United States Department of Agriculture

Animal and Plant Health Inspection Service

Veterinary Services

National Animal Health Monitoring System

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Sheep 2011

Part I: Reference of Sheep Management Practices in the United States, 2011

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Items of Note

The U.S. sheep industry is facing new challenges as demand for lamb and wool is at an all-time high. In 2011, a major grocery-store chain began promoting American Lamb products, and a major retailer committed to selling U.S.-grown lamb exclusively in its stores. Nontraditional market channels such as on-farm and farmer's market sales and sales to small processors have also seen recent growth.

Population estimates and operator experience

Sheep breeds in the United States can be categorized by purpose, fiber type, and face color. Black- or nonwhite-faced breeds include Suffolk, Hampshire, Shropshire, Oxford, and Southdown. These breeds are often considered meat producers, while white-faced breeds are more often used for wool production. Because each sheep breed offers superiority in some trait, producers often blend the breeds to gain the superior characteristics of each breed in offspring. These offspring are used to attain the phenotypic requirements of their operation's type and geographical conditions. While the highest percentage of operations (44.7 percent) had black-faced wool breeds, the highest percentage of sheep and lambs (41.7 percent) were in the white-faced breed category.

Sheep are a multiuse species. For example, 81.6 percent of operations raised sheep for meat, 26.5 percent for seed or breeding stock, 15.8 percent for wool, and nearly 32.6 percent of operations raised sheep for more than one reason.

When rapid means of communication with producers is important, it can be helpful to work with national or State industry organizations to promulgate necessary information. Over one-fifth of producers (22.9 percent) belonged to a national sheep organization, and almost one-third (29.0 percent) belonged to a State or local sheep industry association or club. These percentages vary by size of operation and by operation type.

Identification

Flock and individual animal identification (ID) are important tools used to reduce disease and increase productivity on U.S. sheep operations. Almost 9 of 10 operations (88.6 percent) used some form of individual ID for their sheep. The most commonly used form of either individual or flock ID was the free Scrapie Program ear tag.

Lambing management

With the increase of smaller operations, nontraditional marketing methods, and improved reproductive techniques, more operations have the ability to lamb during the season that best suits their customers' needs. The highest percentage of lambs were born from February through May, which allows producers to make the most use of available forage. Spring lambing also coincides with natural breeding and lambing seasons, when ewes are likely to produce larger lamb crops.

For operations that managed their sheep primarily on the open range, docking may be the first time they view the sheep after lambing. At this time, lambs are tagged, castrated, docked, and vaccinated, and ewes are examined to ensure health and fecundity. Overall, 80.5 percent of lambs born alive were docked. Nearly 7 of 10 operations castrated ram lambs at an average age of 23.4 days, and more than 3 of 10 operations castrated ram lambs in the first 7 days of age.

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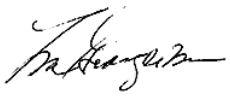
- USDA–ARS, Bacterial Epidemiology and Antimicrobial Resistance Research Unit, Athens, GA

All participants are to be commended, particularly the producers whose voluntary efforts made the Sheep 2011 study possible.



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Feedback
Feedback, comments, and suggestions regarding Sheep 2011 study reports are welcomed. You may submit feedback via online survey at: http://nahms.aphis.usda.gov (Click on “FEEDBACK on NAHMS reports.”)

Introduction

The National Animal Health Monitoring System (NAHMS) is a nonregulatory division of the United States Department of Agriculture's (USDA) Animal and Plant Health Inspection Service. NAHMS is designed to help meet the Nation's animal-health information needs and has collected data on sheep health and management practices through two previous studies.

The NAHMS 1996 National Sheep Survey was developed through collaboration with the Research and Education Division of the American Sheep Industry Association (ASI) and focused on identifying health and productivity issues affecting America's sheep industry. Study results provided an overview of sheep health, productivity, and management on 5,174 U.S. sheep operations.

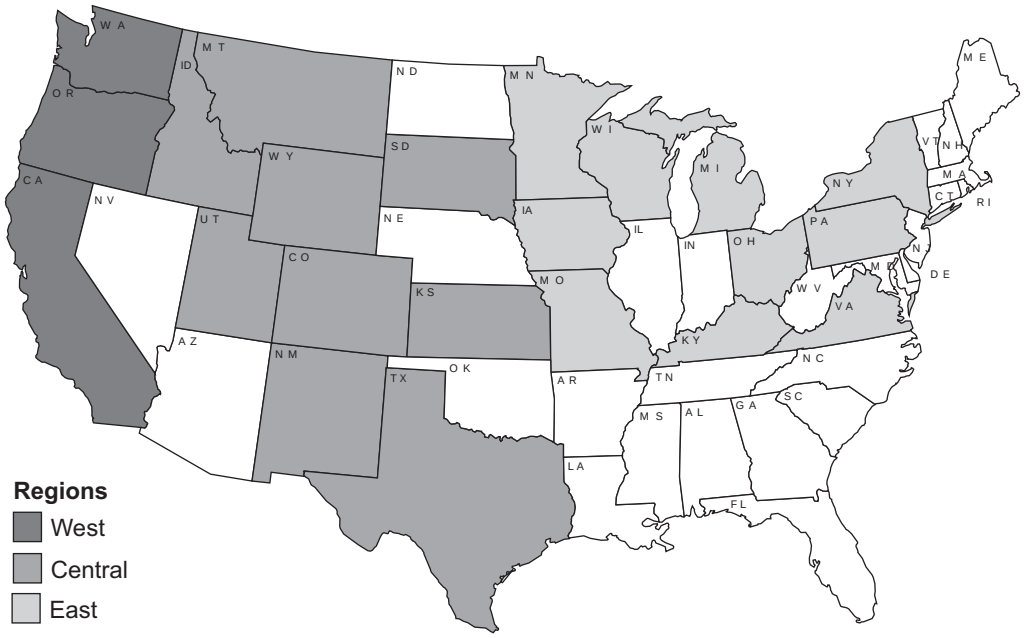
The NAHMS Sheep 2001 study was designed to provide both participants and the industry with information about the U.S. sheep flock on operations with one or more sheep. The USDA's National Agricultural Statistics Service (NASS) collaborated with VS to select a producer sample statistically designed to provide inferences to the Nation's sheep population in 22 participating States. These 22 States accounted for 87.4 percent of the U.S. sheep inventory on January 1, 2001, and 72.3 percent of U.S. sheep operations in 2000.

The NAHMS Sheep 2011 study was conducted in 22 of the Nation's major sheep-producing States (see map on next page). The study provides participants, stakeholders, and the industry with valuable information representing 70.1 percent of U.S. farms with ewes and 85.5 percent of the U.S. ewe inventory (NASS 2007 Census of Agriculture).

"Part 1: Reference of Sheep Management Practices in the United States, 2011" is the first report containing national information from the NAHMS Sheep 2011 study. Data for this report were collected from two samples totaling 4,920 sheep operations. Operations with 20 or more ewes were personally interviewed by NASS enumerators on-site from January 1 to February 11, 2011, to complete the full version of the study questionnaire. Operations with fewer than 20 ewes completed a shorter version of the questionnaire by telephone.

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

Sheep 2011 Participating States



Terms Used in This Report

Crutching: Prelambing shearing of the perineal area.

Estimated Breeding Values: Breed-specific genetic parameters that allow for genetic evaluation of carcass traits and parasite resistance across breeds.

Expected progeny difference (EPD): Measurement used to determine the genetic value of an animal based on predicted genetically improved offspring. Performance records determine the measurement and are based on complex analysis of birth, growth, maternal, and carcass traits, and can be compared between animals of the same breed.

Flock size: Flock sizes are based on the number of ewes for each operation on the NASS list sampling frame. Size breakouts are: very small (fewer than 20); small (20–99); medium (100–499); and large (500 or more).

Flock type: The following designations represent flocks with 20 or more ewes.

Dry lot/feedlot—pen that does not allow for grazing.

Fenced range—any fenced area not specifically cultivated to raise forage or browse.

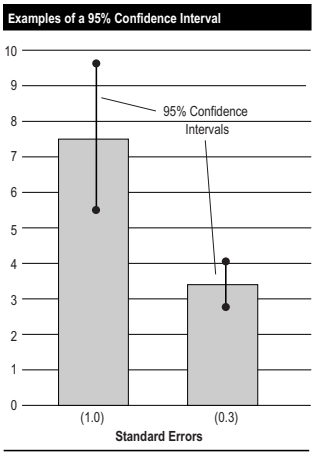
Herded/open range—any unfenced acreage, even if it was a few acres surrounded by residential areas.

Pasture—any fenced area specifically cultivated to raise forage or browse.

Flushing: Temporary but purposeful elevation in nutritional status around breeding time. Ewes are fed extra energy rations prior to the breeding season to improve ovulations, conception, and embryo implantation rate, ultimately increasing the lamb crop ratio.

Lamb: Sheep less than 1 year old.

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. See table D.6.b., operation average age lambs were castrated.



Population estimates: Estimates in this report are provided with a measure of precision called the standard error. A 95-percent confidence interval can be created with bounds equal to the estimate, plus or minus two standard errors. If the only error is sampling error, the confidence intervals created in this manner will contain the true population mean 95 out of 100 times. In the example to the left, an estimate of 7.5 with a standard error of 1.0 results in limits of 5.5 to 9.5 (two times the standard error above and below the estimate). The second estimate of 3.4 shows a standard error of 0.3 and results in limits of 2.8 and 4.0. Alternatively, the 90-percent confidence interval would be created by multiplying the standard error by 1.65 instead of 2.0. Most estimates in this report are rounded to the nearest tenth. If rounded to 0, the standard error was reported (0.0). If there were no reports of the event, no standard error was reported (—).

Regions:

West: California, Oregon, Washington

Central: Colorado, Idaho, Kansas, Montana, New Mexico, South Dakota, Texas, Utah, Wyoming

East: Iowa, Kentucky, Michigan, Minnesota, Missouri, New York, Ohio, Pennsylvania, Virginia, Wisconsin

Sheep: Animal 1 year old and older.

Section I: Population Estimates

A. Inventory—Primary Use

Note: Where appropriate, column totals are shown as 100.0 to aid in interpretation. However, estimates may not sum to exactly 100.0 due to rounding.

Sheep are important sources of meat, fiber, and other by-products. Producers participating in the Sheep 2011 study were asked to report which breeds of sheep and lambs they had on hand on January 1, 2011, and the primary use of these sheep and lambs.

1. Breed categories

Sheep breeds in the United States can be categorized by purpose, fiber type, and face color. Black- or nonwhite-faced breeds include Suffolk, Hampshire, Shropshire, Oxford, and Southdown. These breeds are often considered meat producers, while the white-faced breeds are more often used for wool production. Because each breed offers superiority in some trait, producers often blend the breeds to gain the superior characteristics of each breed and to attain the genetic requirements of their type of operation and the geographic conditions of the operation's location. Desired characteristics include parasite resistance, ability to thrive on the range, and cold hardiness.

All sheep grow both hair and wool fibers, but hair breeds have more hair fibers than wool breeds and shed their coats annually. Hair breeds usually do not require shearing. Some hair breeds have been developed through crossbreeding with other hair, meat, and wool breeds. Wool breeds need to be sheared at least annually and have been specifically bred to produce either fine wool, which has small fiber diameters and short lengths, or long wool, which has large fiber diameters and long lengths. Medium-wool sheep are typically meat breeds.

Fine-wool breeds include Rambouillet, American Cormo, Booroola Merino, Debouillet, and Delaine-Merino.

Medium-wool sheep breeds include Columbia, Corriedale, East Friesian, Finnsheep, Montadale, Panama, Polypay, and Targhee (sometimes produce fine wool too).

Long-wooled breeds include Blueface Leicester, Border Leicester, Coopworth, Cotswold, Leicester Longwool, Lincoln, Romney, and Wensleydale.

Colored-wool breeds include Jacob, Navajo-Churro, Icelandic, California Red, Black Welsh Mountain, Romanov, Shetland, and California Variegated Mutant. Milk-sheep breeds include East Friesian, Lacaune, and Rideau Arcott. The "other" breeds category includes Karakul and Tunis (fat-tail breeds), Saoy, and other minor breeds.

Hair breeds include American Blackbelly, Barbados Blackbelly, Dorper, Katahdin, St. Croix, and Wiltshire Horn.

The highest percentage of operations with one or more ewes and with 20 or more ewes had black-faced wool breeds (44.7 and 48.6 percent, respectively). The highest percentage of very small, small, and medium operations also had black-faced wool breeds, while the highest percentage of large operations had fine-wool white-faced breeds. The percentage of operations that had fine-wool white-faced breeds ranged from 14.0 percent of very small operations to 72.4 percent of large operations. The percentage of operations that had hair breeds increased over fourfold from 2001 to 2011 (4.6 and 21.5 percent, respectively).

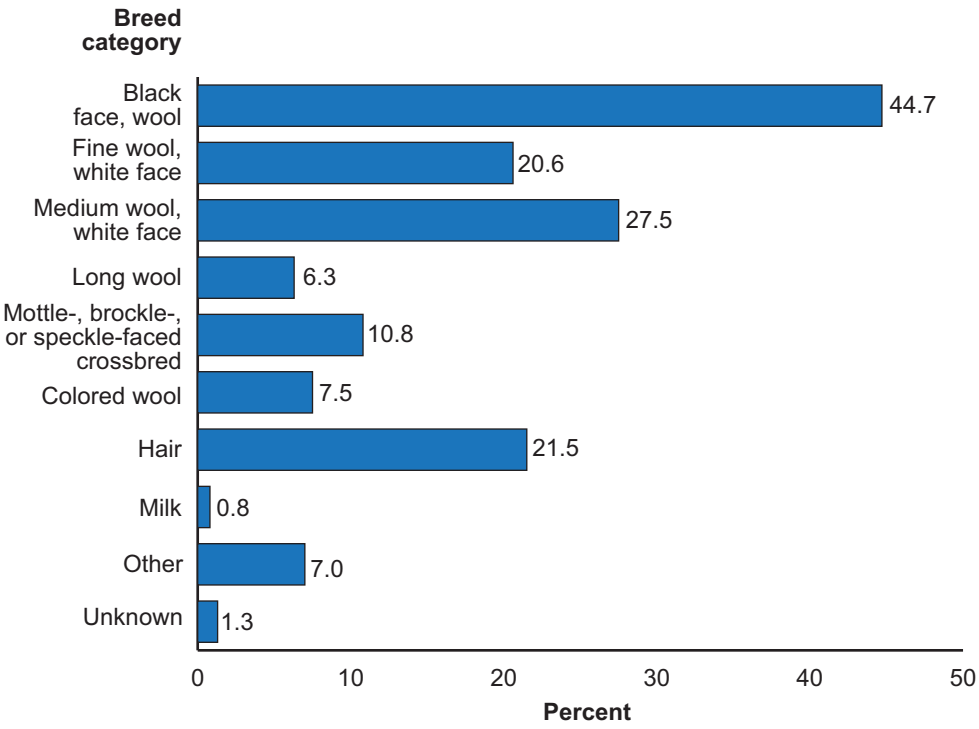
A.1.a. Percentage of operations by breed category of sheep and lambs, and by flock size:

Percent Operations

Flock Size (number of ewes)

	Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Breed category	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Black face, wool	40.1	(1.7)	49.8	(1.5)	46.3	(1.6)	42.5	(1.8)	44.7	(1.0)	48.6	(1.1)
Fine wool, white face	14.0	(1.3)	19.2	(1.2)	38.4	(1.5)	72.4	(1.7)	20.6	(0.8)	26.2	(0.9)
Medium wool, white face	21.5	(1.5)	31.6	(1.4)	38.0	(1.6)	27.0	(1.6)	27.5	(0.9)	32.7	(1.1)
Long wool	8.3	(1.0)	5.1	(0.7)	3.8	(0.6)	1.6	(0.3)	6.3	(0.6)	4.6	(0.5)
Mottle-, brockle-, or speckle-faced crossbred	7.5	(0.9)	13.3	(1.0)	15.8	(1.2)	10.9	(1.1)	10.8	(0.6)	13.7	(0.8)
Colored wool	10.1	(1.1)	5.8	(0.7)	3.9	(0.7)	2.3	(0.6)	7.5	(0.6)	5.2	(0.5)
Hair	21.2	(1.4)	23.5	(1.3)	18.3	(1.3)	11.0	(1.2)	21.5	(0.8)	21.7	(1.0)
Milk	0.6	(0.3)	0.7	(0.3)	1.3	(0.3)	0.7	(0.3)	0.8	(0.2)	0.9	(0.2)
Other	7.5	(1.0)	6.5	(0.8)	7.8	(1.0)	4.6	(0.8)	7.0	(0.6)	6.7	(0.6)
Unknown	1.7	(0.5)	1.0	(0.3)	0.7	(0.2)	0.8	(0.4)	1.3	(0.3)	0.9	(0.2)

Percentage of operations by breed category of sheep and lambs



A higher percentage of operations in the Central region (35.0 percent) had fine-wool white-faced sheep than operations in the West or East regions (12.1 and 13.9 percent, respectively). Conversely, a lower percentage of operations in the Central region had long-wool, colored-wool, or the mottle-faced crossbreds (1.7, 4.1, and 7.7 percent, respectively) than operations in the West region (10.8, 9.0, and 12.5 percent, respectively) or East region (7.9, 9.2, and 12.4 percent, respectively).

A.1.b. Percentage of operations by breed category of sheep and lambs, and by region:

Percent Operations (1 or more ewes)

	Region					
	West		Central		East	
Breed category	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Black face, wool	49.5	(2.5)	38.9	(1.5)	46.9	(1.5)
Fine wool, white face	12.1	(1.6)	35.0	(1.5)	13.9	(1.1)
Medium wool, white face	23.5	(2.1)	19.8	(1.1)	34.3	(1.5)
Long wool	10.8	(1.6)	1.7	(0.4)	7.9	(0.9)
Mottle-, brockle-, or speckle-faced crossbred	12.5	(1.6)	7.7	(0.7)	12.4	(0.9)
Colored wool	9.0	(1.5)	4.1	(0.6)	9.2	(1.0)
Hair	20.4	(2.0)	27.1	(1.5)	18.1	(1.2)
Milk	0.7	(0.4)	0.6	(0.3)	0.9	(0.3)
Other	6.2	(1.2)	5.5	(0.9)	8.4	(0.9)
Unknown	1.6	(0.7)	1.0	(0.4)	1.3	(0.4)

A higher percentage of herded/open range operations (63.1 percent) had fine-wool white-faced breeds compared with fenced-range (36.9 percent), pasture (20.7 percent), or dry lot/feedlot (19.2 percent) operations. A lower percentage of herded/open range operations had long-wool breeds (0.6 percent) compared with fenced-range (2.3 percent), pasture (5.5 percent), or dry lot/feedlot (7.1 percent) operations. A lower percentage of herded/open range operations (6.1 percent) had hair sheep compared with fenced-range (29.1 percent) or pasture (20.0 percent) operations.

A.1.c. Percentage of operations by breed category of sheep and lambs, and by primary flock type:

Percent Operations (20 or more ewes)

Primary Flock Type

	Herded/ open range		Fenced range		Pasture		Dry lot/ feedlot	
Breed category	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Black face, wool	43.0	(5.0)	35.7	(2.0)	53.6	(1.5)	56.2	(4.4)
Fine wool, white face	63.1	(5.5)	36.9	(2.0)	20.7	(1.2)	19.2	(3.3)
Medium wool, white face	31.7	(4.8)	19.6	(1.6)	37.7	(1.5)	39.2	(4.2)
Long wool	0.6	(0.2)	2.3	(0.7)	5.5	(0.7)	7.1	(2.3)
Mottle-, brockle-, or speckle-faced crossbred	11.0	(3.7)	6.9	(1.1)	16.2	(1.1)	18.7	(3.3)
Colored wool	3.9	(2.6)	3.4	(0.8)	5.9	(0.7)	6.1	(2.2)
Hair	6.1	(3.1)	29.1	(2.1)	20.0	(1.3)	14.7	(3.3)
Milk	0.3	(0.2)	0.7	(0.4)	0.7	(0.2)	2.1	(1.0)
Other	4.9	(1.3)	5.4	(1.1)	6.8	(0.8)	10.0	(2.8)
Unknown	2.7	(2.5)	1.0	(0.5)	0.8	(0.3)	1.4	(1.0)

While the highest percentage of **operations** (44.7 percent) owned black-faced sheep (see table A.1.a.), fine-wool white-faced sheep accounted for the highest percentage of **sheep and lamb inventory** on all operations with 1 or more ewes and 20 or more ewes (41.7 and 43.5 percent, respectively). Fine-wool white-faced sheep accounted for a higher percentage of sheep and lamb inventory on large operations than on any of the other operation sizes.

A.1.d. Percentage of January 1, 2011, sheep and lamb inventory, by breed category and by flock size:

Percent Sheep and Lambs

Flock Size (number of ewes)

	Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Breed category	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Black faced, wool	28.2	(2.3)	28.6	(1.4)	15.6	(1.4)	6.9	(1.1)	14.9	(0.7)	14.0	(0.7)
Fine wool, white face	13.1	(2.9)	12.9	(1.2)	32.0	(3.9)	62.9	(2.2)	41.7	(1.5)	43.5	(1.5)
Medium wool, white face	13.1	(1.6)	18.0	(1.2)	23.3	(1.5)	15.8	(1.5)	18.0	(0.9)	18.3	(0.9)
Long wool	3.6	(0.7)	1.9	(0.4)	1.0	(0.2)	0.6	(0.2)	1.2	(0.1)	1.0	(0.1)
Mottle-, brockle-, or speckle-faced crossbred	4.6	(0.9)	6.0	(0.8)	6.7	(1.2)	4.5	(0.7)	5.4	(0.5)	5.4	(0.5)
Colored wool	7.0	(1.0)	2.1	(0.5)	0.8	(0.2)	0.2	(0.1)	1.1	(0.1)	0.8	(0.1)
Hair	23.7	(2.3)	24.0	(1.8)	13.8	(1.5)	3.9	(0.6)	11.8	(0.6)	11.0	(0.7)
Milk	0.4	(0.3)	2.1	(1.7)	0.8	(0.3)	0.1	(0.0)	0.7	(0.4)	0.7	(0.4)
Other	5.5	(1.0)	3.7	(0.7)	5.2	(0.8)	5.0	(1.2)	4.8	(0.6)	4.8	(0.7)
Unknown	0.7	(0.2)	0.8	(0.6)	0.9	(0.5)	0.1	(0.1)	0.5	(0.2)	0.5	(0.2)
Total	100.0		100.0		100.0		100.0		100.0		100.0	

Fine-wool white-faced breeds accounted for the highest percentage of sheep and lamb inventory on operations in the Central and West regions (57.8 and 33.3 percent, respectively). On operations in the East region, black-faced wool breeds and medium-wool white-faced breeds accounted for the highest percentages of the sheep and lamb inventory (26.1 and 28.7 percent, respectively).

A.1.e. Percentage of January 1, 2011, sheep and lamb inventory, by breed category and by region:

	Percent Sheep and Lambs*					
	Region					
	West		Central		East	
Breed categories	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Black face, wool	24.2	(2.8)	7.3	(0.5)	26.1	(1.2)
Fine wool, white face	33.3	(3.3)	57.8	(1.9)	8.5	(0.8)
Medium wool, white face	13.8	(2.0)	15.1	(1.2)	28.7	(1.5)
Long wool	3.1	(0.5)	0.2	(0.1)	2.0	(0.3)
Mottle-, brockle-, or speckle-faced crossbred	9.4	(1.6)	2.0	(0.4)	10.4	(1.3)
Colored wool	1.0	(0.2)	0.6	(0.2)	2.5	(0.4)
Hair	7.2	(1.1)	12.5	(1.0)	13.7	(1.1)
Milk	2.1	(1.9)	0.1	(0.0)	1.0	(0.3)
Other	5.7	(1.7)	4.0	(0.9)	6.1	(0.8)
Unknown	0.1	(0.0)	0.4	(0.2)	1.2	(0.5)
Total	100.0		100.0		100.0	

*On operations with one or more ewes.

Fine-wool white-faced breeds accounted for the highest percentage of sheep and lamb inventory on herded/open range and fenced-range operations (65.3 and 59.5 percent, respectively). Black-faced wool breeds and medium-wool white-faced breeds each accounted for about one-fourth of the sheep and lamb inventory on pasture and dry lot/ feedlot operations.

A.1.f. Percentage of January 1, 2011, sheep and lamb inventory, by breed category and by primary flock type:

Percent Sheep and Lambs*

Primary Flock Type

	Herded/ open range		Fenced range		Pasture		Dry lot/ feedlot	
Breed categories	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Black face, wool	4.5	(0.8)	8.1	(0.9)	24.3	(1.5)	27.0	(3.4)
Fine wool, white face	65.3	(3.8)	59.5	(1.8)	17.5	(1.5)	10.8	(2.1)
Medium wool, white face	18.7	(2.6)	10.1	(1.0)	24.8	(1.4)	26.3	(3.9)
Long wool	0.3	(0.2)	0.2	(0.0)	2.3	(0.3)	0.7	(0.3)
Mottle-, brockle-, or speckle-faced crossbred	2.9	(0.9)	2.9	(0.8)	8.5	(0.8)	14.5	(5.5)
Colored wool	0.1	(0.0)	0.5	(0.2)	1.4	(0.3)	0.9	(0.4)
Hair	0.6	(0.4)	15.1	(1.4)	14.6	(1.2)	8.5	(2.9)
Milk	0.0	(0.0)	0.2	(0.1)	1.4	(1.1)	2.5	(1.2)
Other	7.5	(2.3)	3.2	(0.9)	4.0	(0.5)	8.2	(3.1)
Unknown	0.0	(0.0)	0.2	(0.1)	1.0	(0.5)	0.6	(0.5)
Total	100.0		100.0		100.0		100.0	

*On operations with 20 or more ewes.

2. Primary use

Most sheep operations derive sheep-associated income from selling lambs for meat, while others sell lambs as seed or breeding stock. Wool production is also a use for sheep, although usually less important to operations than meat production. Some operations keep sheep only for 4-H activities or for showing at fairs. The dairy-sheep industry is small; few operations raise sheep for milk. Most sheep are raised for more than one use.

Overall, 81.6 percent of operations with 20 or more ewes raised sheep primarily for meat. A higher percentage of large operations raised sheep primarily for wool compared with small and medium operations.

A.2.a. Percentage of operations by primary use of sheep and lambs, and by flock size:

Percent Operations

Flock Size (number of ewes)

	Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Primary use*	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Meat production			79.3	(1.3)	86.8	(1.2)	91.4	(1.1)			81.6	(1.0)
Wool production			12.8	(1.0)	19.1	(1.3)	42.7	(1.8)			15.8	(0.8)
Showing, competition, 4-H, or club			14.3	(1.1)	9.5	(1.0)	3.0	(0.6)			12.6	(0.8)
Seed or breeding stock			28.0	(1.4)	23.0	(1.5)	20.1	(1.5)			26.5	(1.1)
Milk production			0.4	(0.2)	1.0	(0.3)	0.0	(—)			0.5	(0.1)
Other			4.1	(0.6)	1.5	(0.5)	0.2	(0.1)			3.3	(0.5)

*An operation may have sheep and lambs for more than one purpose. Therefore, some operations may be represented in more than one primary use category.

A higher percentage of operations in the Central region raised sheep primarily for wool (24.3 percent) compared with operations in the East and West regions (8.9 and 14.6 percent, respectively).

A.2.b. Percentage of operations by primary use of sheep and lambs, and by region:

	Percent Operations (20 or more ewes)					
	Region					
	West		**Central**		**East**	
Primary use*	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Meat production	81.4	(2.5)	80.7	(1.4)	82.4	(1.5)
Wool production	14.6	(2.2)	24.3	(1.4)	8.9	(1.0)
Showing, competition, 4-H, or club	19.3	(2.6)	8.2	(1.0)	14.2	(1.3)
Seed or breeding stock	27.4	(2.9)	23.3	(1.4)	28.9	(1.7)
Milk production	0.2	(0.2)	0.1	(0.1)	0.9	(0.3)
Other	2.5	(1.1)	4.1	(0.9)	2.9	(0.7)

*An operation may have sheep and lambs for more than one purpose. Therefore, some operations may be represented in more than one primary use category.

Photograph courtesy of Camilla Kristensen.

Sheep kept primarily for meat accounted for the highest percentage of inventory on operations with 20 or more ewes (70.4 percent), regardless of flock size or region.

A.2.c. Percentage of January 1, 2011, sheep inventory, by primary use and by flock size:

Percent Sheep and Lamb Inventory

Flock Size (number of ewes)

	Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Primary use	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Meat production			67.4	(1.6)	77.5	(1.9)	67.9	(2.2)			70.4	(1.3)
Wool production			7.2	(0.9)	8.4	(1.0)	21.3	(2.2)			14.7	(1.2)
Showing, competition, 4-H, or club			7.0	(0.8)	2.5	(0.4)	0.2	(0.1)			2.3	(0.2)
Seed or breeding stock			15.2	(1.1)	10.1	(1.1)	10.6	(1.4)			11.5	(0.8)
Milk production			0.2	(0.1)	0.9	(0.3)	0.0	(0.0)			0.3	(0.1)
Other			3.0	(0.8)	0.6	(0.2)	0.0	(0.0)			0.8	(0.2)
Total			100.0		100.0		100.0				100.0	

A.2.d. Percentage of January 1, 2011, sheep inventory, by primary use and by region:

Percent Sheep and Lamb Inventory (20 or more ewes)

	Region					
	West		Central		East	
Primary use	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Meat production	71.8	(2.8)	68.3	(2.0)	75.0	(1.4)
Wool production	14.5	(2.7)	18.6	(1.8)	4.0	(0.6)
Showing, competition, 4-H, or club	2.8	(0.6)	1.4	(0.2)	4.6	(0.6)
Seed or breeding stock	10.3	(2.0)	11.0	(1.2)	14.2	(1.1)
Milk production	0.1	(0.1)	0.0	(0.0)	1.2	(0.4)
Other	0.6	(0.3)	0.8	(0.3)	1.0	(0.3)
Total	100.0		100.0		100.0	

On operations with 20 or more ewes, a higher percentage of sheep used primarily for wool were managed on herded/open range (23.3 percent) and fenced range (19.0 percent) than were managed on pasture (6.1 percent) or dry lot/feedlot (3.3 percent). A higher percentage of sheep used primarily for milk were managed on a dry lot/feedlot (2.9 percent) than pasture (0.3 percent), and none was kept on fenced or herded/open range.

A.2.e. Percentage of January 1, 2011, sheep inventory, by primary use and by primary flock type:

Percent Sheep and lamb Inventory (20 or more ewes)

	Primary Flock Type							
	Herded/ open range		Fenced range		Pasture		Dry lot/ feedlot	
Primary use	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Meat production	64.6	(4.5)	69.3	(1.6)	75.8	(1.3)	67.6	(3.9)
Wool production	23.3	(4.2)	19.0	(1.6)	6.1	(0.6)	3.3	(0.9)
Showing, competition, 4-H, or club	0.0	(—)	1.9	(0.3)	3.5	(0.4)	9.6	(2.6)
Seed or breeding stock	11.7	(2.5)	9.1	(1.0)	13.1	(1.1)	15.0	(2.5)
Milk production	0.0	(—)	0.1	(0.1)	0.3	(0.1)	2.9	(1.4)
Other	0.3	(0.2)	0.7	(0.2)	1.2	(0.4)	1.9	(1.6)
Total	100.0		100.0		100.0		100.0	

Overall, 32.6 percent of operations with 20 or more ewes kept sheep for more than one use. A higher percentage of large operations (49.6 percent) kept sheep for more than one use than either small or medium operations (31.2 and 33.2 percent, respectively).

A.2.f. Percentage of operations that kept sheep for more than one use, by flock size:

Percent Operations

Flock Size (number of ewes)

Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Pct.	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
		31.2	(1.4)	33.2	(1.6)	49.6	(1.8)			32.6	(1.1)

A.2.g. Percentage of operations that kept sheep for more than one use, by primary flock type:

Percent Operations (20 or more ewes)

Primary Flock Type

Herded/ open range		**Fenced range**		**Pasture**		**Dry lot/ feedlot**	
Pct.	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
43.3	(5.0)	34.5	(2.1)	31.2	(1.4)	33.0	(4.1)

B. Flock Management

1. Flock type

Large operations, which own the majority of sheep in the United States, frequently raise sheep on rangeland. Small and medium operations often graze sheep on irrigated or cultivated pasture. Many operations manage sheep on more than one type of feeding environment. The highest percentage of operations with 20 or more ewes (75.8 percent) managed at least some of their sheep on pasture.

B.1.a. Percentage of operations by type of flock management used during the previous 12 months:

Type of flock management	**Percent operations** (20 or more ewes)	**Std. error**
Herded/open range	5.5	(0.4)
Fenced range	40.5	(1.1)
Pasture	75.8	(0.9)
Dry lot/feedlot	37.9	(1.0)
Other	1.9	(0.3)

Pasture was the primary management type for 62.2 percent of operations. A higher percentage of small operations (66.7 percent) kept sheep primarily on pasture than did medium and large operations (57.5 and 21.8 percent, respectively). Just over half of large operations (50.6 percent) kept sheep primarily on fenced range.

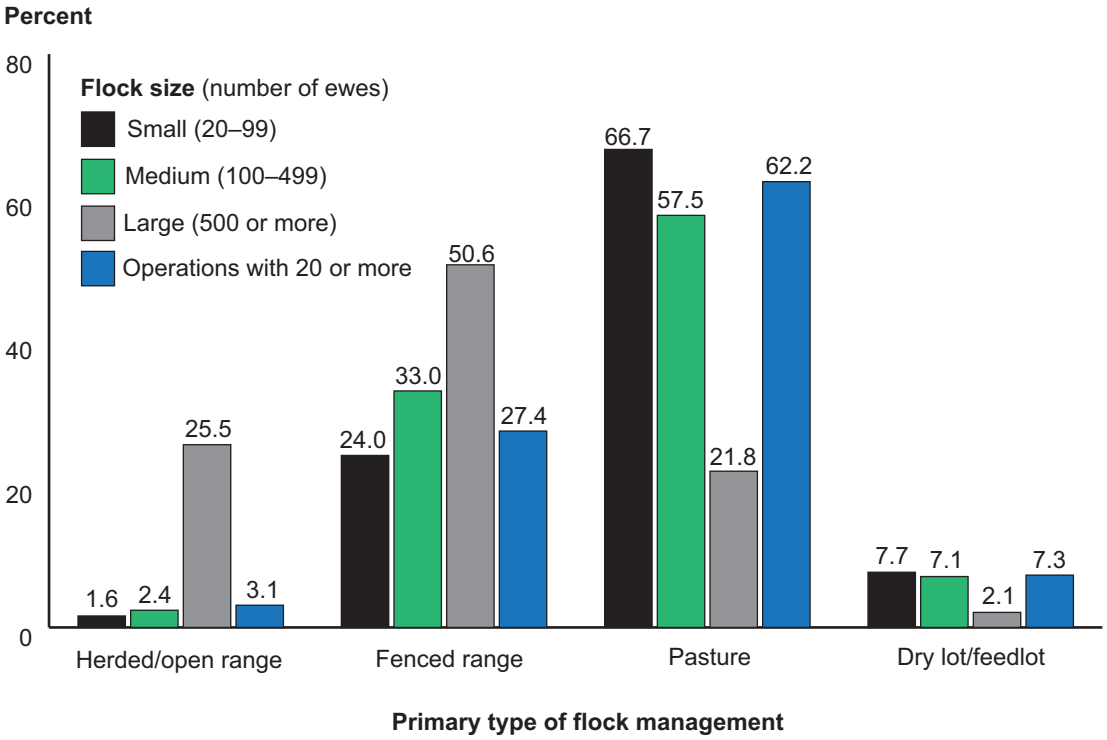
B.1.b. Percentage of operations by **primary** type of flock management used during the previous 12 months, and by flock size:

Percent Operations

Flock Size (number of ewes)

	Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Primary type of flock management	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Herded/ open range			1.6	(0.4)	2.4	(0.5)	25.5	(1.2)			3.1	(0.3)
Fenced range			24.0	(1.2)	33.0	(1.3)	50.6	(1.5)			27.4	(1.0)
Pasture			66.7	(1.4)	57.5	(1.5)	21.8	(1.5)			62.2	(1.0)
Dry lot/feedlot			7.7	(0.8)	7.1	(0.8)	2.1	(0.6)			7.3	(0.6)
Total			100.0		100.0		100.0				100.0	

Percentage of operations by primary type of flock management used during the previous 12 months, and by flock size



A higher percentage of operations in the Central region managed their sheep on herded/open or fenced range than operations in the West or East regions. Conversely, a higher percentage of operations in the West and East regions managed their sheep on pasture compared with operations in the Central region.

B.1.c. Percentage of operations by **primary** type of flock management used during the previous 12 months, and by region:

	Percent Operations (20 or more ewes)					
	Region					
	West		**Central**		**East**	
Primary type of flock management	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Herded/open range	3.4	(0.8)	6.3	(0.7)	0.1	(0.1)
Fenced range	23.0	(2.7)	47.3	(1.7)	11.8	(1.2)
Pasture	67.4	(2.9)	39.2	(1.7)	80.3	(1.4)
Dry lot/feedlot	6.1	(1.7)	7.2	(0.9)	7.8	(0.9)
Total	100.0		100.0		100.0	

Photograph courtesy of Camilla Kristensen.

A higher percentage of ewes on small and medium operations (64.6 and 53.0 percent, respectively) were managed on pasture compared with ewes on large operations (14.1 percent). Nearly half of ewes on large operations (46.7 percent) were managed on herded/open range. Although herded/open range flocks represented only 3.1 percent of operations, they accounted for over one-fourth of ewes on operations with 20 or more ewes (26.1 percent).

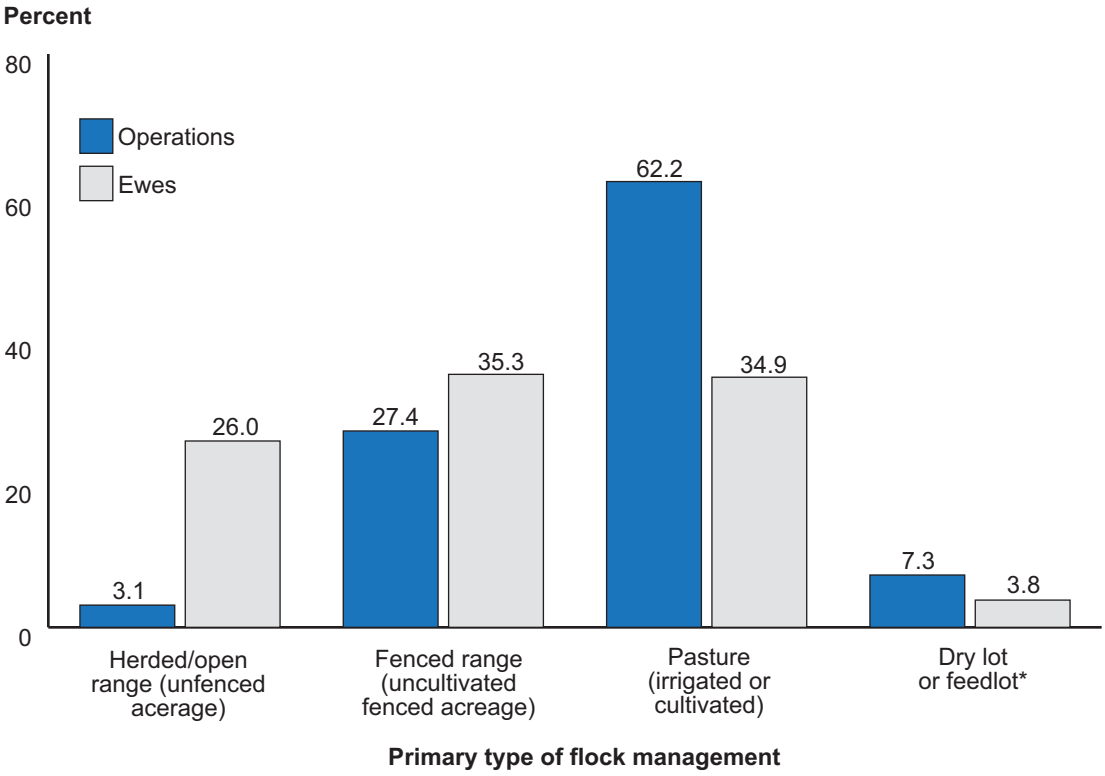
B.1.d. Percentage of ewes by **primary** type of flock management used during the previous 12 months, and by flock size:

Percent Ewes

Flock Size (number of ewes)

	Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Primary type of flock management	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Herded/ open range			1.3	(0.4)	4.3	(1.1)	46.6	(2.4)			26.0	(1.5)
Fenced range			27.1	(1.7)	35.7	(1.5)	38.4	(2.0)			35.3	(1.2)
Pasture			64.3	(1.7)	53.2	(1.7)	14.1	(1.6)			34.9	(1.1)
Dry lot/feedlot			7.3	(1.0)	6.8	(0.9)	0.9	(0.3)			3.8	(0.4)
Total			100.0		100.0		100.0				100.0	

For operations with 20 or more ewes, percentage of operations, and percentage of ewes on these operations, by primary type of flock management used during the previous 12 months



*Pen that does not allow grazing.

In the West and East regions, the highest percentage of ewes (80.2 and 46.1 percent, respectively) were managed primarily on pasture. In the Central region, the highest percentage of ewes (45.9 percent) were managed on fenced range.

B.1.e. Percentage of ewes on operations with 20 or more ewes by **primary** type of flock management used during the previous 12 months, and by region:

	Percent Ewes*					
	Region					
	West		Central		East	
Primary type of flock management	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Herded/open range	26.8	(3.9)	34.6	(2.0)	0.1	(0.1)
Fenced range	25.2	(3.7)	45.9	(1.7)	11.0	(1.1)
Pasture	46.1	(3.7)	17.0	(1.1)	80.2	(1.5)
Dry lot/feedlot	1.9	(0.6)	2.5	(0.4)	8.7	(1.1)
Total	100.0		100.0		100.0	

*On operations with 20 or more ewes.

Note: Only operations with 20 or more ewes were asked about their primary flock type; therefore, any table in this report that describes primary flock type does not represent operations with fewer than 20 ewes.

Operations with 20 to 99 ewes accounted for 73.1 percent of all operations with 20 or more ewes, while large operations (500 or more ewes) accounted for only 5.5 percent of all operations with 20 or more ewes. Large operations made up 45.7 percent of all herded/open range operations; just over one-third of herded/open range operations (37.3 percent) were small operations.

B.1.f. Percentage of operations by flock size and by primary flock type:

Percent Operations

Primary Flock Type

	Herded/ open range		Fenced range		Pasture		Dry lot/ feedlot		All operations (20 or more)	
Flock size	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Small (20-99)	37.6	(5.6)	64.1	(1.4)	78.3	(0.6)	77.5	(2.6)	73.1	(0.3)
Medium (100-499)	16.7	(3.2)	25.8	(1.2)	19.8	(0.6)	20.9	(2.5)	21.4	(0.3)
Large (500 or more)	45.7	(4.4)	10.1	(0.6)	1.9	(0.2)	1.6	(0.5)	5.5	(0.1)
Total	100.0		100.0		100.0		100.0		100.0	

While small operations made up 73.1 percent of sheep operations with 20 or more ewes, they represented only 22.1 percent of all sheep. Conversely, large operations only represented 5.5 percent of sheep operations but raised 53.1 percent of all sheep. The highest percentage of sheep in herded/open and fenced-range operations were on large operations (94.8 and 57.8 percent, respectively).

B.1.g. Percentage of ewes by size of operation and by primary flock type:

Percent Ewes

Primary Flock Type

	Herded/ open range		Fenced range		Pasture		Dry lot/ feedlot		All operations (20 or more)	
Flock size	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Small	1.1	(0.3)	17.0	(1.1)	40.6	(1.3)	42.8	(4.6)	22.1	(0.6)
Medium	4.1	(1.0)	25.2	(1.1)	38.0	(1.3)	45.1	(4.7)	24.9	(0.6)
Large	94.8	(1.1)	57.8	(1.5)	21.4	(1.9)	12.1	(3.5)	53.0	(1.0)
Total	100.0		100.0		100.0		100.0		100.0	

2. Inventory expectations in 5 years

To meet the increasing demand for lamb, wool, and sheep milk in the United States, the American Sheep Industry is encouraging sheep producers to increase the size of their flocks through the “Let’s Grow with Two Plus” program. Producers are encouraged to grow their flocks by 2 ewes per 100 ewes, increase the average birth rate per ewe to 2 lambs per year, and increase the harvested lamb crop by 2 percent. Visit http://www.growourflock.org/twoplus for more information on this program.

The highest percentage of operations with 20 or more ewes (59.0 percent) expected to have about the same number of sheep in 5 years. A higher percentage of large operations (32.4 percent) expected to have more sheep in the next 5 years compared with medium and small operations (25.7 and 22.7 percent, respectively). Overall, a higher percentage of operations expected to have more sheep (23.9 percent) than operations that expected to have fewer sheep (10.6 percent).

B.2.a. Percentage of operations by sheep inventory expected in 5 years, as compared with the January 1, 2011, inventory, and by flock size:

Percent Operations

Flock Size (number of ewes)

	Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Expected change in Inventory	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
None			7.1	(0.8)	4.5	(0.8)	4.2	(0.8)			6.4	(0.6)
Fewer sheep			11.1	(1.0)	10.1	(1.0)	6.6	(0.9)			10.6	(0.7)
About the same number of sheep			59.0	(1.5)	59.7	(1.6)	56.8	(1.9)			59.0	(1.2)
More sheep			22.7	(1.3)	25.7	(1.5)	32.4	(1.7)			23.9	(1.0)
Total			100.0		100.0		100.0				100.0	

The West region accounted for the highest percentage of operations that expected to have fewer sheep in the next 5 years. In the Central and East regions, the percentage of operations expecting to have more sheep was higher than the percentage expecting to have fewer sheep.

B.2.b. Percentage of operations by sheep inventory expected in 5 years, as compared with the January 1, 2011, inventory, and by region:

Percent Operations (20 or more ewes)

	Region					
	West		Central		East	
Expected change in Inventory	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
None	5.4	(1.6)	6.0	(0.8)	7.1	(1.0)
Fewer	17.3	(2.5)	9.4	(1.0)	9.4	(1.1)
About the same	59.1	(3.2)	61.0	(1.7)	57.3	(1.8)
More	18.2	(2.4)	23.6	(1.5)	26.2	(1.6)
Total	100.0		100.0		100.0	

B.2.c. Percentage of operations by sheep inventory expected in 5 years, as compared with the January 1, 2011, inventory, and by primary flock type:

Percent Operations (20 or more ewes)

	Primary Flock Type							
	Herded/ open range		Fenced range		Pasture		Dry lot/ feedlot	
Expected change in Inventory	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
None	6.1	(2.9)	5.9	(1.1)	6.9	(0.8)	4.1	(1.7)
Fewer	18.2	(5.4)	7.0	(1.1)	11.5	(1.0)	14.0	(3.0)
About the same	50.3	(5.2)	64.3	(2.2)	56.8	(1.5)	61.2	(4.2)
More	25.4	(4.2)	22.8	(1.9)	24.8	(1.3)	20.7	(3.3)
Total	100.0		100.0		100.0		100.0	

Family/personal situation was the most common reason cited for expecting to not have sheep in 5 years.

B.2.d. For operations that did not expect to have sheep in 5 years, percentage of operations by main reason and by flock size:

Percent Operations

Flock Size (number of ewes)

Reason	Very small (fewer than 20)		Small (20–99)		Medium (100–499)		Large (500 or more)		All operations (1 or more)		Operations with 20 or more	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Personal/ family situation			81.2	(4.5)	72.6	(8.5)	63.8	(9.0)			79.3	(3.9)
Price of wool			2.1	(2.0)	3.6	(3.3)	0.0	(0.0)			2.2	(1.7)
Price of lambs			3.2	(2.2)	1.1	(0.8)	0.0	(0.0)			2.8	(1.8)
Predator loss			4.8	(2.3)	3.7	(2.3)	5.9	(4.5)			4.7	(1.9)
Labor shortage			1.3	(1.3)	9.5	(6.1)	5.9	(4.5)			2.7	(1.4)
Government regulations			0.0	(0.0)	2.7	(2.4)	5.2	(3.8)			0.6	(0.4)
Sheep disease			0.0	(0.0)	0.0	(0.0)	5.9	(4.5)			0.2	(0.2)
Other			7.4	(2.9)	6.8	(6.2)	13.4	(5.5)			7.5	(2.6)
Total			100.0		100.0		100.0				100.0	

3. Sources of information on sheep health

Sheep health information can be found through a wide variety of sources. The “Sheep Production Handbook,” sponsored by the American Sheep Industry Association, is a comprehensive source of information. In addition, many universities offer sheep health information through extension resources. Industry meetings, magazine, shearers, and other sheep producers are also good resources. Also, a veterinarian familiar with the existing conditions on an operation can provide advice specific to illnesses, management, and production. Veterinarians were considered to be a very important source of information on 40.4 percent of operations, while other sheep producers were considered a very important source on 38.3 percent of operations.

B.3.a. Percentage of operations by importance of the following sources of sheep health information:

	Percent Operations						
	Importance						
	Very important		Somewhat important		Not important		
Health information source	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Total
Sheep Industry Development (SID) “Sheep Production Handbook”	19.1	(0.9)	31.8	(1.0)	49.1	(1.1)	100.0
Industry meetings	11.7	(0.7)	29.2	(1.0)	59.1	(1.1)	100.0
Internet	25.8	(1.0)	33.1	(1.1)	41.1	(1.1)	100.0
Magazines/newsletters	26.3	(0.9)	47.6	(1.1)	26.1	(1.0)	100.0
University/extension	27.6	(1.0)	35.4	(1.0)	37.1	(1.0)	100.0
Veterinarians	40.4	(1.1)	33.1	(1.0)	26.5	(1.0)	100.0
Feed and drug salespeople	13.4	(0.8)	30.8	(1.0)	55.8	(1.1)	100.0
Shearer	31.7	(1.0)	24.3	(0.9)	44.0	(1.1)	100.0
Other sheep producers	38.3	(1.1)	40.0	(1.1)	21.8	(0.9)	100.0

Industry meetings were considered very important sources of sheep health information on 9.6 percent of very small operations, compared with 16.9 percent of medium operations and 29.6 percent of large operations. About 5 of 10 large operations (54.5 percent) considered other sheep producers a very important source of information, compared with about 4 of 10 very small operations (36.1 percent).

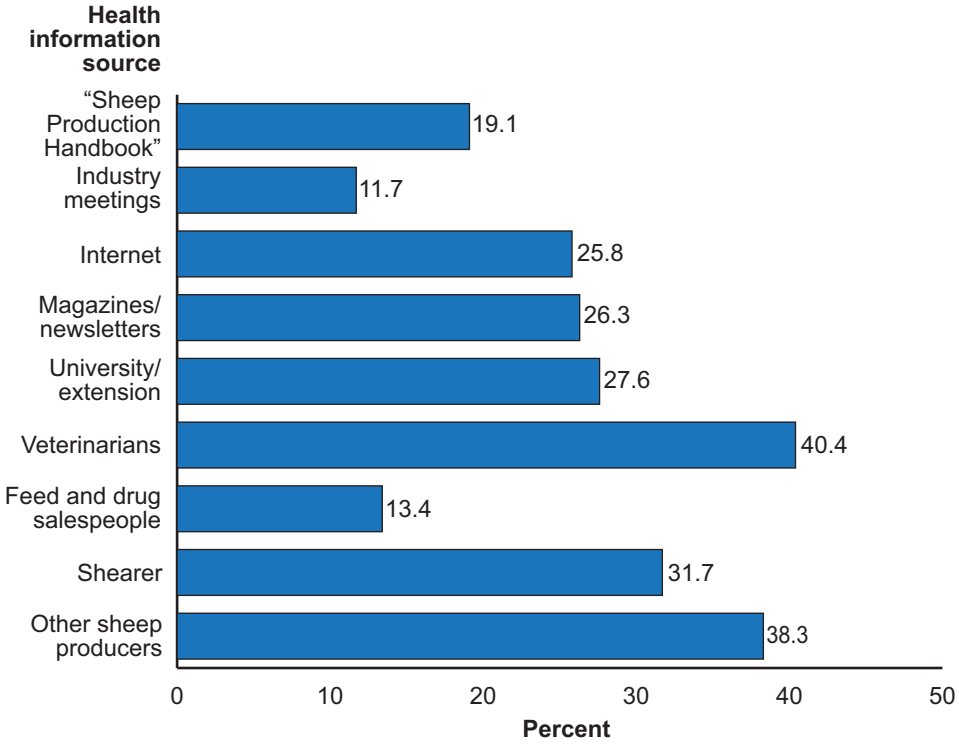
B.3.b. Percentage of operations that rated the following sources of sheep health information **very important,** by flock size:

Percent Operations

Flock Size (number of ewes)

	Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Health information source	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Sheep Industry Development (SID) “Sheep Production Handbook”	19.6	(1.6)	19.4	(1.3)	16.5	(1.2)	17.5	(1.5)	19.1	(0.9)	18.6	(1.0)
Industry meetings	9.6	(1.2)	10.9	(1.0)	16.9	(1.3)	29.6	(1.7)	11.7	(0.7)	13.3	(0.8)
Internet	28.3	(1.8)	24.7	(1.4)	22.5	(1.4)	17.8	(1.4)	25.8	(1.0)	23.8	(1.1)
Magazines/ newsletters	22.5	(1.6)	27.8	(1.4)	32.9	(1.6)	34.1	(1.8)	26.3	(0.9)	29.3	(1.1)
University/ extension	26.5	(1.7)	27.9	(1.4)	28.6	(1.6)	34.0	(1.8)	27.6	(1.0)	28.4	(1.1)
Veterinarians	42.1	(1.9)	38.8	(1.5)	37.8	(1.7)	45.7	(1.9)	40.4	(1.1)	39.0	(1.2)
Feed and drug salespeople	15.0	(1.4)	11.5	(1.0)	12.4	(1.2)	18.3	(1.4)	13.4	(0.8)	12.0	(0.8)
Shearer	33.4	(1.8)	29.8	(1.4)	29.4	(1.5)	40.4	(1.8)	31.7	(1.0)	30.4	(1.1)
Other sheep producers	36.1	(1.9)	38.5	(1.5)	41.1	(1.7)	54.5	(1.9)	38.3	(1.1)	40.0	(1.2)

Percentage of all operations that rated the following sources of sheep health information very important



B.3.c. Percentage of operations that rated the following sources of sheep health information **very important**, by region:

	Percent Operations (1 or more ewes)					
	Region					
	West		**Central**		**East**	
Health information source	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Sheep Industry Development (SID) Sheep Production Handbook	20.6	(2.1)	18.6	(1.5)	18.8	(1.3)
Industry meetings	8.4	(1.3)	12.8	(1.3)	12.2	(1.0)
Internet	25.4	(2.3)	25.2	(1.6)	26.3	(1.5)
Magazines/newsletters	21.8	(2.1)	25.7	(1.5)	28.4	(1.4)
University/extension	22.3	(2.1)	25.9	(1.6)	30.6	(1.5)
Veterinarians	37.5	(2.4)	41.4	(1.7)	40.7	(1.6)
Feed and drug salespeople	10.1	(1.5)	15.0	(1.3)	13.4	(1.1)
Shearer	23.1	(2.2)	32.0	(1.5)	34.7	(1.6)
Other sheep producers	35.1	(2.4)	39.9	(1.7)	38.3	(1.6)

4. Sheep association and club membership

Overall, 22.9 percent of all operations belonged to a national sheep organization. By flock size, the percentage of operations that belonged to a national sheep organization ranged from 13.6 percent of very small operations to 57.0 percent of large operations. The percentage of operations that belonged to a State or local sheep organization ranged from 14.8 percent of very small operations to 76.9 percent of large operations.

B.4.a. Percentage of operations by type of association or club operation belonged to, and by flock size:

Percent Operations

Flock Size (number of ewes)

	Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Type of association/ club	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
National	13.6	(1.3)	27.5	(1.4)	35.4	(1.6)	57.0	(1.8)	22.9	(0.8)	30.8	(1.1)
State/local	14.8	(1.4)	35.3	(1.4)	51.9	(1.7)	76.9	(1.6)	29.0	(0.9)	41.1	(1.1)

A higher percentage of herded/open range operations (57.0 percent) belonged to State or local sheep associations than fenced-range (41.0 percent), pasture (41.3 percent), or dry lot/feedlot (34.4 percent) operations.

B.4.b. Percentage of operations by type of association or club operation belonged to, and by primary flock type:

Percent Operations (20 or more ewes)

Primary Flock Type

	Herded/ open range		**Fenced range**		**Pasture**		**Dry lot/ feedlot**	
Association/ club type	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
National	39.2	(4.2)	25.4	(1.7)	32.6	(1.4)	33.6	(4.1)
State/local	57.0	(5.4)	41.0	(2.1)	41.3	(1.5)	34.4	(4.2)

5. Production records

Production records can be important tools for monitoring animal performance and for tracking which lambs should be kept, which ewes should be bred, and which animals should be culled. These records can be kept through handwritten notes or in computerized databases, spreadsheets, or specialized farm management software.

Over half of operations (55.9 percent) kept handwritten production records and another 25.7 percent kept both handwritten and computerized production records. Nearly 15 percent of small operations kept no records, while only 3.9 percent of large operations kept no production records.

B.5.a. Percentage of operations by type of production records used during 2010, and by flock size:

Percent Operations

Flock Size (number of ewes)

	Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Record type	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Computerized			5.3	(0.7)	4.2	(0.7)	5.8	(0.8)			5.1	(0.5)
Handwritten			54.9	(1.6)	59.9	(1.7)	55.0	(1.8)			55.9	(1.2)
Both			24.9	(1.3)	25.7	(1.4)	35.3	(1.8)			25.7	(1.0)
None			14.9	(1.1)	10.1	(1.1)	3.9	(0.8)			13.3	(0.9)
Total			100.0		100.0		100.0				100.0	

The highest percentage of operations, regardless of primary flock type, handwrote production records. The majority of herded/open range operations with 20 to 499 ewes did not keep any production records, which helps explain the relatively high percentage of all herded/open range operations (25.1 percent) that did not use records.

B.5.b. Percentage of operations by type of production records used during 2010, and by primary flock type:

Percent Operations (20 or more ewes)

Primary Flock Type

	Herded/ open range		Fenced range		Pasture		Dry lot/ feedlot	
Record type	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Computerized	4.4	(0.9)	4.8	(1.0)	5.2	(0.7)	5.1	(1.8)
Handwritten	43.8	(5.1)	59.4	(2.2)	56.1	(1.6)	46.7	(4.3)
Both	26.7	(3.3)	21.4	(1.8)	26.1	(1.4)	37.2	(4.2)
None	25.1	(5.8)	14.4	(1.8)	12.5	(1.1)	11.0	(3.0)
Total	100.0		100.0		99.9		100.0	

For operations that kept records, the highest percentage kept records on the number of lambs born. Records of individual lamb weights—at birth and at weaning— were kept by the lowest percentage of operations.

B.5.c. Of operations that kept records, percentage of operations by type of records kept during 2010, and by flock size:

Percent Operations

Flock Size (number of ewes)

Type of record	Very small (fewer than 20)		Small (20–99)		Medium (100–499)		Large (500 or more)		All operations (1 or more)		Operations with 20 or more	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Number of lambs born			90.4	(1.0)	87.7	(1.1)	80.2	(1.5)			89.2	(0.8)
Individual birth weights			18.1	(1.3)	11.1	(1.1)	5.3	(0.9)			15.7	(1.0)
Number of lambs weaned			76.6	(1.4)	77.5	(1.5)	89.1	(1.3)			77.5	(1.1)
Individual weaning weights			15.7	(1.2)	11.0	(1.0)	16.4	(1.4)			14.7	(0.9)
Health and treatment/ vaccination practices			70.0	(1.6)	64.3	(1.6)	65.1	(1.8)			68.4	(1.2)
Breeding			72.6	(1.5)	71.2	(1.6)	66.0	(1.8)			71.9	(1.1)
Number of animals culled or died			79.3	(1.4)	80.3	(1.4)	83.1	(1.5)			79.7	(1.0)

A lower percentage of herded/open range operations (3.2 percent) recorded individual birth weights compared with fenced range, pasture, or dry lot/feedlot operations (11.8, 17.7, and 18.0 percent, respectively).

B.5.d. Percentage of operations by type of records kept during 2010, and by primary flock type:

Percent Operations (20 or more ewes)

	Primary Flock Type							
	Herded/ open range		Fenced range		Pasture		Dry lot/ feedlot	
Record type	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Number of lambs born	84.6	(2.9)	85.0	(1.8)	91.2	(0.9)	89.1	(2.9)
Individual birth weights	3.2	(1.0)	11.8	(1.6)	17.7	(1.3)	18.0	(3.8)
Number of lambs weaned	79.5	(5.5)	76.5	(2.2)	78.1	(1.4)	75.9	(4.0)
Individual weaning weights	18.8	(3.1)	13.5	(1.6)	15.4	(1.2)	11.8	(3.1)
Health and treatment/ vaccination practices	75.4	(4.3)	62.0	(2.3)	70.6	(1.5)	71.2	(4.0)
Breeding	62.8	(5.1)	62.4	(2.3)	75.4	(1.4)	79.9	(3.3)
Number of animals culled or died	79.5	(5.5)	76.6	(2.1)	81.1	(1.3)	79.6	(3.8)

6. Operator experience

For all operations, operators averaged 23.9 years of experience. The average number of years of experience ranged from 19.1 years for operators on very small operations to 35.6 years for operators on large operations.

B.6.a. Average number of years the primary operator had owned or managed any sheep, by flock size:

Average Number Years

Flock Size (number of ewes)

Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Avg.	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**
19.1	(0.6)	26.9	(0.5)	29.5	(0.5)	35.6	(0.6)	23.9	(0.3)	27.9	(0.4)

Herded/open range operations had the most experienced operators (average of 37.5 years).

B.6.b. Average number of years the primary operator had owned or managed any sheep, by primary flock type:

Average Number Years*

Primary Flock Type

Herded/ open range		**Fenced range**		**Pasture**		**Dry lot/ feedlot**	
Avg.	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**
37.5	(2.7)	28.9	(0.8)	27.2	(0.5)	27.7	(1.5)

*On operations with 20 or more ewes.

On operations with 20 or more ewes, operators on over half of operations (54.4 percent) had managed sheep for 21 to 59 years. Very small operations accounted for the highest percentage of operations (17.2 percent) with the least experienced operators (1 to 5 years).

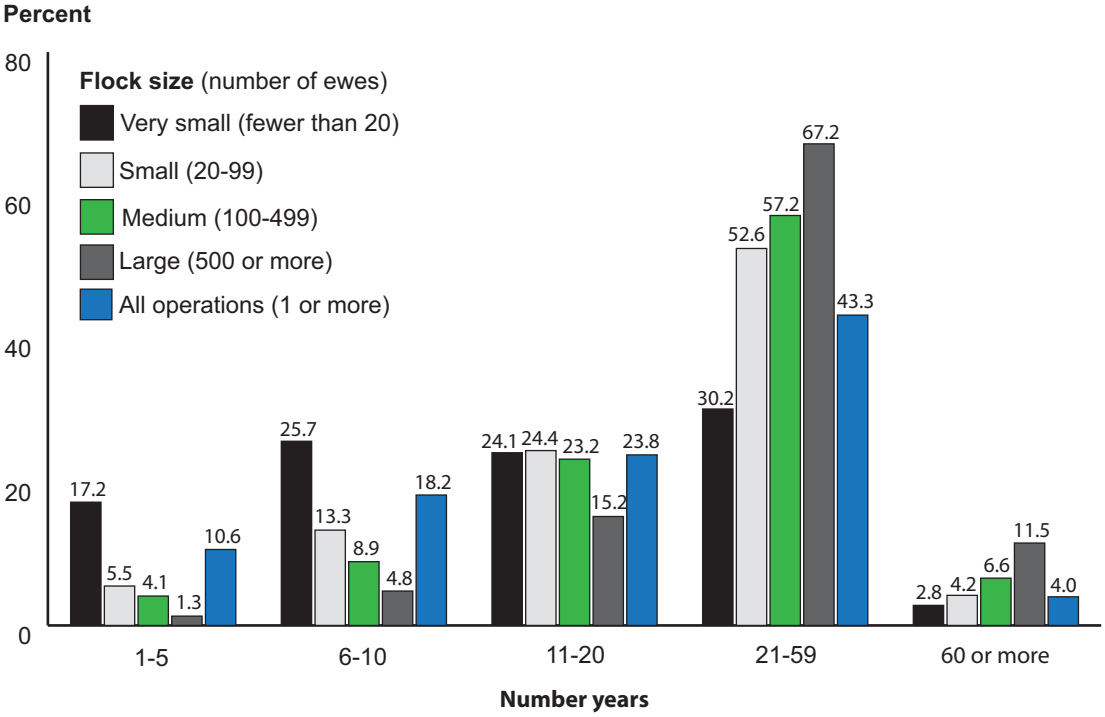
B.6.c. Percentage of operations by number of years the primary operator had owned or managed any sheep, and by flock size:

Percent Operations

Flock Size (number of ewes)

	Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Number years	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
1–5	17.2	(1.5)	5.5	(0.7)	4.1	(0.6)	1.3	(0.4)	10.6	(0.7)	5.0	(0.5)
6–10	25.7	(1.7)	13.3	(1.1)	8.9	(0.9)	4.8	(0.8)	18.2	(0.9)	11.9	(0.8)
11–20	24.1	(1.6)	24.4	(1.4)	23.2	(1.4)	15.2	(1.3)	23.8	(0.9)	23.6	(1.0)
21–59	30.2	(1.7)	52.6	(1.6)	57.2	(1.6)	67.2	(1.8)	43.3	(1.0)	54.4	(1.2)
60 or more	2.8	(0.6)	4.2	(0.6)	6.6	(0.8)	11.5	(1.3)	4.0	(0.4)	5.1	(0.5)
Total	100.0		100.0		100.0		100.0		100.0		100.0	

Percentage of operations by number of years the primary operator had owned or managed any sheep, and by flock size



B.6.d. Percentage of operations by number of years the primary operator had owned or managed any sheep, and by region:

Percent Operations (1 or more ewes)

	Region					
	West		Central		East	
Number years	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
1–5	11.8	(1.7)	11.2	(1.3)	9.6	(1.0)
6–10	19.4	(2.0)	13.5	(1.3)	21.1	(1.4)
11–20	23.1	(2.1)	23.5	(1.4)	24.4	(1.4)
21–59	41.8	(2.4)	46.1	(1.7)	41.9	(1.5)
60 or more	3.9	(0.9)	5.7	(0.8)	3.0	(0.5)
Total	100.0		100.0		100.0	

7. Flock identification

Note: Estimates in this section do not include operations that were primarily dry lot/ feedlot.

Flock and individual-animal identification (ID) are important tools for reducing disease and increasing productivity on U.S. sheep operations. The most basic record keeping requires some kind of individual-animal ID, even if it is temporary. The best form of ID is permanent, easy to read, and easy to apply.

There are many methods used to identify individual sheep and flocks, some of which are required by the USDA before sheep leave their place of birth. Required ID includes ear tags with the owner's flock ID number on one side and an individual number for the sheep or official serial number tags on the other side. Official ear tags and applicators can be obtained free of charge from the USDA. All States require that sheep be officially identified on change of ownership. Some States require that all sheep be officially identified before intrastate movement. These requirements are part of national efforts to eradicate scrapie in the United States. To learn more about national and State-specific scrapie eradication requirements, go to www.eradicatescrapie.org. Other methods of ID include tattoos, ear marks (notches), neck chains, electronic, paint brands, chalks, and sprays.

Overall, 81.5 percent of operations with 20 or more ewes used at least one form of flock ID, compared with 61.4 percent of operations with one or more ewes. As flock size increased, so did the percentage of operations that used at least one form of ID. On large operations, 96.1 percent used some form of ID, compared with only 39.6 percent of very small operations. This same comparison can be made by ID type. The scrapie program ear tag was used by 77.9 percent of large operations, compared with only 31.0 percent of very small operations. Since smaller operations are probably less likely to move their animals, the scrapie ear tag may not be required on these operations.

B.7.a. Percentage of operations by flock ID method(s) used and by flock size:

Percent Operations

Flock Size (number of ewes)

	Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Flock ID method*	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Scrapie program ear tag	31.0	(1.7)	71.8	(1.5)	75.5	(1.5)	77.9	(1.5)	52.8	(1.0)	72.9	(1.1)
Other ear tag	13.6	(1.3)	19.1	(1.3)	23.8	(1.5)	33.1	(1.8)	17.4	(0.8)	20.9	(1.0)
Tattoo	0.7	(0.3)	1.4	(0.4)	1.5	(0.4)	1.8	(0.5)	1.1	(0.2)	1.4	(0.3)
Paint brand	3.0	(0.6)	6.2	(0.7)	17.4	(1.1)	43.3	(1.6)	7.0	(0.4)	10.7	(0.6)
Ear mark	2.8	(0.6)	6.0	(0.8)	19.4	(1.2)	49.4	(1.8)	7.3	(0.5)	11.3	(0.6)
Other	0.5	(0.2)	0.4	(0.2)	0.3	(0.2)	1.8	(0.5)	0.5	(0.1)	0.4	(0.1)
At least one form of ID	39.6	(1.8)	78.4	(1.3)	88.1	(1.1)	96.1	(0.7)	61.4	(1.0)	81.5	(1.0)

*All animals in a flock have the same ID.

A higher percentage of operations in the Central region used paint brands and ear marks (14.4 and 13.9 percent, respectively) than operations in the West region (5.1 and 4.6 percent, respectively) and East region (2.7 and 3.7 percent, respectively).

B.7.b. Percentage of operations with one or more ewes by flock ID method(s) used and by region:

	Percent Operations (1 or more ewes)					
	Region					
	West		**Central**		**East**	
Flock ID method*	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Scrapie program ear tag	42.0	(2.2)	53.5	(1.5)	56.4	(1.6)
Other ear tag	14.6	(1.7)	18.9	(1.4)	17.4	(1.2)
Tattoo	1.1	(0.5)	0.9	(0.3)	1.2	(0.3)
Paint brand	5.1	(0.9)	14.4	(0.9)	2.7	(0.5)
Ear mark	4.6	(0.8)	13.9	(0.8)	3.7	(0.7)
Other	0.1	(0.0)	0.7	(0.2)	0.4	(0.2)
At least one form of ID	50.9	(2.3)	64.7	(1.6)	63.1	(1.5)

*All animals in a flock have the same ID.

Photograph courtesy of Camilla Kristensen.

A higher percentage of herded/open range operations (40.7 percent) used paint brands than fenced range operations (15.3 percent) and pasture operations (7.2 percent).

B.7.c. Percentage of operations with 20 or more ewes by flock ID method(s) used and by primary flock type:

Percent Operations (20 or more ewes)

	Primary Flock Type					
	Herded/ open range		Fenced range		Pasture	
Flock ID method*	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Scrapie program ear tag	58.8	(5.3)	71.3	(2.1)	74.4	(1.4)
Other ear tag	20.6	(2.8)	19.6	(1.7)	21.6	(1.3)
Tattoo	0.6	(0.4)	0.7	(0.2)	1.8	(0.4)
Paint brand	40.7	(4.6)	15.3	(1.2)	7.2	(0.7)
Ear mark	31.1	(3.4)	21.7	(1.6)	6.0	(0.7)
Other	1.2	(0.6)	0.6	(0.2)	0.4	(0.2)
At least one form of ID	73.7	(5.7)	81.6	(1.9)	82.1	(1.2)

*All animals in a flock have the same ID.

8. Individual-animal ID

Note: Estimates in this section do not include operations that were primarily dry lot/ feedlot.

A higher percentage of operations with 20 or more ewes (93.6 percent) used at least one form of individual-animal ID compared with operations with 1 or more ewes (88.6 percent). A total of 83.2 percent of very small operations had at least one form of ID, while at least 92 percent of small, medium, or large operations had at least one form of ID. The scrapie program ear tag was the most commonly used form of individual-animal ID; 61.4 percent of operations with one or more ewes and 73.7 percent of operations with 20 or more ewes used this method of ID.

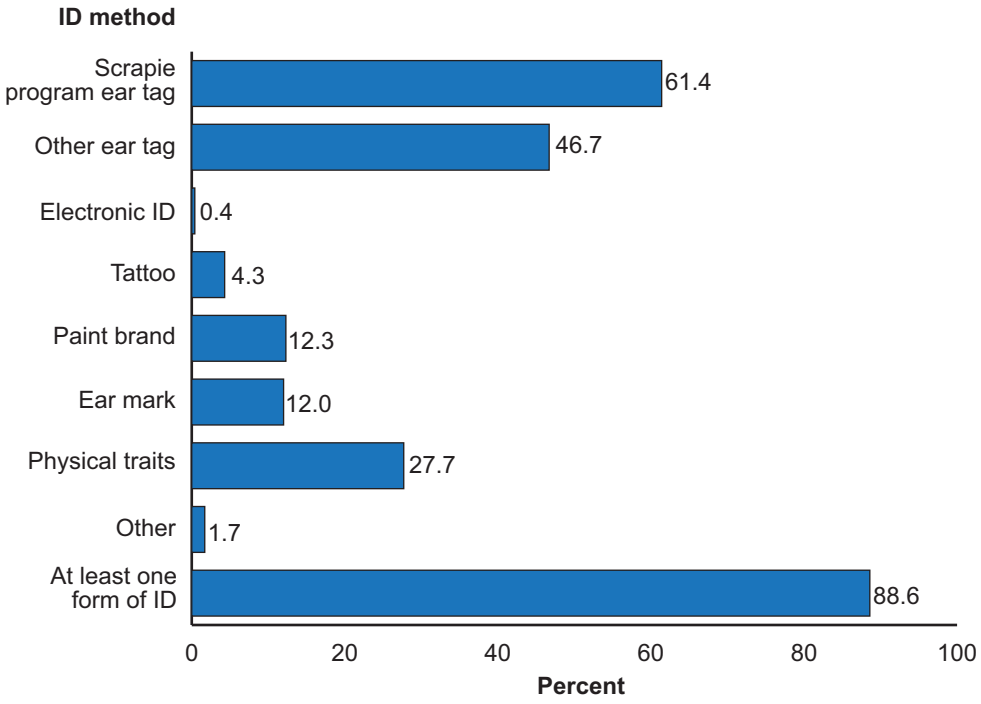
B.8.a. Percentage of operations by individual-animal ID method(s) used and by flock size:

Percent Operations

Flock Size (number of ewes)

	Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Individual ID method	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Scrapie program ear tag	48.1	(1.8)	72.7	(1.4)	75.6	(1.4)	78.3	(1.5)	61.4	(1.0)	73.7	(1.1)
Other ear tag	37.7	(1.8)	55.2	(1.6)	58.1	(1.7)	42.2	(1.8)	46.7	(1.1)	55.1	(1.2)
Electronic ID	0.2	(0.2)	0.5	(0.2)	0.7	(0.3)	1.1	(0.4)	0.4	(0.1)	0.6	(0.2)
Tattoo	2.8	(0.7)	5.8	(0.7)	5.5	(0.9)	4.2	(0.8)	4.3	(0.4)	5.6	(0.6)
Paint brand	4.1	(0.7)	16.0	(1.1)	29.0	(1.5)	35.1	(1.6)	12.3	(0.6)	19.9	(0.9)
Ear mark	5.9	(0.9)	12.1	(1.0)	29.1	(1.6)	46.3	(1.9)	12.0	(0.6)	17.7	(0.8)
Physical traits	31.6	(1.7)	26.5	(1.4)	18.8	(1.4)	14.0	(1.3)	27.7	(1.0)	24.2	(1.1)
Other	2.1	(0.6)	1.4	(0.4)	1.1	(0.3)	1.9	(0.5)	1.7	(0.3)	1.3	(0.3)
At least one form of ID	83.2	(1.4)	93.1	(0.9)	95.5	(0.6)	92.4	(0.9)	88.6	(0.7)	93.6	(0.6)

Percentage of all operations by individual-animal ID method(s) used



A higher percentage of operations in the Central region (19.5 percent) used ear marks to individually identify their sheep compared with operations in the West region (7.5 percent) and East region (8.6 percent). This relationship was also true for paint-brand ID.

B.8.b. Percentage of operations by individual-animal ID method(s) used and by region:

	Percent Operations (1 or more ewes)					
	Region					
	West		**Central**		**East**	
Individual ID method	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Scrapie program ear tag	48.1	(2.4)	59.3	(1.6)	67.9	(1.5)
Other ear tag	42.9	(2.4)	45.4	(1.8)	49.1	(1.6)
Electronic ID	0.0	(0.0)	0.2	(0.1)	0.6	(0.2)
Tattoo	6.9	(1.2)	3.0	(0.5)	4.2	(0.7)
Paint brand	8.1	(1.2)	18.0	(1.0)	10.0	(0.9)
Ear mark	7.5	(1.1)	19.5	(1.2)	8.6	(0.9)
Physical traits	25.8	(2.2)	25.8	(1.5)	29.8	(1.5)
Other	1.5	(0.6)	0.8	(0.2)	2.4	(0.6)
At least one form of ID	81.3	(1.9)	88.4	(1.4)	91.5	(1.0)

A lower percentage of herded/open range operations used scrapie ear tags than fenced range and pasture operations.

B.8.c. Percentage of operations with 20 or more ewes by individual-animal ID method(s) used and by primary flock type:

	Percent Operations (20 or more ewes)					
	Primary Flock Type					
	Herded/ open range		**Fenced range**		**Pasture**	
Individual-animal ID method	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Scrapie program ear tag	58.8	(5.3)	73.4	(2.1)	74.4	(1.4)
Other ear tag	36.3	(4.9)	44.9	(2.2)	60.4	(1.5)
Electronic ID	0.3	(0.2)	0.8	(0.4)	0.5	(0.2)
Tattoo	2.7	(1.7)	4.9	(1.0)	6.2	(0.7)
Paint brand	50.3	(5.2)	17.3	(1.5)	19.5	(1.1)
Ear mark	47.7	(5.2)	26.3	(1.8)	12.7	(0.9)
Physical traits	21.9	(4.9)	18.9	(1.8)	26.6	(1.4)
Other	1.4	(0.6)	1.2	(0.4)	1.4	(0.4)
At least one form of ID	91.7	(3.5)	92.3	(1.3)	94.3	(0.8)

C. Breeding Management

Note: Estimates in this section do not include operations that were primarily dry lot/ feedlot.

Age, weather, time of breeding, and prebreeding practices can all affect reproductive outcome and should be considered when breeding ewes. As expected, about 98 percent of operations in all size groups bred ewes during 2010.

1. Reproductive practices

C.1.a. Percentage of operations that bred any ewes during 2010, by flock size:

Percent Operations

Flock Size (number of ewes)

Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Pct.	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
		98.2	(0.4)	98.9	(0.5)	99.4	(0.3)			98.4	(0.3)

Reproductive performance can be improved by intensive management practices such as flushing ewes, crutching, using teaser rams, breeding marks, ultrasound, breeding soundness exams, udder palpations, embryo transfer, and estrous synchronization. Flushing provides ewes with extra nutrition prior to—and sometimes during—the breeding season. Flushing increases the number of ovulations, resulting in a higher proportion of twins and triplets.

A breeding soundness examination should be conducted prior to each breeding season to assess buck fertility. A breeding soundness exam should include a physical examination for general health, but examination of the reproductive organs (testicular palpation and size evaluation, and semen evaluation) should be the primary basis for this exam.

For operations with 20 or more ewes, 99.6 percent conducted some form of reproductive practice. The most commonly performed practice was flushing ewes prior to breeding (52.8 percent of operations). A higher percentage of small operations (22.6 percent) used breeding marks compared with large operations (8.8 percent). A higher percentage of large operations (15.0 percent) used ultrasound as part of their breeding strategy compared with medium and small operations (8.1 and 6.2 percent, respectively).

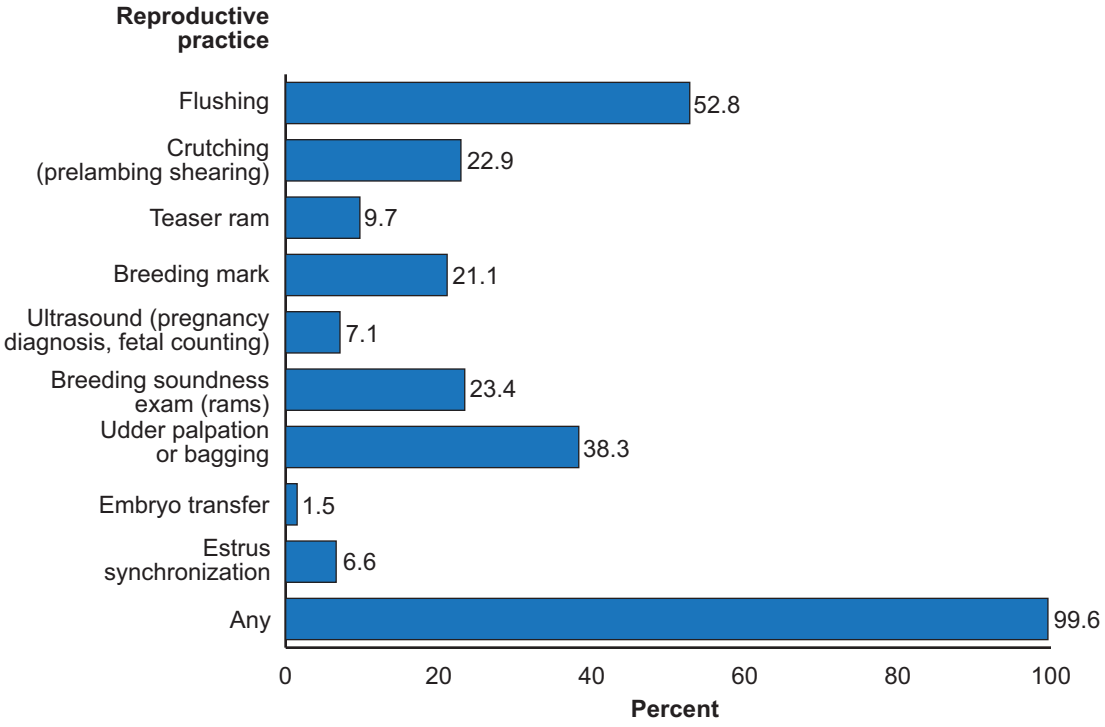
C.1.b. For operations that bred any ewes during 2010, percentage of operations by reproductive practice and by flock size:

Percent Operations

Flock Size (number of ewes)

Reproductive practice	Very small (fewer than 20)		Small (20–99)		Medium (100–499)		Large (500 or more)		All operations (1 or more)		Operations with 20 or more	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Flushing			49.9	(1.5)	61.4	(1.6)	58.0	(1.7)			52.8	(1.2)
Crutching			21.7	(1.3)	23.7	(1.4)	35.4	(1.7)			22.9	(1.0)
Teaser ram			8.8	(0.9)	12.0	(1.1)	11.6	(1.2)			9.7	(0.7)
Breeding mark			22.6	(1.3)	19.6	(1.4)	8.8	(1.0)			21.1	(1.0)
Ultrasound (pregnancy diagnosis, fetal counting)			6.2	(0.8)	8.1	(0.9)	15.0	(1.3)			7.1	(0.6)
Breeding soundness exam (rams)			21.0	(1.3)	26.3	(1.5)	42.7	(1.8)			23.4	(1.0)
Udder palpation or bagging			34.3	(1.4)	45.9	(1.6)	59.9	(1.7)			38.3	(1.1)
Embryo transfer			1.7	(0.5)	1.0	(0.4)	1.4	(0.5)			1.5	(0.3)
Estrus synchronization			6.9	(0.8)	6.7	(0.9)	3.2	(0.6)			6.6	(0.6)
Any			99.5	(0.3)	99.8	(0.2)	100.0	(0.0)			99.6	(0.2)

For operations with 20 or more ewes that bred any ewes during 2010, percentage of operations by reproductive practice



A higher percentage of operations in the East region (63.8 percent) flushed their ewes prior to breeding than did operations in the West and Central regions (43.0 and 44.5 percent, respectively). Just 3.8 percent of operations in the Central region, 7.7 percent in the East region, and 10.5 percent in the West region used estrus synchronization. The regional percentage of operations that used breeding marks ranged from 12.9 percent in the Central region to 28.4 percent in the East region.

C.1.c. For operations with 20 or more ewes that bred any ewes during 2010, percentage of operations by reproductive practice and by region:

Percent Operations (20 or more ewes)

	Region					
	West		Central		East	
Reproductive practice	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Flushing	43.0	(3.3)	44.5	(1.6)	63.8	(1.9)
Crutching	29.6	(3.0)	19.3	(1.1)	23.7	(1.7)
Teaser ram	11.9	(2.1)	7.1	(0.9)	11.1	(1.2)
Breeding mark	21.4	(2.8)	12.9	(1.1)	28.4	(1.7)
Ultrasound (pregnancy diagnosis, fetal counting)	5.4	(1.4)	5.5	(0.7)	9.2	(1.1)
Breeding soundness exam (rams)	25.1	(2.8)	25.2	(1.4)	21.3	(1.6)
Udder palpation or bagging	45.3	(3.3)	34.2	(1.3)	39.4	(1.9)
Embryo transfer	2.3	(1.0)	0.7	(0.4)	2.0	(0.6)
Estrus synchronization	10.5	(2.0)	3.8	(0.6)	7.7	(1.1)
Any	99.7	(0.3)	100.0	(0.0)	99.4	(0.4)

A lower percentage of fenced-range and pasture operations (6.4 and 10.1 percent, respectively) used a teaser ram as part of their breeding strategy compared with herded/ open range operations (28.1 percent).

C.1.d. For operations with 20 or more ewes that bred any ewes during 2010, percentage of operations by reproductive practice and by primary flock type:

Percent Operations (20 or more ewes)

	Primary Flock Type					
	Herded/ open range		Fenced range		Pasture	
Reproductive practice	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Flushing	47.6	(5.0)	43.8	(2.1)	57.0	(1.5)
Crutching	28.0	(3.4)	19.3	(1.6)	24.3	(1.3)
Teaser ram	28.1	(5.6)	6.4	(1.0)	10.1	(0.9)
Breeding mark	6.9	(2.3)	14.9	(1.6)	24.8	(1.3)
Ultrasound (pregnancy diagnosis, fetal counting)	9.8	(1.7)	5.3	(0.9)	7.9	(0.8)
Breeding soundness exam (rams)	33.5	(3.7)	24.1	(1.8)	22.6	(1.3)
Udder palpation or bagging	42.1	(4.3)	31.7	(1.8)	41.1	(1.5)
Embryo transfer	0.3	(0.2)	1.4	(0.6)	1.5	(0.4)
Estrus synchronization	2.0	(0.6)	6.0	(1.1)	7.2	(0.8)
Any	100.0	(0.0)	99.0	(0.6)	99.9	(0.1)

2. Breeding seasons

Sheep normally breed during fall, although the breeding season varies depending on geography, temperature, and breed. Many producers prefer fall lambing for a variety of reasons, including warmer weather for newborn lambs and for the often profitable Christmas to Easter holiday season. However, breeding in warm weather can adversely affect fertility and reduce embryo survival. Overall, 24.5 percent of operations with 20 or more ewes bred their ewes out of season (February to July). There was little difference by operation size or by region in the percentage of operations that bred ewes out of season.

C.2.a. For operations that bred any ewes during 2010, percentage of operations that bred ewes out of season (February to July), by flock size:

Percent Operations

Flock Size (number of ewes)

Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Pct.	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
		24.6	(1.4)	26.1	(1.5)	16.7	(1.4)			24.5	(1.1)

C.2.b. For operations with 20 or more ewes that bred any ewes during 2010, percentage of operations that bred ewes out of season (February to July), by region:

Percent Operations (20 or more ewes)

Region

West		**Central**		**East**	
Percent	**Std. error**	**Percent**	**Std. error**	**Percent**	**Std. error**
28.1	(3.0)	22.4	(1.6)	25.0	(1.7)

About 1 of 20 herded/open range operations (5.6 percent) bred ewes out of season, compared with about one-fourth of fenced-range and pasture operations (22.5 and 26.3 percent, respectively). Many herded/open range operations that bred ewes out of season did so in July, as daylight hours began to shorten.

C.2.c. For operations with 20 or more ewes that bred any ewes during 2010, percentage of operations that bred ewes out of season (February to July), by primary flock type:

Percent Operations (20 or more ewes)

Primary Flock Type

Herded/open range		Fenced range		Pasture	
Percent	**Std. error**	**Percent**	**Std. error**	**Percent**	**Std. error**
5.6	(2.2)	22.5	(2.0)	26.3	(1.4)

When ewes are isolated from all rams for at least one month, they typically ovulate within several days after rams are re-introduced. Often called the “ram effect,” this first ovulation after rams are re-introduced is usually silent, with no signs of estrus and no breeding. Most ewes will ovulate and be bred within three to four weeks after rams are re-introduced.

Placing a ram with ewes was the most commonly used out-of-season breeding method (85.5 percent of operations). Certain breeds of sheep have a longer breeding period than other breeds and are more successful at out-of-season breeding. Genetic selection for ability to breed out of season was the second most common out-of-season breeding method used (33.8 percent of operations).

C.2.d. For operations that bred any ewes out of season during 2010, percentage of operations by method used for out-of-season breeding (February to July), and by flock size:

Percent Operations

Flock Size (number of ewes)

	Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Out-of-season breeding method	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Genetic selection for ability to breed out of season			31.9	(3.0)	39.3	(3.3)	37.1	(4.6)			33.8	(2.3)
Placing ram with ewes			85.3	(2.4)	85.1	(2.3)	92.5	(2.3)			85.5	(1.8)
Regulating light			0.6	(0.5)	0.7	(0.4)	2.3	(2.0)			0.7	(0.4)
Hormone treatments (CIDRS, hormone protocols, etc.)			11.0	(2.0)	15.1	(2.5)	1.8	(0.8)			11.6	(1.6)
Other			4.9	(1.4)	7.3	(1.7)	5.3	(1.8)			5.5	(1.1)

About three of four operations (75.5 percent) had one defined breeding season per year, while 11.9 percent of operations had two breeding seasons per year, and 10.0 percent had no defined breeding season.

C.2.e. For operations that bred any ewes during 2010, percentage of operations by number of breeding seasons per year and by flock size:

Percent Operations

Flock Size (number of ewes)

	Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Number of breeding seasons	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
One defined breeding season per year			74.6	(1.4)	76.1	(1.5)	84.5	(1.4)			75.5	(1.1)
Two defined breeding seasons per year			12.0	(1.1)	12.6	(1.2)	9.3	(1.1)			11.9	(0.8)
Three defined breeding seasons per 2 years			2.4	(0.5)	3.0	(0.5)	3.1	(0.7)			2.5	(0.4)
No defined breeding season			11.1	(1.0)	8.3	(1.0)	3.1	(0.8)			10.0	(0.8)
Total			100.0		100.0		100.0				100.0	

C.2.f. For operations with 20 or more ewes that bred any ewes during 2010, percentage of operations by number of breeding seasons per year, and by region:

	Percent Operations (20 or more ewes)					
	Region					
	West		**Central**		**East**	
Number of breeding seasons	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
One defined breeding season per year	76.6	(2.9)	74.0	(1.6)	76.4	(1.6)
Two defined breeding seasons per year	13.8	(2.4)	9.3	(1.1)	13.6	(1.3)
Three defined breeding seasons per 2 years	2.7	(1.1)	1.4	(0.4)	3.5	(0.7)
No defined breeding season	6.9	(1.7)	15.3	(1.5)	6.4	(1.0)
Total	100.0		100.0		100.0	

3. Breeding practices

Only 1.4 percent of operations had used artificial insemination to breed at least some ewes during the most recent breeding season, while 99.8 percent of operations had bred their ewes naturally, either by their own or another operation's rams.

C.3.a. Percentage of **operations** by method used to breed (service) ewes during the most recent breeding season, and by flock size:

Percent Operations

Flock Size (number of ewes)

	Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Servicing method	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Artificial insemination (AI)			1.5	(0.4)	1.3	(0.4)	0.2	(0.1)			1.4	(0.3)
Natural, by this operation's rams			96.8	(0.6)	99.2	(0.3)	99.0	(0.3)			97.4	(0.4)
Natural, by another operation's rams			5.3	(0.7)	3.2	(0.6)	3.0	(0.6)			4.7	(0.5)
Natural, either by this operation's or another operation's ram			99.7	(0.2)	100.0	(0.0)	100.0	(0.0)			99.8	(0.1)

C.3.b. Percentage of **operations** with 20 or more ewes by method used to breed (service) ewes during the most recent breeding season, and by region:

	Percent Operations (20 or more ewes)					
	Region					
	West		**Central**		**East**	
Servicing method	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Artificial insemination (AI)	1.9	(0.8)	0.8	(0.3)	1.8	(0.6)
Natural, by this operation's rams	97.3	(1.1)	97.1	(0.6)	97.8	(0.6)
Natural, by another operation's rams	4.6	(1.4)	4.1	(0.7)	5.3	(0.9)
Natural, either by this operation's or another operation's ram	100.0	(0.0)	100.0	(0.0)	99.6	(0.3)

Across flock types, over 9 of 10 operations had used their own rams to breed (service) ewes during the last breeding season.

C.3.c. Percentage of **operations** with 20 or more ewes by method used to breed (service) ewes during the most recent breeding season, and by primary flock type:

	Percent Operations (20 or more ewes)					
	Primary Flock Type					
	Herded/ open range		**Fenced range**		**Pasture**	
Servicing method	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Artificial insemination (AI)	0.0	(—)	1.6	(0.6)	1.4	(0.4)
Natural, by this operation's rams	95.4	(2.7)	96.6	(0.9)	97.9	(0.5)
Natural, by another operation's rams	7.6	(2.8)	3.8	(0.8)	5.0	(0.7)
Natural, either by this operation's or another operation's ram	100.0	(0.0)	99.4	(0.4)	100.0	(0.0)

Overall, 97.7 percent of ewes were bred naturally by using the operation's rams.

C.3.d. Percentage of **ewes** by method used to breed (service) ewes during the most recent breeding season, and by flock size:

Percent Ewes

Flock Size (number of ewes)

	Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Servicing method	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Artificial insemination (AI)			0.5	(0.2)	0.2	(0.1)	0.0	(0.0)			0.2	(0.0)
Natural, by this operation's rams			96.2	(0.6)	98.9	(0.3)	97.7	(0.6)			97.7	(0.4)
Natural, by another operation's rams			3.3	(0.6)	1.0	(0.3)	2.3	(0.6)			2.2	(0.4)
Total			100.0		100.0		100.0				100.0	

C.3.e. Percentage of **ewes** by method used to breed (service) ewes during the most recent breeding season, and by primary flock type:

	Percent Ewes*					
	Primary Flock Type					
	Herded/ open range		Fenced range		Pasture	
Servicing method	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Artificial insemination (AI)	0.0	(—)	0.2	(0.1)	0.3	(0.1)
Natural, by this operation's rams	95.7	(1.2)	98.6	(0.3)	98.3	(0.3)
Natural, by another operation's rams	4.3	(1.2)	1.3	(0.3)	1.5	(0.3)
Total	100.0		100.0		100.0	

*On operations with 20 or more ewes.

For the 1.4 percent of operations that artificially inseminated ewes, 79.3 percent used frozen semen and 28.6 percent used fresh semen.

C.3.f. For operations with 20 or more ewes that artificially inseminated ewes in 2010,* percentage of operations by type of semen used:

Semen type	**Percent operations** (20 or more ewes)	**Std. error**
Fresh	28.6	(9.8)
Frozen	79.3	(9.1)

*During most recent breeding season.

Most operations (81.5 percent) obtained their semen from another operation.

C.3.g. For operations with 20 or more ewes that artificially inseminated ewes during 2010,* percentage of operations by source of semen and by flock size:

Semen source	Percent operations (20 or more ewes)	Std. error
This operation	34.8	(10.3)
Other operation	81.5	(8.1)

*For the most recent breeding season.

4. Ram and ewe lamb selection

Since rams account for half the flock genetics, ram selection is an important determinant of flock health and productivity. The National Sheep Improvement Program (NSIP) offers a genetic evaluation system for U.S. sheep flocks. NSIP has historically provided expected progeny differences (EPDs) to help producers determine the genetic merit of an animal for a particular trait, such as number of lambs born, wool characteristics, milking traits, etc. NSIP generates estimated breeding values (EBVs) using breed-specific genetic parameters. These values allow for genetic evaluations for carcass traits and parasite resistance across breeds, as well as other evaluations not previously available.

For operations that used rams for natural breeding during 2010, 77.4 percent reported that visual appearance was a very important characteristic while 69.8 percent indicated that meat production was very important. A total of 60.3 percent of operations identified soundness of rams' flock of origin as very important.

C.4.a. For operations with 20 or more ewes that used rams for natural breeding during 2010, percentage of operations by importance of ram selection characteristics:

	Percent Operations (20 or more ewes)						
	Importance						
	Very important		**Somewhat important**		**Not important**		
Ram characteristic	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Total**
Visual appearance	77.4	(1.1)	18.8	(1.0)	3.9	(0.5)	100.1
Scrotal circumference, semen quality	35.3	(1.2)	31.1	(1.2)	33.6	(1.2)	100.0
Wool quality	21.0	(0.9)	22.9	(1.0)	56.1	(1.2)	100.0
Meat production	69.8	(1.2)	18.3	(1.0)	11.9	(0.9)	100.0
Ram's average daily gain as a lamb	28.4	(1.1)	29.5	(1.1)	42.0	(1.2)	99.9
Pedigree	33.1	(1.2)	30.3	(1.2)	36.6	(1.2)	100.0
Breeding history	31.3	(1.2)	29.8	(1.2)	38.9	(1.2)	100.0
National Sheep Improvement Program (NSIP) records	5.7	(0.5)	13.5	(0.8)	80.8	(1.0)	100.0
Genetic resistance to scrapie (RR genotype)	39.3	(1.2)	23.3	(1.1)	37.3	(1.2)	99.9
Genetic resistance to intestinal parasites	30.2	(1.1)	25.4	(1.1)	44.4	(1.2)	100.0
Genetic resistance to other diseases	7.7	(0.7)	3.4	(0.5)	88.9	(0.8)	100.0
Soundness of ram's flock of origin	60.3	(1.2)	19.7	(1.0)	20.0	(1.0)	100.0
Nonram-related reasons (cost, proximity, availability)	27.5	(1.1)	37.6	(1.2)	34.9	(1.2)	100.0

A higher percentage of large operations (80.3 percent) rated meat production as a very important characteristic when selecting rams than did small operations (67.7 percent). NSIP records were very important for a higher percentage of large operations (11.4 percent) than small operations (4.6 percent).

C.4.b. For operations with 20 or more ewes that used rams for natural breeding during 2010, percentage of operations by ram characteristics that were very important when selecting rams, and by flock size:

Percent Operations (20 or more ewes)

Flock Size (number of ewes)

	Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Ram characteristic	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Visual appearance			76.7	(1.4)	78.4	(1.4)	81.6	(1.5)			77.4	(1.1)
Scrotal circumference, semen quality			32.6	(1.5)	40.5	(1.7)	48.8	(1.9)			35.3	(1.2)
Wool quality			17.0	(1.2)	25.5	(1.4)	54.0	(1.8)			21.0	(0.9)
Meat production			67.7	(1.6)	74.1	(1.5)	80.3	(1.5)			69.8	(1.2)
Ram's average daily gain as a lamb			27.7	(1.5)	29.7	(1.6)	32.2	(1.8)			28.4	(1.1)
Pedigree			33.3	(1.5)	32.5	(1.7)	32.6	(1.8)			33.1	(1.2)
Breeding history			31.8	(1.5)	30.1	(1.7)	28.4	(1.7)			31.3	(1.2)
National Sheep Improvement Program (NSIP) records			4.6	(0.7)	7.8	(0.9)	11.4	(1.2)			5.7	(0.5)
Genetic resistance to scrapie (RR genotype)			40.4	(1.6)	35.7	(1.7)	39.1	(1.8)			39.3	(1.2)
Genetic resistance to intestinal parasites			30.3	(1.5)	29.2	(1.6)	31.9	(1.8)			30.2	(1.1)
Genetic resistance to other diseases			7.8	(0.9)	7.6	(1.0)	6.5	(0.9)			7.7	(0.7)
Soundness of ram's flock of origin			58.9	(1.6)	64.6	(1.7)	61.8	(1.8)			60.3	(1.2)
Nonram-related reasons (cost, proximity, availability)			27.7	(1.5)	27.0	(1.6)	27.8	(1.6)			27.5	(1.1)

Overall, 76.2 percent of operations had replacement ram or ewe lambs. As expected, a higher percentage of large operations than very small operations had replacement ram or ewe lambs (91.3 and 65.3 percent, respectively).

C.4.c. Percentage of operations that had replacement ram or ewe lambs, by flock size:

Percent Operations

Flock Size (number of ewes)

Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Pct.	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
65.3	(1.8)	85.3	(1.1)	87.7	(1.2)	91.3	(1.1)	76.2	(1.0)	86.2	(0.9)

A slightly higher percentage of herded/open range operations had replacement ram or ewe lambs than other flock types.

C.4.d. Percentage of operations that had replacement rams or ewe lambs, by primary flock type:

Percent Operations (20 or more ewes)

Primary Flock Type

Herded/ open range		**Fenced range**		**Pasture**	
Percent	**Std. error**	**Percent**	**Std. error**	**Percent**	**Std. error**
95.0	(1.8)	83.8	(1.7)	86.7	(1.1)

More than 80 percent of the replacement ram and ewe lambs were born and raised on the operation.

C.4.e. For operations that had replacement ram or ewe lambs in 2010, percentage of replacement ram and ewe lambs born and raised on the operation and percentage acquired elsewhere:

Source of replacement lambs	Percent rams	Std. error	Percent ewes	Std. error
Born and raised on this operation	81.0	(2.6)	82.7	(1.5)
Acquired elsewhere	19.0	(2.6)	17.3	(1.5)
Total	100.0		100.0	

The majority of operations that acquired replacement ewe lambs rated visual appearance/conformation (79.7 percent), meat production (69.8 percent), and health status of flock of origin (61.8 percent) as very important ewe lamb characteristics.

C.4.f. For operations that acquired replacement ewe lambs during 2010, percentage of operations by importance of the following ewe lamb selection characteristics:

Percent Operations (20 or more ewes)

	Importance						
	Very important		Somewhat important		Not important		
Ewe lamb characteristic*	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Total**
Visual appearance/ conformation	79.7	(2.5)	17.4	(2.3)	2.9	(1.2)	100.0
Wool quality	20.5	(2.3)	22.6	(2.5)	56.9	(3.1)	100.0
Meat production	69.8	(2.8)	20.1	(2.4)	10.1	(1.9)	100.0
Ability to breed out of season	14.2	(2.3)	19.4	(2.5)	66.4	(3.0)	100.0
National Sheep Improvement Program records (NSIP) or EPD	5.6	(1.5)	15.3	(2.4)	79.1	(2.7)	100.0
Ability to have multiple lambs	47.0	(3.2)	30.0	(2.9)	22.9	(2.7)	100.0
Health status of flock origin	61.8	(3.1)	24.3	(2.7)	13.9	(2.3)	100.0
Early sexual maturity	22.6	(2.7)	38.5	(3.1)	38.9	(3.1)	100.0
Pedigree	36.1	(3.0)	33.4	(3.0)	30.5	(2.9)	100.0
Average daily gain	26.6	(2.8)	37.8	(3.1)	35.6	(3.1)	100.0
Genetic resistance to scrapie (RR genotype)	48.3	(3.2)	25.0	(2.8)	26.7	(2.8)	100.0
Genetic resistance to intestinal parasites	33.8	(3.1)	25.1	(2.7)	41.2	(3.2)	100.0
Other genetic resistance	7.3	(1.7)	3.4	(1.3)	89.4	(2.1)	100.0
Nonewe-related reasons (cost, availability, etc.)	22.8	(2.7)	40.6	(3.1)	36.6	(3.0)	100.0

*For replacement ewe lambs that were acquired elsewhere.

Nearly 6 of 10 large operations (59.4 percent) rated wool quality as a very important characteristic for choosing replacement ewes, while about 1 of 5 operations with 20 or more ewes (20.5 percent) rated wool quality as a very important characteristic.

C.4.g. For operations with 20 or more ewes that acquired replacement ewe lambs during 2010, percentage of operations that rated the following ewe lamb characteristics as **very important** for selecting replacement ewe lambs, by flock size:

Percent Operations

Flock Size (number of ewes)

	Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Ewe lamb characteristic*	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Visual appearance/ conformation			79.7	(3.3)	79.0	(3.6)	82.2	(3.2)			79.7	(2.5)
Wool quality			14.2	(2.9)	28.9	(3.8)	59.4	(4.2)			20.5	(2.3)
Meat production			73.7	(3.6)	59.1	(4.4)	62.1	(4.6)			69.8	(2.8)
Ability to breed out of season			12.7	(3.0)	18.2	(3.8)	17.4	(3.5)			14.2	(2.3)
National Sheep Improvement Program records (NSIP) or EPD			4.3	(1.8)	10.8	(3.0)	3.4	(1.5)			5.6	(1.5)
Ability to have multiple lambs			47.8	(4.2)	45.6	(4.4)	43.4	(4.5)			47.0	(3.2)
Health status of flock origin			61.6	(4.1)	60.8	(4.3)	66.9	(4.2)			61.8	(3.1)
Early sexual maturity			21.4	(3.5)	26.5	(4.0)	23.6	(3.8)			22.6	(2.7)
Pedigree			34.5	(4.0)	42.9	(4.4)	32.4	(4.4)			36.1	(3.0)
Average daily gain			26.0	(3.8)	29.2	(4.1)	25.1	(3.7)			26.6	(2.8)
Genetic resistance to scrapie (RR genotype)			50.6	(4.2)	42.7	(4.4)	40.5	(4.6)			48.3	(3.2)
Genetic resistance to intestinal parasites			34.9	(4.1)	29.4	(4.1)	35.2	(4.4)			33.8	(3.1)
Other genetic resistance			7.8	(2.2)	6.2	(2.1)	4.8	(2.1)			7.3	(1.7)
Nonewe-related reasons (cost, availability, etc.)			22.7	(3.6)	21.6	(3.8)	27.6	(4.1)			22.8	(2.7)

*For replacement ewe lambs that were acquired elsewhere.

Wool quality was a very important characteristic for replacement ewe lambs on 63.7 percent of herded/open range operations. A lower percentage of fenced-range operations (33.0 percent) and pasture operations (13.4 percent) rated wool quality as a very important characteristic. As shown in Table A.1.c., a higher percentage of herded/open range operations had fine wool, white-faced sheep than fenced range or pasture operations.

C.4.h. For operations with 20 or more ewes that acquired replacement ewe lambs during 2010, percentage of operations that rated the following ewe lamb characteristics as **very important** for selecting replacement ewe lambs, by primary flock type:

Percent Operations (20 or more ewes)

	Primary Flock Type					
	Herded/ open range		Fenced range		Pasture	
Ewe lamb characteristic*	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Visual appearance/ conformation	79.7	(5.6)	84.5	(4.1)	77.6	(3.3)
Wool quality	63.7	(6.7)	33.0	(5.3)	13.4	(2.5)
Meat production	64.1	(7.3)	68.8	(5.3)	70.8	(3.5)
Ability to breed out of season	9.1	(4.0)	16.4	(4.8)	13.8	(2.7)
National Sheep Improvement Program records (NSIP) or EPD	1.9	(1.1)	9.9	(3.8)	4.2	(1.6)
Ability to have multiple lambs	37.5	(7.0)	40.9	(6.1)	50.5	(3.9)
Health status of flock origin	66.3	(6.1)	67.1	(5.7)	59.8	(3.8)
Early sexual maturity	10.7	(3.9)	30.5	(5.8)	20.6	(3.1)
Pedigree	35.4	(7.2)	42.4	(6.1)	33.5	(3.6)
Average daily gain	10.2	(2.9)	27.5	(5.5)	27.4	(3.5)
Genetic resistance to scrapie (RR)	33.2	(7.0)	47.4	(6.2)	49.2	(3.9)
Genetic resistance to intestinal parasites	25.3	(6.6)	38.1	(6.0)	33.1	(3.8)
Other genetic resistance	6.7	(4.2)	5.4	(2.7)	8.1	(2.2)
Non-ewe related reasons (cost, availability, etc.)	25.4	(6.3)	26.9	(5.6)	21.7	(3.3)

*For replacement ewe lambs that were acquired elsewhere.

C.4.i. For the most recent lamb crop, percentage of ewes expected to lamb, by breeding location and by flock size:

Percent Ewes

Flock Size (number of ewes)

Breeding location	Very small (fewer than 20)		Small (20–99)		Medium (100–499)		Large (500 or more)		All operations (1 or more)		Operations with 20 or more	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Bred on operation	95.1	(2.3)	99.1	(0.3)	98.5	(0.5)	99.0	(0.3)	98.7	(0.2)	98.9	(0.2)
Purchased pregnant	4.9	(2.3)	0.9	(0.3)	1.5	(0.5)	1.0	(0.3)	1.3	(0.2)	1.1	(0.2)
Total	100.0		100.0		100.0		100.0		100.0		100.0	

C.4.j. For the most recent lamb crop, percentage of ewes expected to lamb, by breeding location and by primary flock type:

Percent Ewes*

Primary Flock Type

Breeding location	Herded/open range		Fenced range		Pasture	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Bred on operation	98.4	(0.6)	99.5	(0.2)	98.8	(0.3)
Purchased pregnant	1.6	(0.6)	0.5	(0.2)	1.2	(0.3)
Total	100.0		100.0		100.0	

*On operations with 20 or more ewes.

5. Outcome of ewes expected to lamb

The increased demand for lamb and wool products in the United States has resulted in high prices for sheep products and a sheep industry goal to increase sheep numbers. The new TwoPLUS program of the American Sheep Industry Association encourages producers to grow their flocks by 2 ewes per 100 ewes, increase the average birth rate per ewe to 2 lambs per year, and increase the harvested lamb crop by 2 percent. For this to occur, a higher percentage of ewes must deliver multiple lambs. It can be difficult for producers to distinguish between ewes that did not become pregnant and ewes that did become pregnant but aborted prior to lambing; therefore, the following percentages are only rough estimates of ewe lambing outcomes.

A slightly lower percentage of ewes expected to lamb on very small operations (40.2 percent) had only single live births compared with ewes on large operations (49.5 percent). It follows, then, that a higher percentage of ewes on very small operations (54.3 percent) had multiple lambs with at least one live birth compared with ewes on large operations (42.8 percent). A lower percentage of ewes on very small operations aborted (0.4 percent) or became pregnant but died prior to lambing (0.5 percent) compared with ewes on large operations (1.1 and 1.2 percent, respectively).

C.5.a. Of ewes expected to lamb during the most recent lamb crop, average percentage of ewes by breeding outcome and by flock size:

Percent Ewes

Flock Size (number of ewes)

	Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Breeding outcome	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Had only single live births	40.2	(2.7)	38.2	(1.0)	42.2	(0.8)	49.5	(1.0)	45.0	(0.6)	45.3	(0.6)
Had multiple lambs with at least one live birth	54.3	(2.5)	56.3	(1.0)	51.2	(0.9)	42.8	(1.0)	48.1	(0.6)	47.8	(0.6)
Had only dead births	1.8	(0.2)	1.8	(0.1)	1.6	(0.1)	1.4	(0.1)	1.6	(0.1)	1.5	(0.1)
Aborted	0.4	(0.1)	0.6	(0.1)	0.7	(0.1)	1.1	(0.1)	0.9	(0.1)	0.9	(0.1)
Became pregnant, but died prior to lambing	0.5	(0.1)	0.7	(0.1)	0.9	(0.1)	1.2	(0.1)	1.0	(0.1)	1.0	(0.1)
Became pregnant, but removed from the operation prior to lambing	0.3	(0.3)	0.3	(0.1)	0.5	(0.1)	0.5	(0.1)	0.4	(0.1)	0.4	(0.1)
Did not become pregnant	2.4	(0.3)	2.0	(0.2)	2.8	(0.2)	3.6	(0.3)	3.0	(0.1)	3.0	(0.2)
Total	100.0		100.0		100.0		100.0		100.0		100.0	

A higher percentage of ewes that were expected to lamb in the West and Central regions (49.2 and 48.8 percent, respectively) had only single live births compared with ewes in East region (31.8 percent). Just under two-thirds of ewes in the East region (61.5 percent) had multiple lambs with at least one live birth, while less than half of ewes in the West region (43.8 percent) and Central region (44.3 percent) had multiple lambs with at least on live birth.

C.5.b. Of ewes expected to lamb during the most recent lamb crop, average percentage of ewes by breeding outcome and by region:

	Percent Ewes*					
	Region					
	West		Central		East	
Breeding outcome	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Had only single live births	49.2	(1.6)	48.8	(0.8)	31.9	(0.8)
Had multiple lambs with at least one live birth	43.8	(1.8)	44.3	(0.8)	61.3	(0.8)
Had only dead births	1.7	(0.1)	1.3	(0.1)	2.1	(0.1)
Aborted	1.1	(0.1)	0.8	(0.1)	0.8	(0.1)
Became pregnant, but died prior to lambing	1.0	(0.1)	1.0	(0.1)	0.9	(0.1)
Became pregnant, but removed from the operation prior to lambing	0.3	(0.1)	0.4	(0.1)	0.4	(0.1)
Did not become pregnant	2.8	(0.3)	3.2	(0.2)	2.6	(0.2)
Total	100.0		100.0		100.0	

*On operations with one or more ewes.

Photograph courtesy of Camilla Kristensen

About 4 of 10 ewes that were expected to lamb on pasture and herded/open range operations (37.1 and 41.0 percent, respectively) had only single live births compared with about 6 of 10 ewes on fenced-range operations (57.2 percent). Similarly, the percentage of ewes that had multiple lambs with at least one live birth was lower on fenced-range operations (36.4 percent) compared with pasture operations (56.0 percent) and herded/open range operations (51.3 percent). Herded/open range flocks were sometimes uncertain how many lambs were born alive or born dead and often did not know how many ewes had only dead births or did not become pregnant. These estimates may reflect this uncertainty.

C.5.c. Of ewes expected to lamb during the most recent lamb crop, percentage of ewes by breeding outcome and by primary flock type:

	Percent Ewes*					
	Primary Flock Type					
	Herded/ open range		Fenced range		Pasture	
Breeding outcome	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Had only single live births	41.0	(1.4)	57.2	(0.9)	37.1	(0.9)
Had multiple lambs with at least one live birth	51.3	(1.3)	36.4	(0.9)	56.0	(1.0)
Had only dead births	1.5	(0.1)	1.1	(0.1)	2.0	(0.1)
Aborted	0.9	(0.1)	0.8	(0.2)	0.9	(0.1)
Became pregnant, but died prior to lambing	1.5	(0.1)	0.9	(0.1)	0.8	(0.1)
Became pregnant, but removed from the operation prior to lambing	0.2	(0.1)	0.4	(0.2)	0.6	(0.1)
Did not become pregnant	3.5	(0.3)	3.1	(0.3)	2.7	(0.2)
Total	100.0		100.0		100.0	

*On operations with 20 or more ewes.

D. Reproductive Outcomes

Note: Dry lot and feedlot operations are not represented in this section.

To estimate productivity in a flock, producers must track the number of lambs born alive and the number born dead; however, for operations in which lambs are born on the open range without close monitoring, it is not practical to track lambing rates. For these operations, lamb processing (when lambs are docked, vaccinated, castrated, etc.) may be the first time they are able to track their lambs.

Without baseline information on lambing rates, it is difficult to provide answers to basic questions relative to reasons for low lambing rates. Abortions, poor mothering, lack of colostrum, pneumonia, or predators can be causes of low lambing rates.

1. Lambs born

Close to 100.0 percent of operations had at least one lamb born alive in 2010. Some operations were new and had not lambed, while others were changing management strategies or had lost their pregnant ewes for one reason or another.

D.1.a. Percentage of operations that had any lambs born in 2010, by flock size:

Percent Operations

Flock Size (number of ewes)

Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Pct.	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
100.0	(—)	99.3	(0.3)	99.7	(0.2)	99.8	(0.2)	99.7	(0.1)	99.4	(0.2)

D.1.b. Percentage of operations that had any lambs born in 2010, by region:

Percent Operations (1 or more ewes)

Region

West		**Central**		**East**	
Percent	**Std. error**	**Percent**	**Std. error**	**Percent**	**Std. error**
100.0	(—)	99.5	(0.2)	99.7	(0.2)

D.1.c. Percentage of operations with 20 or more ewes that had any lambs born in 2010, by primary flock type:

Percent Operations (20 or more ewes)

Primary Flock Type					
Herded/open range		**Fenced range**		**Pasture**	
Percent	**Std. error**	**Percent**	**Std. error**	**Percent**	**Std. error**
100.0	(—)	99.1	(0.4)	99.5	(0.2)

2. Lambs born alive

Overall, 96.0 percent of lambs born were born alive. There was little difference in the percentage of lambs born alive for very small, small, and medium operations; however, the percentage of lambs born alive was higher for large operations than for the other flock sizes. The relatively high percentage of lambs born alive on large operations is likely due to the inability of these operations to detect dead-lamb births.

D.2.a. For the most recent lamb crop, percentage of lambs born alive and percentage born dead, by flock size:

Percent Lambs Born

	Flock Size (number of ewes)											
	Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Status	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Born alive	94.6	(0.4)	95.3	(0.2)	95.7	(0.1)	96.7	(0.3)	96.0	(0.1)	96.1	(0.1)
Born dead	5.4	(0.4)	4.7	(0.2)	4.3	(0.1)	3.3	(0.3)	4.0	(0.1)	3.9	(0.1)
Total	100.0		99.9		100.0		100.0		100.0		100.0	

The percentage of lambs born dead ranged from 3.4 percent in the West region to 5.2 percent in the East region.

D.2.b. For the most recent lamb crop, percentage of lambs born alive and percentage born dead, by region:

	Percent Lambs Born*					
	Region					
	West		Central		East	
Status	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Born alive	96.6	(0.2)	96.5	(0.2)	94.8	(0.2)
Born dead	3.4	(0.2)	3.5	(0.2)	5.2	(0.2)
Total	100.0		100.0		100.0	

*On operations with one or more ewes.

D.2.c. For the most recent lamb crop, percentage of lambs born alive and percentage born dead, by primary flock type:

	Percent Lambs Born*					
	Primary Flock Type					
	Herded/open range		Fenced range		Pasture	
Status	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Born alive	96.4	(0.5)	96.7	(0.1)	95.5	(0.2)
Born dead	3.6	(0.5)	3.3	(0.1)	4.5	(0.2)
Total	100.0		100.0		100.0	

*On operations with 20 or more ewes.

3. Lambs docked

For operations that managed their sheep primarily on open range, lamb processing (when lambs are docked, vaccinated, castrated, etc.) may be the first time these operations are able to view their sheep after lambing. During docking, herded/open range operations track lambs, vaccinate, ensure that all ewes are healthy, and perform other management measures. Not all operations dock any or all of their lambs, depending on whether animals are intended for replacements, show, market, or other uses.

Overall, operations with one or more ewes docked 81.5 percent of lambs born alive. Large operations docked a higher percentage of lambs born alive (87.7 percent) than very small operations (64.5 percent) or small operations (75.2 percent).

D.3.a. For the most recent lamb crop, percentage of lambs born alive that were docked, by flock size:

Percent Lambs Born

Flock Size (number of ewes)

Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Pct.	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
64.5	(2.5)	75.2	(1.5)	81.4	(1.3)	87.7	(1.2)	81.5	(0.8)	82.7	(0.8)

Operations in the Central region docked a higher percentage of lambs born alive (83.4 percent) than operations in the East region (74.9 percent).

D.3.b. For the most recent lamb crop, percentage of lambs born alive that were docked, by region:

Percent Lambs Born*

Region

West		**Central**		**East**	
Percent	**Std. error**	**Percent**	**Std. error**	**Percent**	**Std. error**
83.4	(2.7)	84.4	(0.9)	74.9	(1.4)

*On operations with one or more ewes.

Operations that managed their sheep as a herded/open range docked a higher percentage of lambs born alive (89.4 percent) than operations that managed their sheep on pasture (79.1 percent).

D.3.c. For the most recent lamb crop, percentage of lambs born alive that were docked, by primary flock type:

Percent Lambs Born*

Primary Flock Type

Herded/open range		Fenced range		Pasture	
Percent	**Std. error**	**Percent**	**Std. error**	**Percent**	**Std. error**
89.4	(1.2)	82.2	(1.6)	79.1	(1.3)

*On operations with 20 or more ewes.

The average number of lambs born alive per ewe exposed was 1.3 for all operations.

D.3.d. For the most recent lamb crop, average number of lambs born alive per ewe exposed,* by flock size:

Average Number of Lambs

Flock Size (number of ewes)

Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Avg.	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**
1.4	(0.0)	1.4	(0.0)	1.3	(0.0)	1.2	(0.0)	1.3	(0.0)	1.3	(0.0)

* Ewes exposed includes ewes that aborted, had only dead births, did not become pregnant, became pregnant but died or were removed prior to lambing.

D.3.e. For the most recent lamb crop, average number of lambs born alive per ewe exposed,[1] by region:

Average Number of Lambs[2]					
Region					
West		Central		East	
Average	Std. error	Average	Std. error	Average	Std. error
1.3	(0.0)	1.2	(0.0)	1.5	(0.0)

[1]Ewes exposed includes ewes that aborted, had only dead births, did not become pregnant, became pregnant but died or were removed prior to lambing.
[2]On operations with one or more ewes.

D.3.f. For the most recent lamb crop, average number of lambs born alive per ewe exposed,[1] by primary flock type:

Average Number of Lambs[2]					
Primary Flock Type					
Herded/open range		Fenced range		Pasture	
Average	Std. error	Average	Std. error	Average	Std. error
1.2	(0.0)	1.2	(0.0)	1.4	(0.0)

[1]Ewes exposed includes ewes that aborted, had only dead births, did not become pregnant, became pregnant but died or were removed prior to lambing.
[2]On operations with one or more ewes.

4. Monthly distribution of lambs born

Lambing in late fall through late winter provides great marketing opportunities, as lamb prices are often highest during the Easter period. Lambing in April and May synchronizes with the forage production cycle and allows for the most efficient use of forage. Lambing in April and May also coincides with the natural breeding and lambing seasons, when the ewes are likely to have larger lamb crops. For all operations, the highest percentage of lambs were born in February through May. A higher percentage of lambs born on very small operations were born in February than in any other month. April and May saw the highest percentages of lambs born on large operations (22.2 and 25.6 of lambs born, respectively). July and August were the months with the lowest percentage of lambs born for all operations. Lambing during these months requires better parasite and predator management.

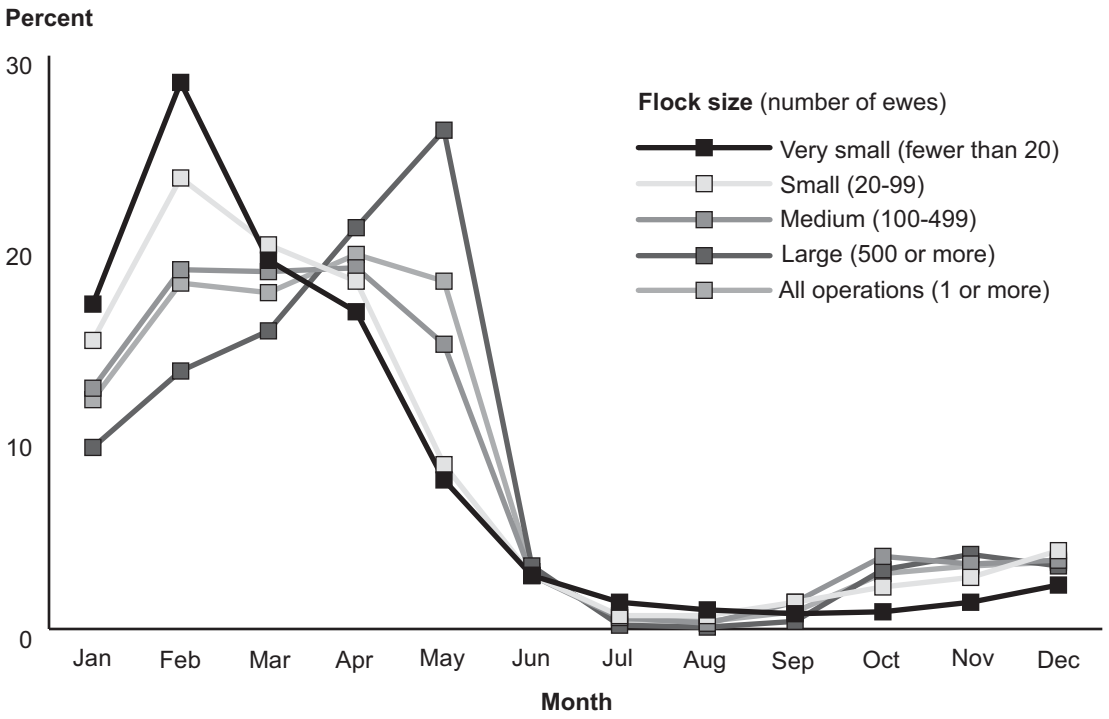
D.4.a. Percentage of lambs born alive or dead, by month and by flock size:

Percent Lambs

Flock Size (number of ewes)

	Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Month born	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
January	17.0	(1.7)	15.1	(0.9)	12.6	(0.7)	9.5	(1.1)	12.0	(0.6)	11.7	(0.6)
February	28.6	(1.8)	23.6	(1.1)	18.8	(0.9)	13.5	(0.9)	18.1	(0.6)	17.4	(0.6)
March	19.3	(1.4)	20.1	(1.1)	18.7	(1.0)	15.6	(1.2)	17.6	(0.7)	17.5	(0.7)
April	16.6	(1.5)	18.2	(1.6)	18.9	(1.0)	21.0	(1.6)	19.6	(0.9)	19.8	(0.9)
May	7.8	(1.1)	8.6	(0.8)	14.9	(1.0)	26.1	(2.7)	18.2	(1.4)	18.9	(1.4)
June	2.8	(0.9)	2.8	(1.2)	2.8	(0.4)	3.3	(0.4)	3.0	(0.4)	3.0	(0.4)
July	1.4	(0.3)	0.7	(0.2)	0.6	(0.1)	0.2	(0.1)	0.5	(0.1)	0.5	(0.1)
August	1.0	(0.3)	0.7	(0.1)	0.3	(0.1)	0.1	(0.0)	0.4	(0.1)	0.3	(0.1)
September	0.8	(0.2)	1.4	(0.4)	1.4	(0.2)	0.4	(0.1)	0.9	(0.1)	0.9	(0.1)
October	0.9	(0.3)	2.2	(0.4)	3.8	(0.5)	3.1	(0.6)	2.9	(0.3)	3.1	(0.3)
November	1.4	(0.4)	2.7	(0.5)	3.4	(0.3)	3.9	(0.5)	3.3	(0.3)	3.4	(0.3)
December	2.3	(0.5)	4.1	(0.5)	3.6	(0.5)	3.3	(0.5)	3.5	(0.3)	3.6	(0.3)
Total	100.0		100.0		100.0		100.0		100.0		100.0	

Percentage of lambs born alive or dead, by month and by flock size



In the Central region, lambing peaked in April and May, with 22.0 and 24.3 percent of the lambs born in those months, respectively. In the West region, lambing peaked in January through March, and in the East region in February through April. Of interest is the second, smaller peak in October through November in the West region.

D.4.b. Percentage of lambs born alive or dead, by month and by region:

	Percent Lambs*					
	Region					
	West		Central		East	
Month born	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
January	19.5	(1.3)	9.1	(0.9)	13.9	(0.8)
February	20.0	(1.2)	14.8	(0.8)	23.7	(0.9)
March	17.2	(1.6)	17.1	(1.0)	18.9	(0.9)
April	8.9	(1.3)	22.0	(1.3)	20.4	(1.4)
May	3.3	(0.9)	24.3	(2.2)	13.9	(1.0)
June	0.6	(0.2)	4.0	(0.6)	2.4	(0.3)
July	0.3	(0.1)	0.5	(0.1)	0.6	(0.1)
August	0.2	(0.1)	0.4	(0.1)	0.3	(0.1)
September	0.9	(0.2)	0.7	(0.1)	1.3	(0.3)
October	9.2	(1.6)	2.0	(0.3)	1.3	(0.2)
November	10.9	(1.3)	2.2	(0.2)	1.4	(0.3)
December	9.2	(0.9)	2.8	(0.4)	1.7	(0.3)
Total	100.0		100.0		100.0	

*On operations with one or more ewes.

A higher percentage of lambs were born in May on herded/open range operations (35.3 percent) compared with fenced-range (15.9 percent) or pasture (11.0 percent) operations.

D.4.c. Percentage of lambs born alive or dead, by month and by primary flock type:

	Percent Lambs*					
	Primary Flock Type					
	Herded/open range		Fenced range		Pasture	
Month born	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
January	7.5	(1.8)	10.8	(0.9)	14.9	(0.7)
February	11.5	(1.4)	16.5	(1.1)	21.5	(0.8)
March	12.6	(2.0)	18.8	(1.1)	19.4	(0.8)
April	23.7	(2.9)	19.4	(1.1)	17.8	(1.1)
May	35.3	(4.6)	15.9	(1.0)	11.0	(0.8)
June	3.1	(0.6)	3.8	(0.4)	2.4	(0.7)
July	0.1	(0.0)	0.6	(0.2)	0.6	(0.1)
August	0.1	(0.0)	0.5	(0.1)	0.3	(0.1)
September	0.0	(0.0)	1.0	(0.2)	1.4	(0.3)
October	1.9	(0.9)	3.7	(0.5)	3.3	(0.5)
November	2.0	(0.6)	4.4	(0.6)	3.6	(0.5)
December	2.1	(0.6)	4.5	(0.6)	3.8	(0.4)
Total	100.0		100.0		100.0	

*On operations with 20 or more ewes.

Lambs were born in February and March on the highest percentage of operations; however, there were at least some operations lambing throughout the year, which helps meet market demands.

D.4.d. Percentage of operations with one or more lambs born in each of the following months, by flock size:

Percent Operations

Flock Size (number of ewes)

	Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Month born	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
January	28.5	(1.9)	42.8	(1.6)	38.0	(1.7)	31.1	(1.6)	35.5	(1.1)	41.1	(1.2)
February	46.2	(2.0)	55.9	(1.6)	49.7	(1.7)	38.5	(1.8)	50.4	(1.1)	53.6	(1.2)
March	41.1	(2.0)	53.7	(1.6)	54.5	(1.7)	45.9	(1.8)	48.0	(1.1)	53.4	(1.3)
April	29.9	(1.8)	39.3	(1.6)	48.3	(1.7)	50.1	(1.9)	36.6	(1.1)	41.8	(1.2)
May	15.1	(1.5)	23.3	(1.4)	34.1	(1.6)	42.4	(1.7)	21.6	(0.9)	26.7	(1.1)
June	6.1	(1.0)	9.0	(0.9)	13.6	(1.2)	17.3	(1.4)	8.5	(0.6)	10.4	(0.7)
July	5.0	(1.0)	5.6	(0.8)	5.7	(0.9)	3.2	(0.7)	5.3	(0.5)	5.5	(0.6)
August	3.4	(0.8)	4.9	(0.7)	3.5	(0.7)	2.3	(0.6)	4.0	(0.5)	4.4	(0.6)
September	3.2	(0.8)	6.4	(0.8)	8.8	(1.0)	4.2	(0.9)	5.2	(0.5)	6.8	(0.7)
October	2.7	(0.7)	9.1	(1.0)	14.8	(1.2)	11.0	(1.1)	7.0	(0.5)	10.5	(0.8)
November	3.8	(0.8)	11.2	(1.1)	16.4	(1.2)	13.6	(1.3)	8.7	(0.6)	12.5	(0.8)
December	5.9	(1.0)	15.6	(1.2)	15.5	(1.2)	15.3	(1.3)	11.3	(0.7)	15.6	(0.9)

In the West region, the highest percentage of operations (61.3 percent) lambed in February. In the Central and East regions the highest percentages of operations lambed in February (43.0 and 51.7 percent, respectively) and March (46.4 and 50.3 percent, respectively).

D.4.e. Percentage of operations with one or more lambs born in each of the following months, by region:

	Percent Operations (1 or more ewes)					
	Region					
	West		**Central**		**East**	
Month born	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
January	48.1	(2.5)	30.2	(1.7)	34.9	(1.6)
February	61.3	(2.6)	43.0	(1.8)	51.7	(1.7)
March	45.0	(2.6)	46.4	(1.8)	50.3	(1.7)
April	22.8	(2.2)	37.3	(1.7)	41.0	(1.6)
May	12.1	(1.7)	24.8	(1.5)	22.8	(1.3)
June	5.9	(1.2)	10.4	(1.1)	8.1	(0.9)
July	4.1	(1.1)	6.7	(1.0)	4.7	(0.7)
August	2.7	(0.9)	6.5	(1.1)	2.6	(0.6)
September	6.4	(1.3)	6.8	(1.0)	3.7	(0.6)
October	8.2	(1.2)	10.2	(1.2)	4.4	(0.6)
November	11.4	(1.5)	12.3	(1.2)	5.2	(0.6)
December	20.3	(1.9)	13.1	(1.3)	6.9	(0.8)

5. Lambing locations

On nearly half of operations (48.4 percent), lambs were born in barns or sheds. A smaller percentage of large operations (27.9 percent) lambed in barns or sheds compared with medium and small operations (45.0 and 50.9 percent, respectively). The highest percentage of large operations (37.3 percent) lambed in an "other fenced pasture."

D.5.a. For operations with lambs born in 2010, percentage of operations by lambing locations used for at least one lamb, and by flock size:

Percent Operations

Flock Size (number of ewes)

	Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Lambing location	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Individual lambing pen			25.1	(1.3)	21.4	(1.4)	19.3	(1.4)			24.0	(1.0)
Barn or shed (covered, but without individual pens)			50.9	(1.6)	45.0	(1.6)	27.9	(1.6)			48.4	(1.2)
Special lambing pasture that allows increased observation and/or shelter			15.0	(1.2)	21.6	(1.4)	17.0	(1.4)			16.6	(0.9)
Other fenced pasture			26.8	(1.4)	28.8	(1.5)	37.3	(1.7)			27.8	(1.1)
Open range			4.1	(0.7)	6.9	(0.8)	25.2	(1.6)			5.9	(0.5)
Dry lot (pen which does not allow grazing)			4.8	(0.7)	9.5	(1.0)	9.0	(1.0)			6.0	(0.5)
Other			0.5	(0.2)	0.4	(0.2)	0.4	(0.3)			0.5	(0.2)

In the West region, at least some lambs were born in barns or sheds on 36.1 percent of operations, on a special lambing pasture on 32.6 percent, and on “other fenced pasture” on 33.4 percent of operations. In the Central and East regions, at least some lambs were born in barns or sheds on 39.6 and 60.2 percent of operations, respectively. The Central region had the highest percentage of operations (11.8 percent) in which at least some lambs were born on the open range.

D.5.b. For operations with lambs born in 2010, percentage of operations by lambing locations used for at least one lamb, and by region:

Percent Operations (20 or more ewes)

	Region					
	West		Central		East	
Lambing location	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Individual lambing pen	18.2	(2.6)	17.2	(1.2)	31.9	(1.8)
Barn or shed (covered, but without individual pens)	36.1	(3.2)	39.6	(1.7)	60.2	(1.9)
Special lambing pasture that allows increased observation and/or shelter	32.6	(3.1)	14.9	(1.3)	12.2	(1.2)
Other fenced pasture	33.4	(3.1)	32.8	(1.7)	21.5	(1.6)
Open range	5.3	(1.4)	11.8	(1.2)	1.0	(0.4)
Dry lot (pen which does not allow grazing)	6.8	(1.7)	9.4	(0.9)	2.9	(0.6)
Other	0.2	(0.2)	0.5	(0.3)	0.6	(0.3)

A similar percentage of herded/open range operations lambed on the open range or in a barn or shed (41.8 and 35.5 percent, respectively). A higher percentage of pasture operations than herded/open range and fenced-range operations lambed in a barn or shed.

D.5.c. For operations with 20 or more ewes that had lambs born in 2010, percentage of operations by lambing locations used for at least one lamb, and by primary flock type:

Percent Operations (20 or more ewes)

	Primary Flock Type					
	Herded/ open range		Fenced range		Pasture	
Lambing location	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Individual lambing pen	19.0	(3.8)	18.3	(1.6)	27.0	(1.4)
Barn or shed (covered, but without individual pens)	35.5	(5.3)	35.1	(2.1)	54.3	(1.6)
Special lambing pasture that allows increased observation and/or shelter	10.5	(2.1)	16.4	(1.6)	16.9	(1.1)
Other fenced pasture	24.9	(5.1)	38.0	(2.2)	23.9	(1.4)
Open range	41.8	(5.1)	9.9	(1.3)	2.5	(0.5)
Dry lot (pen which does not allow grazing)	10.8	(3.8)	5.6	(0.9)	6.0	(0.7)
Other	0.0	(—)	0.9	(0.5)	0.2	(0.1)

Just over one-fourth of all lambs born (26.2 percent) were born in a barn or shed. The single highest percentage of lambs born on small and medium operations (40.3 and 34.9 percent, respectively) were born in barns or sheds, while the single highest percentage of lambs born on large operations (31.8 percent) were born on the open range.

D.5.d. For operations with lambs born in 2010, percentage of lambs born, by lambing location and by flock size:

Percent Lambs

Flock Size (number of ewes)

	Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Lambing location	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Individual lambing pen			20.4	(1.7)	16.6	(1.3)	14.9	(2.1)			16.7	(1.2)
Barn or shed (covered, but without individual pens)			40.3	(1.8)	34.9	(1.6)	14.5	(1.6)			26.2	(1.1)
Special lambing pasture that allows increased observation and/or shelter			12.8	(1.7)	14.6	(1.1)	9.7	(1.3)			11.7	(0.8)
Other fenced pasture			20.6	(1.6)	20.3	(1.2)	23.3	(2.0)			21.8	(1.1)
Open range			3.0	(0.7)	6.8	(0.9)	31.8	(2.9)			18.1	(1.6)
Dry lot (pen which does not allow grazing)			2.7	(0.5)	6.5	(0.8)	5.9	(1.0)			5.2	(0.5)
Other			0.4	(0.2)	0.4	(0.2)	0.0	(—)			0.2	(0.1)
Total			100.0		100.0		100.0				100.0	

The single highest percentage of lambs born in the East region (46.8 percent) were born in barns or sheds.

D.5.e. For operations with lambs born in 2010, percentage of lambs born, by lambing location and by region:

	Percent Lambs*					
	Region					
	West		Central		East	
Lambing location	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Individual lambing pen	7.9	(1.6)	14.6	(1.8)	26.8	(1.9)
Barn or shed (covered, but without individual pens)	15.2	(1.6)	19.9	(1.4)	46.8	(2.0)
Special lambing pasture that allows increased observation and/or shelter	31.8	(3.3)	8.3	(1.0)	7.5	(0.9)
Other fenced pasture	29.2	(3.6)	22.7	(1.5)	15.4	(1.4)
Open range	8.4	(2.4)	28.4	(2.4)	0.7	(0.3)
Dry lot (pen which does not allow grazing)	7.5	(1.7)	5.9	(0.8)	2.5	(0.6)
Other	0.0	(0.0)	0.1	(0.1)	0.4	(0.2)
Total	100.0		100.0		100.0	

*On operations with 20 or more ewes.

D.5.f. For operations with lambs born in 2010, percentage of lambs born, by lambing location and by primary flock type:

	Percent Lambs*					
	Primary Flock Type					
	Herded/ open range		Fenced range		Pasture	
Lambing location	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Individual lambing pen	16.7	(3.8)	9.1	(0.9)	22.5	(1.4)
Barn or shed (covered, but without individual pens)	13.7	(2.8)	20.5	(1.2)	37.0	(1.5)
Special lambing pasture that allows increased observation and/or shelter	6.3	(1.5)	11.7	(1.4)	15.1	(1.3)
Other fenced pasture	11.3	(2.5)	37.0	(1.9)	17.3	(1.4)
Open range	45.8	(4.6)	16.8	(1.7)	2.8	(0.5)
Dry lot (pen which does not allow grazing)	6.3	(1.7)	4.5	(0.6)	5.2	(0.6)
Other	0.0	(—)	0.4	(0.2)	0.1	(0.0)
Total	100.0		100.0		100.0	

*On operations with 20 or more ewes.

6. Castration management

Overall, 68.5 percent of operations castrated lambs. The percentage of operations that castrated ram lambs ranged from 60.0 percent of small operations to 94.9 percent of large operations.

D.6.a. For operations with ram lambs born alive in 2010, percentage of operations that castrated ram lambs, by flock size:

Percent Operations

Flock Size (number of ewes)

Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Pct.	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
60.0	(2.0)	71.6	(1.4)	81.9	(1.4)	94.9	(1.0)	68.5	(1.1)	75.1	(1.1)

Overall, ram lambs were castrated at an average age of 24.7 days. Ram lambs on large operations were castrated at an average age of 28.0 days compared with an average age of 21.8 days on small operations.

D.6.b. For operations with ram lambs castrated in 2010, operation average age (in days) that rams were castrated, by flock size:

Operation Average Age (days)

Flock Size (number of ewes)

Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Avg.	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**
21.8	(1.3)	25.3	(1.1)	21.9	(0.9)	28.0	(0.8)	23.6	(0.7)	24.7	(0.8)

In the Central region, ram lambs were castrated at an average age of 29.9 days compared with an average age of 18.6 days in the East region.

D.6.c. For operations with ram lambs castrated in 2010, operation average age (in days) that rams were castrated, by region:

Operation Average Age (days)*					
Region					
West		**Central**		**East**	
Average	**Std. error**	**Average**	**Std. error**	**Average**	**Std. error**
23.7	(1.6)	29.9	(1.3)	18.6	(0.9)

*On operations with one or more ewes.

The operation average days at castration for ram lambs on herded/open range operations was 34.7 days compared with 22.1 days on pasture operations.

D.6.d. For operations with ram lambs castrated in 2010, operation average age (in days) that rams were castrated, by flock type:

Operation Average Age (days)*					
Flock Type					
Herded/open range		**Fenced range**		**Pasture**	
Average	**Std. error**	**Average**	**Std. error**	**Average**	**Std. error**
34.7	(5.8)	28.8	(1.4)	22.1	(0.9)

*On operations with 20 or more ewes.

Overall, ram lambs were castrated at 7 days or younger on 38.3 percent of operations.

D.6.e. For operations with ram lambs castrated in 2010, percentage of operations that castrated rams, by age of rams at castration:

Age at castration (days)	**Percent Operations** (1 or more ewes)	**Std. error**
1–7	38.3	(1.3)
8–21	24.8	(1.2)
22 or more	36.9	(1.2)
Total	100.0	

The majority of operations (87.5 percent) used a band to castrate ram lambs. Approximately one-third of large operations (34.5 percent) used a knife to castrate ram lambs.

D.6.f. For operations with ram lambs castrated in 2010, percentage of operations by primary method of castration and by flock size:

Percent Operations

Flock Size (number of ewes)

	Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Castration method	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Band	93.1	(1.3)	88.1	(1.3)	80.3	(1.5)	56.9	(1.7)	87.5	(0.8)	84.0	(1.0)
Burdizzo or emasculator	2.1	(0.7)	3.3	(0.7)	4.5	(0.8)	7.0	(0.9)	3.2	(0.4)	3.8	(0.5)
Knife	4.5	(1.1)	7.8	(1.0)	13.3	(1.2)	34.5	(1.7)	8.5	(0.7)	11.0	(0.8)
Other	0.3	(0.3)	0.9	(0.4)	1.8	(0.5)	1.5	(0.5)	0.8	(0.2)	1.1	(0.3)
Total	100.0		100.0		100.0		100.0		100.0		100.0	

A lower percentage of operations in the Central region (78.4 percent) castrated ram lambs with a band compared with operations in the West or East regions (91.6 and 93.0 percent, respectively). A higher percentage of operations in the Central region (16.3 percent) used a knife for castration compared with operations in the West or East regions (4.0 and 4.3 percent, respectively).

D.6.g. For operations with ram lambs castrated during 2010, percentage of operations by primary method of castration and by region:

Percent Operations (1 or more ewes)

	Region					
	West		Central		East	
Castration method	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Band	91.6	(1.5)	78.4	(1.5)	93.0	(1.0)
Burdizzo or emasculator	3.9	(1.1)	3.5	(0.7)	2.5	(0.6)
Knife	4.0	(0.9)	16.3	(1.4)	4.3	(0.8)
Other	0.5	(0.5)	1.7	(0.5)	0.2	(0.1)
Total	100.0		100.0		100.0	

A higher percentage of pasture operations castrated ram lambs with a band.

D.6.h. For operations with ram lambs castrated during 2010, percentage of operations by primary method of castration and by primary flock type:

Percent Operations (1 or more ewes)

Primary Flock Type*

Castration method	Herded/ open range Pct.	Herded/ open range Std. error	Fenced range Pct.	Fenced range Std. error	Pasture Pct.	Pasture Std. error
Band	59.8	(5.1)	70.6	(2.2)	90.9	(1.0)
Burdizzo or emasculator	3.0	(1.0)	6.4	(1.3)	2.8	(0.6)
Knife	36.5	(5.1)	20.4	(1.9)	5.8	(0.8)
Other	0.8	(0.7)	2.6	(0.9)	0.4	(0.2)
Total	100.0		100.0		100.0	

*Table does not apply to dry lot or feedlot operations.

For ram lambs castrated at 1 to 7 days of age, the highest percentage of operations used a band for castration.

D.6.i. For operations that castrated ram lambs, percentage of operations by age of rams at castration and by method of castration:

Percent Operations (1 or more ewes)

Method of Castration

Age (days)	Band Pct.	Band Std. error	Burdizzo or Emasculator Pct.	Burdizzo or Emasculator Std. error	Knife Pct.	Knife Std. error	Other Pct.	Other Std. error
1–7	41.3	(1.4)	17.0	(5.2)	19.0	(4.0)	5.0	(3.6)
8–21	25.1	(1.3)	28.5	(6.3)	22.7	(3.1)	1.8	(1.5)
22 or more	33.6	(1.3)	54.5	(6.8)	58.3	(4.1)	93.1	(4.0)
Total	100.0		100.0		100.0		100.0	

7. Weaned lamb management

The operation average number of lambs weaned per ewe exposed was 1.2. This number was higher in small flocks (1.4 lambs).

D.7.a. For lambs born in 2010, operation average number of lambs weaned per exposed ewe,* by flock size:

Operation Average

Flock Size (number of ewes)

Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Avg.	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**
1.3	(0.1)	1.4	(0.0)	1.3	(0.0)	1.0	(0.0)	1.2	(0.0)	1.2	(0.0)

*Ewes bred on the operation or purchased pregnant.

The operation average number of lambs weaned per exposed ewe was higher in the East region (1.5) than in the West and Central regions (1.2 and 1.1, respectively).

D.7.b. For lambs born in 2010, operation average number of lambs weaned per exposed ewe,[1] by region:

Operation Average[2]

Region

West		**Central**		**East**	
Average	**Std. error**	**Average**	**Std. error**	**Average**	**Std. error**
1.2	(0.0)	1.1	(0.0)	1.5	(0.0)

[1]On operations with one or more ewes.
[2]Ewes bred on the operation or purchased pregnant.

Pasture flocks had the highest operation average number of lambs weaned per ewe exposed.

D.7.c. For lambs born in 2010, operation average number of lambs weaned per exposed ewe,[1] by primary flock type:

Operation Average[2]					
Primary Flock Type					
Herded/open range		Fenced range		Pasture	
Average	Std. error	Average	Std. error	Average	Std. error
1.1	(0.0)	1.1	(0.0)	1.4	(0.0)

[1]On operations with one or more ewes.
[2]Ewes bred on the operation or purchased pregnant.

The average age and average weight of lambs at weaning on all operations was (4.0 months and 65.0 lb). Age and weight at weaning were highest on large operations (4.8 months and 82.4 lb, respectively).

D.7.d. For lambs weaned in 2010, operation average age and weight of lambs at weaning, by flock size:

	Operation Average											
	Flock Size (number of ewes)											
	Very small (fewer than 20)		Small (20–99)		Medium (100–499)		Large (500 or more)		All operations (1 or more)		Operations with 20 or more	
	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error
Age (months)	4.1	(0.1)	3.8	(0.0)	4.1	(0.1)	4.8	(0.1)	4.0	(0.0)	3.9	(0.0)
Weight (lb)	62.5	(1.1)	64.5	(0.7)	69.4	(0.7)	82.4	(0.7)	65.0	(0.5)	66.7	(0.5)

The average weight of lambs at weaning in the East region was 56.3 pounds, but these operations weaned a month earlier than operations in the West or Central regions.

D.7.e. For lambs weaned in 2010, operation average age and weight of lambs at weaning, by region:

	Operation Average (1 or more ewes)					
	Region					
	West		**Central**		**East**	
	Avg.	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**
Age (months)	4.4	(0.1)	4.6	(0.1)	3.4	(0.1)
Weight (lb)	77.8	(1.6)	71.1	(0.8)	56.3	(0.7)

Photograph courtesy of Camilla Kristensen

Lambs on herded/open range flocks averaged 5.1 months of age and 89.0 pounds at weaning.

D.7.f. For lambs weaned in 2010, operation average age and weight of lambs at weaning, by primary flock type:

Operation Average* (20 or more ewes)

Primary Flock Type

	Herded/ open range		Fenced range		Pasture	
	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error
Age (months)	5.1	(0.2)	4.4	(0.1)	3.7	(0.0)
Weight (lb)	89.0	(3.3)	70.7	(1.0)	64.0	(0.7)

*On operations with 20 or more ewes.

Overall, 82.1 percent of operations sold weaned lambs. A lower percentage of very small operations (67.6 percent) sold weaned lambs than small (93.4 percent), medium (97.1 percent) or large (97.9 percent) operations.

D.7.g. Percentage of operations that sold any weaned lambs in 2010, by flock size:

Percent Operations

Flock Size (number of ewes)

Very small (fewer than 20)		Small (20–99)		Medium (100–499)		Large (500 or more)		All operations (1 or more)		Operations with 20 or more	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
67.6	(1.8)	93.4	(0.8)	97.1	(0.6)	97.9	(0.5)	82.1	(0.9)	94.5	(0.6)

A higher percentage of operations in the East region (84.4 percent) sold weaned lambs than operations in the West region (75.6 percent).

D.7.h. Percentage of operations that sold any weaned lambs in 2010, by region:

Percent Operations (1 or more ewes)

Region					
West		**Central**		**East**	
Percent	**Std. error**	**Percent**	**Std. error**	**Percent**	**Std. error**
75.6	(2.2)	82.2	(1.5)	84.4	(1.4)

D.7.i. Percentage of operations that sold any weaned lambs, by primary flock type:

Percent Operations (20 or more ewes)

Primary Flock Type					
Herded/open range		**Fenced range**		**Pasture**	
Percent	**Std. error**	**Percent**	**Std. error**	**Percent**	**Std. error**
82.9	(5.7)	94.4	(1.1)	95.2	(0.7)

Overall, 82.5 percent of weaned lambs were sold.

D.7.j. Percentage of weaned lambs sold, by flock size:

Percent Weaned Lambs

Flock Size (number of ewes)											
Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Pct.	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
77.8	(2.0)	80.6	(1.0)	82.4	(0.9)	84.1	(1.5)	82.5	(0.7)	82.8	(0.8)

Regionally, the percentage of weaned lambs sold was similar.

D.7.k. Percentage of weaned lambs sold, by region:

Percent Weaned Lambs*

Region

West		Central		East	
Percent	**Std. error**	**Percent**	**Std. error**	**Percent**	**Std. error**
81.6	(16)	82.8	(1.1)	82.3	(1.1)

*On operations with one or more ewes.

About 8 of 10 weaned lambs sold on large operations (79.3 percent) were sold from July through December. Overall, 72.5 percent of lambs were sold from July through December.

D.7.l. Of weaned lambs sold in 2010 (including lambs weaned at the time of removal from the operation), percentage of lambs sold, by quarter and by flock size:

Percent Weaned Lambs

Flock Size (number of ewes)

	Very small (fewer than 20)		**Small** (20–99)		**Medium** (100–499)		**Large** (500 or more)		**All operations** (1 or more)		**Operations with 20 or more**	
Quarter	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
January–March			6.3	(0.9)	8.8	(0.8)	3.9	(0.6)			5.8	(0.4)
April–June			30.4	(1.6)	22.5	(1.3)	16.8	(1.5)			21.7	(0.9)
July–September			35.3	(1.7)	38.1	(1.5)	40.2	(2.3)			38.4	(1.3)
October–December			28.0	(2.0)	30.5	(1.5)	39.1	(2.5)			34.1	(1.4)
Total			100.0		99.9		100.0				100.0	

Operations in the West region sold a higher percentage of weaned lambs from April through June and a lower percentage from October through December, compared with operations in the other regions.

D.7.m. Of weaned lambs sold in 2010 (including lambs weaned at the time of removal from the operation) percentage of lambs sold, by quarter and by region:

Percent Weaned Lambs*

Region

	West		Central		East	
Quarter	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
January–March	4.8	(0.9)	5.0	(0.5)	8.3	(0.9)
April–June	40.7	(3.4)	14.7	(0.9)	26.5	(1.4)
July–September	34.3	(2.7)	41.4	(1.9)	33.9	(1.7)
October–December	20.2	(2.0)	38.9	(2.1)	31.3	(1.6)
Total	100.0		100.0		100.0	

*On operations with 20 or more ewes.

Over 90 percent of lambs sold from herded/open range flocks in 2010 were sold from July through December.

D.7.n. Of weaned lambs sold in 2010 (including lambs weaned at the time of removal from the operation) percentage of lambs sold, by quarter and by primary flock type:

Percent Weaned Lambs*

Primary Flock Type

Quarter	Herded/ open range Pct.	Herded/ open range Std. error	Fenced range Pct.	Fenced range Std. error	Pasture Pct.	Pasture Std. error
January–March	2.3	(0.6)	6.3	(0.8)	7.4	(0.7)
April–June	7.6	(1.9)	24.7	(1.5)	27.8	(1.4)
July–September	42.7	(3.9)	38.0	(1.7)	36.3	(1.4)
October–December	47.4	(4.2)	31.0	(1.6)	28.5	(1.4)
Total	100.0		100.0		100.0	

*On operations with 20 or more ewes.

Of weaned lambs sold in 2010, the operation average age was 5.5 months. On average, lambs from large operations were slightly older than lambs from small operations (5.8 and 5.4 months, respectively).

D.7.o. Of weaned lambs sold in 2010 (including lambs weaned at the time of removal from the operation) operation average age and weight of lambs when sold, by flock size:

Operation Average

Flock Size (number of ewes)

	Very small (fewer than 20) Avg.	Very small (fewer than 20) Std. error	Small (20–99) Avg.	Small (20–99) Std. error	Medium (100–499) Avg.	Medium (100–499) Std. error	Large (500 or more) Avg.	Large (500 or more) Std. error	All operations (1 or more) Avg.	All operations (1 or more) Std. error	Operations with 20 or more Avg.	Operations with 20 or more Std. error
Age (months)			5.4	(0.1)	5.7	(0.1)	5.8	(0.1)			5.5	(0.0)
Weight (lb)			91.2	(1.0)	94.7	(0.8)	97.3	(0.8)			92.3	(0.7)

There were no regional differences in the operation average age of lambs sold, but there were differences by weight of lambs sold, with operations in the West region selling heavier lambs than operations in the other regions.

D.7.p. Of lambs sold in 2010 (including lambs weaned at the time of removal from the operation) average age and weight of lambs when sold, by region:

	Operation Average (20 or more ewes)					
	Region					
	West		**Central**		**East**	
	Pct.	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Age (months)	5.8	(0.1)	5.5	(0.1)	5.4	(0.1)
Weight (lb)	99.0	(1.8)	89.5	(1.2)	92.4	(1.1)

Section II: Methodology

A. Needs Assessment

NAHMS develops study objectives by exploring existing literature and contacting industry members about their informational needs and priorities during a needs assessment phase. The needs assessment for the NAHMS Sheep 2011 study collected information from U.S. sheep producers and other sheep specialists about what they perceived to be the most important sheep health and productivity issues. A driving force of the needs assessment was the desire of NAHMS to receive as much input as possible from a variety of producers, industry experts and representatives; Federal, State, and private veterinarians; extension specialists; universities; and industry organizations. Information was collected through a Needs Assessment Survey, and top issues were prioritized by teleconferences with representatives of the sheep industry, along with extension agents and other university affiliates.

The needs assessment survey was conducted from December 2009 through February 2010 to determine the current issues facing the U.S. sheep industry. A total of 278 stakeholders completed the needs assessment questionnaire. Of those, 37.7 percent were meat producers, 13.8 percent were wool producers, 0.7 percent were milk producers, 7.9 percent raised sheep for 4-H or clubs, 10.1 percent were mixed production operations (e.g., both meat and wool), 21.3 percent were from Federal or State government, 7.8 percent were veterinary or extension agents, and 0.7 percent were in an allied industry. The number of sheep raised by producers was between 1 and 5,000.

Of the 278 respondents, 48.7 percent were from the Eastern time zone, 35.0 percent were from the Central time zone, 7.2 percent were from the Mountain time zone, and 9.1 percent were from the Pacific time zone.

Ewe health/management was the most important management issue for respondents, with 40.0 percent of respondents ranking this as their 1st, 2nd, or 3rd most important issue. Infectious disease or diagnostic treatment was the second most important management issue (31.0 percent of respondents), followed closely by disease prevention (29.8 percent), predator control (22.0 percent), lamb health/management (21.3 percent), and death loss (19.6 percent of respondents). If we look only at the first priority issue, these rankings change only a little. The top four remain the same but the fifth most important issue is death loss, followed by extra-label drug use and antimicrobial use/resistance.

For producers who indicated ewe health was their number one priority, their specific areas of interest include: mastitis, Q fever, OPP, Johne's, abortion prevention, parasites, nutrition, and proactive information for ewe health.

Internal parasites were the most important disease issue for respondents. Overall, 65.0 percent of respondents ranked internal parasites as one of their top three disease issues. This top ranking held true for producer respondents and veterinary and university

extension agents. Respondents who indicated internal parasites as their highest priority disease cited the following specific areas of interest: resistance, detections, Haemonchus, new dewormers, immunity to parasites, management, and treatment options. The next most important disease issues were scrapie, abortions, and lameness (22.2, 19.3, and 20.2 percent of respondents, respectively).

Since Federal and State veterinarians made up nearly 22 percent of respondents, the following describes their responses to the survey. The majority of respondents were in the Eastern time zone (61.1 percent) followed by the Central (25.9 percent), Mountain (7.4 percent), and Pacific (5.6 percent) time zones. The top three management issues were: identification, infectious disease, and disease prevalence (48.0, 45.6, and 39.1 percent of respondents, respectively). The top three disease-specific issues were: scrapie, internal parasites, and Johne's (53.3, 40.0, and 31.1 percent of respondents, respectively).

Once the most important issues were identified, the study objectives were created by prioritizing the needs during discussions with producers, veterinarians, university extension agents, and government personnel. These priorities were then evaluated along with the effectiveness of the study design to contribute to existing information gaps. The study objectives were then developed (see Appendix III).

B. Sampling and Estimation

1. State selection

The preliminary selection of States to be included in the study was done from January through April 2010, using the National Agricultural Statistics Service (NASS) 2007 Census of Agriculture and the January 29, 2010, "Sheep and Goat Report." A goal for NAHMS national studies is to include States that account for at least 70 percent of both animals and producer populations in the United States. The initial review of States identified 20 major States representing 84.3 percent of the U.S. 2007 Census of Agriculture ewe inventory and 68.9 percent of farms with ewes. Sampling discussions were held with NASS statisticians; subsequently Arizona was dropped and Kentucky, Kansas, and New York were added. The 22 States recommended for inclusion in the study were California, Colorado, Iowa, Idaho, Kentucky, Kansas, Michigan, Minnesota, Missouri, Montana, New Mexico, New York, Ohio, Oregon, Pennsylvania, South Dakota, Texas, Utah, Virginia, Washington, Wisconsin, and Wyoming. These States, according to the 2007 Census of Agriculture, represented 85.5 percent of the U.S. ewe inventory and 70.1 percent of U.S. farms with ewes. In addition, the States included 84.5 percent of the January 1, 2011, ewe inventory.

A memo identifying these 22 States was provided in July 2010 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. The 22 States were included in the study.

2. Operation selection

The list sampling frame was provided by NASS. Within each State a stratified random sample was selected. The size stratum was the number of sheep and lambs for each operation on the list sampling frame at the time of sample selection. These procedures were used to select the sample for the NASS January 2010 Sheep survey. Sampling efficiencies were gained by drawing a subsample of respondents to this survey. This procedure eliminated a large number of out-of-business and zero-inventory operations. The sample was selected from producers who reported one or more ewes on hand on January 1, 2010. The sample of sheep producers was selected in each State. Among producers reporting fewer than 20 ewes, 1,381 operations were selected for Phase Ia. For operations reporting 20 or more ewes, a total of 3,539 operations were selected for contact during Phase Ib. Therefore, a total of 4,920 operations were selected for the study.

3. Population inferences

a. Phases Ia and Ib: General Sheep Management Questionnaire

Inferences cover the population of sheep producers with at least 1 ewe on hand January 1, 2010, in the 22 participating States. As of December 31, 2007 (2007 Census of Agriculture), these States accounted for 85.5 percent of all ewes in the United States (3,005,813 head out of 3,516,409) and 70.1 percent of farms with ewes (47,855 farms out of 68,222). In addition, these States accounted for 84.5 percent of the January 1, 2011, ewe inventory in the United States or 2,750,000 head out of 3,255,000. (See Appendix II for respective data on individual States.) All respondent data were statistically weighted to reflect the population from which they were selected. The inverse of the probability of selection for each operation was the initial selection weight. This selection weight was adjusted for nonresponse within each State and size group from the NASS survey as well as adjusted for subsampling and again for nonresponse to this study. These adjustments and weighting allow for inferences back to the original population from which the sample was selected.

C. Data Collection

1. Data collectors and data collection period

a. Phases Ia and 1b: General Sheep Management Questionnaire

All data were collected from January 1 to February 11, 2011. Producers with fewer than 20 ewes were contacted via NASS telephone interviewers, who administered the questionnaire, which took an average of 30 minutes to complete. NASS enumerators administered the General Sheep Management Questionnaire to producers with 20 or more ewes via an in-person interview, which took an average of 1 hour to complete.

D. Data Analysis

1. Phase I: Validation—General Sheep Management Questionnaire

Telephone interviews were conducted via computer-assisted telephone interview software at each individual State NASS office. For the questionnaire administered in person, initial data entry and validation were also performed in the individual NASS State offices. Data were entered into a SAS data set and edited. Individual State data files were then combined and sent to NAHMS national staff, which performed additional data validation on the entire data set.

E. Sample Evaluation

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

1. Phase Ia: General Sheep Management Questionnaire—fewer than 20 ewes

A total of 1,381 operations were selected for the survey of operations with fewer than 20 ewes. Of these operations, 64.2 percent completed the questionnaire.

			Measurement parameter		
Response category	Number operations	Percent operations	Contacts	Usable[1]	Complete[2]
Refused GSM questionnaire or inaccessible	494	35.8		x	x
Complete	887	64.2			
Total	1,381	100.0		887	887
Percent of total operations				64.2	64.2
Percent of total operations weighted[3]				60.6	60.6

[1]Useable operation—respondent provided answers to inventory questions for the operation (either zero or positive number on hand).

[2]Survey complete operation—respondent provided answers to all or nearly all questions.

[3]Weighted response—the rate was calculated using the initial selection weights.

2. Phase Ib: General Sheep Management Questionnaire—20 or more ewes

A total of 3,539 operations were selected for the survey of operations with 20 or more ewes. Of these operations, 3,191 (90.2 percent) were contacted. There were 2,661 operations that provided usable inventory information (75.2 percent of the total selected and 83.4 percent of those contacted). In addition, there were 2,369 operations (66.9 percent) that provided "complete" information for the questionnaire.

			Measurement parameter		
Response category	Number operations	Percent operations	Contacts	Usable[1]	Complete[2]
Zero sheep on January 1, 2011	211	5.9	x	x	
Out of business	81	2.3	x	x	
Refused GSMQ questionnaire	530	15.0	x		
Complete VMO consent signed	1,241	35.1	x	x	x
Complete VMO consent refused	1,025	29.0	x	x	x
Complete, ineligible for VMO	103	2.9	x	x	x
Out of scope	17	0.5			
Office hold (NASS elected not to contact)	69	1.9			
Inaccessible	262	7.4			
Total	3,539	100.0	3,191	2,661	2,369
Percent of total operations			90.2	75.2	66.9
Percent of total operations weighted[3]			90.9	77.9	68.5

[1]Useable operation—respondent provided answers to inventory questions for the operation (either zero or positive number on hand).

[2]Survey complete operation—respondent provided answers to all or nearly all questions.

[3]Weighted response—the rate was calculated using the initial selection weights.

Appendix I: Sample Profile

A. Responding Operations

1. Number of responding operations, by herd size

	Phase Ia: General Sheep Management Questionnaire—fewer than 20 ewes	Phase Ib: General Sheep Management Questionnaire—20 or more ewes
Herds (number of ewes)	**Number of responding operations**	
Fewer than 20	887	
20 to 99		1,049
100 to 999		859
1,000 or more		461
Total	887	2,369

2. Number of responding operations, by region

	Phase Ia: General Sheep Management Questionnaire—fewer than 20 ewes	Phase Ib: General Sheep Management Questionnaire—20 or more ewes
Region	**Number of responding operations**	
West	175	325
Central	348	1,208
East	364	836
Total	887	2,369

Appendix II: U.S. Ewes Population and Farms

A. Number of Ewes—State, Region, and United States

Region	State	Number of Ewes*			Number of Farms*		
		Ewes on farms with 1 or more head	Ewes on farms with 20 or more head	Pct. of total	Farms with 1 or more head	Farms with 20 or more head	Pct. of total
West	CA	286,544	269,021	93.9	3,413	946	27.7
	OR	119,356	104,842	87.8	2,802	804	28.7
	WA	35,138	(D)		1,977	367	18.6
	Total	441,038	(D)		8,192	2,117	25.8
Central	CO	200,269	194,698	97.2	1,265	493	39.0
	ID	161,935	(D)		1,047	367	35.1
	KS	52,614	48,143	91.5	1,011	450	44.5
	MT	184,087	(D)		1,375	859	62.5
	NM	87,131	78,150	89.7	2,152	756	35.1
	SD	210,005	(D)		1,580	1,231	77.9
	TX	580,861	550,346	94.7	6,814	2,694	39.5
	UT	210,388	203,621	96.8	1,430	514	35.9
	WY	258,096	255,618	99.0	817	495	60.6
	Total	1,945,386	(D)		17,491	7,859	44.9
East	IA	128,518	113,364	88.2	3,168	1,606	50.7
	KY	22,225	15,880	71.5	1,171	309	26.4
	MI	48,398	38,932	80.4	1,969	582	29.6
	MN	85,049	75,343	88.6	2,225	1,038	46.7
	MO	51,328	41,933	81.7	1,911	718	37.6
	NY	42,321	35,260	83.3	1,523	497	32.6
	OH	74,331	59,700	80.3	2,929	1,103	37.7
	PA	62,828	46,728	74.4	3,067	837	27.3
	VA	48,219	38,991	80.9	1,796	691	38.5
	WI	56,172	44,057	78.4	2,413	780	32.3
	Total	619,389	510,188	82.4	22,172	8,161	36.8
Total (22 States)		3,005,813	(D)		47,855	18,137	37.9
Percent of U.S.		85.5			70.1	74.5	
Total U.S. (50 States)		3,516,409	3,193,721	90.8	68,222	24,346	35.7

*Source: NASS 2007 Census of Agriculture. D = number not published.

B. Ewes, Size Distribution—State, Region, and United States*

		Flock Size							
		1–19		20–99		100–499		500 or more	
Region	State	Farms	Head	Farms	Head	Farms	Head	Farms	Head
West	CA	2,467	17,523	737	28,185	129	24,906	80	215,930
	OR	1,998	14,514	633	24,712	133	27,549	38	52,581
	WA	1,610	(D)	347	(D)	15	(D)	5	(D)
	Total	6,075	(D)	1,717	(D)	277	(D)	123	(D)
Central	CO	772	5,571	347	14,083	88	18,594	58	162,021
	ID	680	5,029	276	10,663	50	9,498	41	136,745
	KS	561	4,471	353	14,825	76	(D)	21	(D)
	MT	516	(D)	486	(D)	277	59,288	96	(D)
	NM	1,396	8,981	674	23,660	52	(D)	30	(D)
	SD	349	(D)	724	(D)	410	81,396	97	(D)
	TX	4,120	30,515	1,762	73,910	666	13,7602	266	338,834
	UT	916	6,767	344	14,137	85	15,843	85	173,641
	WY	322	2,478	298	13,032	96	21,418	101	221,168
	Total	9,632	(D)	5,264	(D)	1,800	368,680	795	1,284,513
East	IA	1,562	15,154	1,357	55,777	236	40,053	13	17,534
	KY	862	6,345	277	9,786	30	(D)	2	(D)
	MI	1,387	9,466	504	20,852	71	12,595	7	5,485
	MN	1,187	9,706	848	33,723	177	32,280	13	9,340
	MO	1,193	9,395	626	23,980	87	14,503	5	3,450
	NY	1,026	7,061	418	16,213	74	15,064	5	3,983
	OH	1,826	14,631	995	38,956	103	17,205	5	3,539
	PA	2,230	16,100	740	28,103	90	13,962	7	4,663
	VA	1,105	9,228	607	23,140	82	(D)	2	(D)
	WI	1,633	12,115	682	26,719	97	(D)	1	(D)
	Total	14,011	109,201	7,054	277,249	1,047	(D)	60	(D)
Total (22 States)		29,718	(D)	14,035	(D)	3,124	604,820	978	1,613,763
Percent of U.S.		67.7		71.7		83.2	84.7	95.0	94.2
Total U.S. (50 States)		43,876	322,688	19,563	767,044	3,753	714,448	1,030	1,712,229

*Source: NASS 2007 Census of Agriculture.

C. U.S. Sheep and Lamb Population, January 1, 2011, Inventory

Region	State	Ewes (x1,000 head)	Rams (x1,000 head)	Replacement lambs (x1,000 head)	Total breeding sheep and lambs (x1,000 head)	All sheep and lambs (x1,000 head)
West	CA	283	12	45	340	610
	OR	118	7	23	148	215
	WA	36	3	7	46	56
	Total	437	22	75	534	881
Central	CO	142	5	28	175	370
	ID	153	6	26	185	235
	KS	33	2	8	43	70
	MT	170	7	38	215	230
	NM	77	5	15	97	110
	SD	176	7	32	215	275
	TX	525	40	125	690	880
	UT	211	9	35	255	280
	WY	220	8	47	275	365
	Total	1,707	89	354	2,150	2,815
East	IA	106	5	19	130	200
	KY	22	1.5	4.5	28	34
	MI	44	3	11	58	74
	MN	77	4	14	95	130
	MO	57	3	13	73	81
	NY	43	3	10	56	70
	OH	81	6	16	103	129
	PA	62	6	16	84	98
	VA	55	3	9	67	90
	WI	59	3	14	76	90
	Total	606	37.5	126.5	770	996
Total (22 States)		2,750	148.5	555.5	3,454	4,692
Percent of U.S.		84.5	78.2	82.9	83.9	84.8
Total U.S. (50 States)		3,255	190	670	4,115	5,530

Source: NASS Sheep and Goats report, January 28, 2011.

D. Breeding Sheep: Survey Percentage by Size Group, United States 2008–09

	1–99 head		100–499 head		500–4,999 head		5,000+ head		
	2008	**2009**	**2008**	**2009**	**2008**	**2009**	**2008**	**2009**	**Total**
Operations	92.5	93.7	6.2	5.2	1.2	1.0	0.1	0.1	100.0
Inventory	32.6	36.2	22.7	20.8	30.2	31.3	14.5	11.7	100.0

Source: NASS Farms, Land in Farms, and Livestock Operations, 2009 Summary, February 2010.

Appendix III: Study Objectives and Related Outputs

To develop the objectives for the NAHMS Sheep 2011 study, a needs assessment was conducted from December 2009 through February 2010 to determine the current issues facing the U.S. sheep industry. A total of 278 stakeholders completed the needs assessment questionnaire. In addition, an advisory group of producers, researchers, extension veterinarians, and clinicians helped develop the study objectives.

Objectives for NAHMS Sheep 2011 study

1. Describe trends in sheep health and management practices from 1996 to 2011.

- Part I: Reference of Sheep Management Practices in the United States, 2011, May 2012
- Part II: Reference of Sheep Marketing and Biosecurity Practices in the United States, 2011, expected spring 2012
- Part III: Changes in the Sheep Industry, 1996–2011, expected summer 2012
- Part IV: Reference of Sheep Health and Health Management in the United States, 2011, expected summer 2012
- Vaccination Practices on U.S. Sheep Operations, 2011, info sheet, expected summer 2012
- Sheep and Lamb Losses on U.S. Sheep Operations, 2011, info sheet, expected summer 2012
- Lambing Management on U.S. Sheep Operations, 2011, info sheet, expected summer 2012

2. Describe management and biosecurity practices used to control common infectious diseases, including scrapie, ovine progressive pneumonia, Johne's disease, and caseous lymphadenitis.

- Biosecurity Practices on U.S. Sheep Operations, 2011, info sheet, expected winter 2012
- Parasite Control on U.S. Sheep Operations, 2011, info sheet, expected winter 2012
- Producer Disease Awareness, 2011, info sheet, expected summer 2012
- Antimicrobial Drug Use on U.S. Sheep Operations, 2011, info sheet, expected summer 2012

3. Estimate the prevalence of gastrointestinal parasites and anthelmintic resistance.

- Gastrointestinal Parasites and Anthelmintic Resistance, 2011, info sheet, expected summer 2012
- Gastrointestinal Parasites and Anthelmintic Resistance on U.S. Sheep Operations, 2011, info sheet, expected summer 2012

4. Estimate the prevalence of *Mycoplasma ovipneumonia* in domestic sheep flocks. Relate presence of the organism in blood and nasal secretions to clinical signs and demographic and management factors.

- *Mycoplasma ovipneumonia* in Domestic Sheep Flocks, 2011, info sheet, expected summer 2012

5. Facilitate the collection of information and samples regarding causes of abortion storms in sheep.

- Toxoplasmosis in Lambs in U.S. Sheep Flocks, 2011, info sheet, expected summer 2012
- Q Fever in Sheep in the United States, 2011, info sheet, expected summer 2012
- *Campylobacter* on U.S. Sheep Operations, 2011, info sheet, expected summer 2012
- *Salmonella* on U.S. Sheep Operations, 2011, info sheet, expected summer 2012

6. Determine producer awareness of the zoonotic potential of contagious ecthyma (sore mouth) and the management practices used to prevent transmission of the disease.

- Sore Mouth on U.S. Sheep Operations, 2011, info sheet, expected summer 2012