any ID	66.6	(2.5)	79.8	(2.4)	83.4	(1.9)	77.3	(1.3)

Higher percentages of calves in the West and Central regions than in the East region were identified using brucellosis vaccination ear tags or a hot-iron brand. A higher percentage of calves in the Central region (81.4 percent) than in the West (53.0 percent) and East (56.6 percent) regions were identified using other plastic ear tags. A higher percentage of calves in the West region (27.0 percent) than in the East region (9.0 percent) had ear notching, and a higher percentage of calves in the East region (35.7 percent) than in the West (23.6 percent) and Central (16.2 percent) regions had no ID.

J.4.d. Percentage of calves by type of ID used, and by region:

Percent Calves						
Region						
ID type	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
840 prefixed electronic ID or microchip responder	3.6	(1.0)	0.2	(0.1)	0.3	(0.2)
840 prefixed nonelectronic ear tags	6.1	(1.1)	3.9	(1.2)	4.0	(1.0)

Table cont'd →

J.4.d. (cont'd) Percentage of calves by type of ID used, and by region:

ID type	Percent Calves					
	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
900 or other prefixed electronic ID or microchip responder	0.9	(0.7)	1.3	(0.8)	0.3	(0.3)
Brucellosis vaccination ear tag (Bang's tag)	19.7	(1.7)	12.6	(2.0)	4.6	(1.2)
Other USDA or State-issued metal ear tag (e.g., NUES tag, Brite tag)	1.4	(0.6)	1.6	(0.7)	1.1	(0.7)
Breed registration ear tattoo	4.2	(0.9)	5.9	(1.5)	2.7	(0.8)
Other plastic ear tag (e.g., bangle tag)	53.0	(2.4)	81.4	(2.5)	56.6	(2.7)
Hot-iron brand	52.3	(2.2)	49.3	(3.8)	3.4	(1.0)
Freeze brand	1.6	(0.6)	6.4	(1.6)	0.9	(0.5)
Ear notch	27.0	(2.2)	15.6	(4.9)	9.0	(1.5)
Other method	1.0	(0.7)	0.3	(0.2)	0.2	(0.1)
No method	23.6	(2.0)	16.2	(2.2)	35.7	(2.5)
Any ID	76.4	(2.0)	83.8	(2.2)	64.3	(2.5)

For operations that used the ID types listed in the following table on at least some calves, those that used other plastic ear tags (e.g., bangle tag) primarily used this ID type for individual-calf ID. Operations that used hot iron brands and ear notches primarily used these ID types for herd ID (i.e., the herd ID identifies the farm or ranch, and this ID is the same for every animal on the farm or ranch). Operations that used freeze brands used them equally for individual-calf ID, farm/ranch ID, and both calf and farm/ranch IDs.

J.4.e. For operations that used the following types of ID on at least some calves, percentage of operations by information included on the ID:

ID type	Percent Operations						
	Information on ID						Total
	Individual-calf		Farm/ranch name		Both individual-calf and farm/ranch name		
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error		
Other plastic ear tag (e.g., bangle tag)	84.6	(1.6)	2.0	(0.5)	13.4	(1.5)	100.0
Hot-iron brand	2.8	(0.8)	92.6	(1.5)	4.6	(1.3)	100.0
Freeze brand	38.4	(13.5)	30.3	(12.2)	31.3	(12.7)	100.0
Ear notch	23.5	(4.4)	70.8	(4.6)	5.7	(2.1)	100.0

Section II: Methodology

A. Needs Assessment

NAHMS develops study objectives by exploring existing literature and contacting industry members about their informational needs and priorities during a needs-assessment phase. A driving force of the needs assessment is the desire of NAHMS to receive as much input as possible from a variety of producers, as well as from industry experts and representatives, veterinarians, extension specialists, university personnel, beef organizations, allied industry groups, and other stakeholders. Information was collected through a needs-assessment survey.

The objective of the needs-assessment survey for the NAHMS Beef 2017 study was to collect information from U.S. beef cow-calf producers, industry leaders, and other stakeholders about what they perceived to be the most important management issues and the top producer incentives to encourage participation in the study. The survey, created in SurveyMonkey, was available online from February through May 2016. The survey was promoted via industry-related electronic newsletters, magazines, Web sites, and various radio shows. In total, 690 people from 43 States completed the study's needs-assessment survey.

Respondents to the needs-assessment survey represented the following affiliations:

- Beef producer, 66 percent of respondents
- Veterinarian, 16 percent
- Federal or State government, 6 percent
- University/extension, 6 percent
- Allied industry personnel, 2 percent
- Nutritionist, 1 percent

Using input from the needs assessment, reviews from the scientific literature, and input from government and industry researchers, three primary study objectives were identified:

1. Describe trends in beef cow-calf health and management practices, specifically
 - a. Cow health and longevity,
 - b. Calf health,
 - c. Reproductive efficiency,
 - d. Selection methods for herd improvement, and
 - e. Biosecurity practices

2. Describe management practices and producer beliefs related to
 - a. Animal welfare,
 - b. Emergency preparedness,
 - c. Environmental stewardship,
 - d. Record-keeping, and
 - e. Animal identification practices

3. Describe antimicrobial-use practices (stewardship) and determine the prevalence and antimicrobial resistance patterns of potential food-safety pathogens, specifically
 - a. Types and reasons for using antimicrobial drugs by animal type,
 - b. Antimicrobial stewardship
 - i. Use of alternatives for disease control
 - ii. Use of Beef Quality Assurance principles
 - iii. Veterinarian-client-patient relationship
 - iv. Information sources, and
 - c. Antimicrobial resistance assessments for *Salmonella*, *E. coli*, and *Enterococcus*.

B. Sampling

1. State selection

The goal for NAHMS national studies is to include States that account for at least 70 percent of the animals and operations being studied. This method helps to ensure that the representation of the sample collected and the statistical inferences made using the sample data can be generalized to the target population, but balances this scientific aim with practical budget constraints.

A total of 24 States were selected for inclusion in the study based upon each State's contribution to the total number of U.S. beef cow-calf operations and the inventory of beef cows, based on population data held by the National Agricultural Statistics Service (NASS). The 24 states were Alabama, Arkansas, California, Colorado, Florida, Georgia, Idaho, Iowa, Kansas, Kentucky, Minnesota, Mississippi, Missouri, Montana, Nebraska, North Dakota, Ohio, Oklahoma, Oregon, South Dakota, Tennessee, Texas, Virginia, and Wyoming. The 24 States represented 86.6 percent of the U.S beef cow inventory and 78.9 percent of all U.S. operations with beef cows (Appendix II).

A memo identifying these 24 States was provided to the USDA–APHIS–VS CEAH Director and, in turn, the VS Regional Directors. Each Regional Director sought input from the respective States about being included or excluded from the study.

2. Operation selection

The list frame from which operations with beef cows were sampled was provided by NASS. NASS selected a sample of beef producers in each State when establishing estimates for their January Cattle Report. The sample from the NASS January 2017 survey was used as the screening sample. Thus, all operations in the 24 States that had 1 or more beef cows on January 1, 2017, were eligible to be included in the NAHMS study sample for contact in October 2017.

A stratified random sampling design was planned, and 4,000 operations were selected to be part of the sample. Stratification was based on State and herd size of the operation from the January 2017 survey (where “herd size” is defined as the number of beef cows on the operation — 1 to 49, 50 to 199, and 200 or more). The total sample size was computed to achieve prespecified precision criteria at the 95-percent confidence level, while accounting for the estimated population size, design effect, and expected response rate. The sample size was allocated to strata proportional to size, based upon a weighted average number of beef cow-calf operations, and the total beef cow inventory within the strata. This sampling design allows for logistical efficiencies in administering the survey, prespecified precision for estimates, and oversampling of larger operations.

3. Population Inferences

a. Phase I: General beef management report

Inferences cover the population of beef producers with at least 1 beef cow in the study's 24 participating states. These States accounted for 86.6 percent of the 31.7 million total U.S. beef cows and 78.9 percent of the 729,046 total operations with beef cows in the United States in 2017 (See Appendix II for respective data on individual states from the NASS 2017 Census of Agriculture). Estimates in this report represent 61.8 percent of U.S. beef cow-calf operations with at least 1 beef cow in the 24 study States, after taking into account the survey design and weighting (see Section II.D.2 for more information on the calculation of the weighted response rate).

Because States participating in the study were selected from operations that participated in the NASS January 2017 Cattle Survey, there were two weighting phases. In the first weighting phase, the inverse of the probability of selection for the January 2017 Cattle Survey was used as the initial weight and then adjusted for nonresponse and sampling-frame duplication. In the second phase, the inverse of the probability of selection for the Cow-Calf study (with probabilities being approximately proportional to stratum size) was used as the initial weight and then adjusted for coverage and nonresponse. Nonresponse is accounted for using an additional adjustment according to the proportion of nonrespondents within each stratum using a propensity score model.

SUDAAN software (RTI, version 11.0.1) was used to produce population estimates and their standard errors. The SUDAAN software allows estimation of standard errors for complex sampling designs using Taylor series linearization.

C. Data Collection

From October through November in 2017, NASS enumerators administered the 2017 NAHMS Beef Management questionnaire via personal interviews. The interview took about 75 minutes to complete.

D. Data Analysis

1. Validation

Data were entered by NASS staff into a SAS data file and checked for validity. NAHMS staff independently performed data validation checks on the data set to identify consistency and statistical issues. Consistency issues include logical inconsistencies within a survey and were identified using summaries of responses to check for invalid

responses (e.g., a response of '3' for a 0/1 response variable); threshold checks (e.g., identifying invalid total sums of beef cow inventory); and, if-then, checks (e.g., if no bull calves will be castrated on the operation, then there should not be a reported average age of bull calf castration).

Statistical issues were identified by investigating summary measures of responses for variables, and extreme outliers were investigated by data analysts and subject-matter experts. Inconsistencies were identified using SAS software, and hard copies of questionnaires were reviewed by data analysts and subject-matter experts. Identified inconsistencies were addressed using item-level imputation measures, if appropriate values could be logically deduced.

Summarization and estimation were performed using SUDAAN software, which accounts for the stratified sampling study design. Estimates were generated by one analyst, and numbers and estimation code were reviewed by a second analyst to ensure accurate reporting of estimates.

2. Response rates

The purpose of this section is to provide counts and percentages of operations by response category, which can be used to compute various measures of response. Historically, the term "response rate" was used as a catch-all parameter, but there are many ways to define and calculate response rates. Therefore, counts and percentages of operations by response code category are presented below so that response rates can be calculated according to the preferred definition of "response rate."

Of the 4,000 operations selected for participation, 317 were ineligible (no resident beef cows, out of business, or out of scope). Of the 3,683 eligible operations, 462 were not contacted (office holds, deliberately not contacted, and inaccessible operations). Of the 3,221 eligible operations that were contacted, 2,013 (766 + 1,247) provided complete questionnaire data. Of those, 766 operations agreed to be contacted for the Phase II of the study.

Response category group label	Response category group	Response category	Number operations	Percent operations	Weighted percent operations*
(a)	In-scope – complete	Completed NASS interview for baseline report, signed consent for phase II	766	19.2	19.3
		Completed NASS interview for baseline report, refused consent for phase II	1,247	31.2	36.5
(b)	In-scope – refused	Refused	1,208	30.2	25.8
(c)	Out of scope	No beef cows on hand between January 1, 2017 and December 31, 2017	269	6.7	7.4
		Out of business	45	1.1	1.6
		Out of scope	3	0.1	0.1
(d)	Not contacted	Office hold	145	3.6	1.7
		Inaccessible	317	7.9	7.8
		Total	4,000	100.0	100.0

* Weighted percentages calculated using the initial sampling weights.

Additionally, the Office of Management and Budget (OMB) has provided guidance regarding the calculation of response rates in their Standards and Guidelines for Statistical Surveys (2006), Section 3.2. The response rate advocated for in the OMB guidance gives the percentage of eligible operations completing the questionnaire. According to the guidance, the response rate for this study would be calculated according to the following formula.

$$\frac{a}{(a + b) + p * (d)}$$

Where the letters a, b, and d (and c below) represent the counts (or percentages) of operations in each of the response category groups in the table above and p is the proportion of the

non-contacted operations that are expected to be in-scope. Specifically,

$$p = \frac{(a + b)}{(a + b + c)} = \frac{3,221}{3,538} \approx 0.910$$

Thus, the OMB guidance-based response rate for Phase I of the NAHMS Beef 2017 study is calculated as follows.

$$\frac{2,013}{3,221 + 0.910 * 462} = 0.553,$$

Meaning approximately 55.3 percent of eligible operations completed the Phase I questionnaire. The weighted OMB guidance-based response rate for Phase I of the NAHMS Beef 2017 study is 61.8 percent (calculated using the initial sampling weights), which means that Phase I questionnaire information is available for approximately 61.8 percent of the beef cow-calf operations with at least 1 beef cow in the 24 study states after taking into account the survey design and weighting.

The unweighted response rate, 55.3 percent, was the rate used to communicate the response rate for this study, as it represented the likelihood that eligible operations completed the Phase I questionnaire.

Appendix I: Sample Profile

A. Responding Operations

1. Size of operations

Herd Size (total beef cow inventory)	Number of Responding Operations*
1 to 49	902
50 to 199	653
200 or more	458
Total	2,013

* Respondent provided answers to all or nearly all questions.

2. Regions

Region	Number of Responding Operations*
West (CA, CO, ID, MT, OK, OR, TX, WY)	780
Central (IA, KS, MN, MO, NE, ND, SD)	511
East (AL, AR, FL, GA, KY, MS, OH, TN, VA)	722
Total	2,013

* Respondent provided answers to all or nearly all questions.

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

Number of Beef Cows and Number of Beef Cow Operations on December 31, 2017			
Region	State	Beef Cow Inventory* (thousand head)	Beef Cow Operations*
West	California	682	10,254
	Colorado	806	12,407
	Idaho	498	8,149
	Montana	1,488	10,290
	Oklahoma	2,129	46,080
	Oregon	839	11,548
	Texas	4,583	134,250
	Wyoming	716	4,982
	Total	11,431	237,960
Central	Iowa	939	19,171
	Kansas	1,500	23,682
	Minnesota	368	13,339
	Missouri	2,164	48,122
	Nebraska	1,896	17,707
	North Dakota	985	8,245
	South Dakota	1,800	12,613
	Total	9,652	142,879
East	Alabama	718	20,004
	Arkansas	927	23,036
	Florida	882	18,493
	Georgia	488	14,869
	Kentucky	1,032	33,864
	Mississippi	503	14,752
	Ohio	301	17,733
	Tennessee	906	32,960

Table cont'd →

**Number of Beef Cows and Number of Beef Cow Operations on
December 31, 2017**

Region	State	Beef Cow Inventory* (thousand Head)	Beef Cow Operations*
East	Virginia	638	18,453
	Total	6,397	194,164
Total (24 States)		27,479	575,003
24 States as a % of 50 States		86.6	78.9
Total U.S. (50 States)		31,722	729,046

* Source: NASS, 2017 Census of Agriculture. State level estimates only available in conjunction with the Census of Agriculture every 5 years.