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National Animal Health Monitoring System

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Sheep 2011

Part II: Reference of Marketing and Death Loss on U.S. Sheep Operations

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Items of Note

Lamb marketing

The largest marketing component of the sheep industry is the sale of lambs. Overall, the majority of sheep operations with 20 or more ewes (52.5 percent) sold their lambs at auction markets or sale barns. Large operations (500 or more ewes) are the exception. Marketing on large operations is more diverse compared with the other operation sizes. For example, a relatively equal percentage of large operations sold lambs directly to slaughter (24.4 percent), directly to feedlots (20.8 percent), at auction or sale barns (29.6 percent), or directly to buyer/dealers (29.0 percent). Marketing characteristics also varied by region. In the Central and East regions the majority of operations sold lambs at auction or sale barns (58.0 and 52.0 percent, respectively), while in the West region similar percentages of operations sold lambs directly to consumers (25.1 percent), directly to another operation (21.3 percent), at auction or sale barn (22.5 percent), and directly to buyer/dealers (23.2 percent). Not surprisingly, lamb marketing also varied by flock type. The majority of fenced-range (59.4 percent), pasture (51.3 percent), and dry lot/feedlot (51.8 percent) operations sold lambs at auctions or sale barns, while similar percentages of herded/open-range operations sold lambs directly to slaughter (22.9 percent), directly to feedlots (27.2 percent), and directly to buyer/dealers (25.3 percent).

Overall, 75.3 percent of lambs were sold in the United States during 2010. Of those, 27.3 percent were sold at auction/sale barn, 24.9 percent were sold directly to slaughter, and 17.3 percent were sold directly to buyer/dealers. For all operations, the majority of cull sheep sold (60.4 percent) were sold at auction markets or sale barns. The majority of breeding and “other” sheep (51.7 percent) were sold directly to another operation. The primary reason for culling rams and ewes was old age. The average age at which rams and ewes were culled was 4.9 and 6.3 years, respectively. Rams and ewes on large operations were slightly older when culled than those on smaller operations.

Death losses

Predator losses have a substantial economic impact on U.S. sheep operations. Overall, coyotes caused the highest percentage of predator losses (51.8 percent), but predator predominance varies by geographic location, flock size, and flock type. For example, mountain lions, cougars, or pumas were a cause of sheep loss on 26.8 percent of operations in the West region but on only 1.3 percent of operations in the East region. Dogs were a cause of sheep loss on 39.3 percent of very small operations (fewer than 20 ewes), while only 4.1 percent of large operations reported predation due to dogs.

Death-loss evaluations in 1994, 1999, 2004, and 2009 have shown lamb death loss ranged from 9.5 to 10.8 percent of lambs born. In 2010, lamb death loss for all operations was 11.2 percent of lambs born. In 1994, 1999, 2004, and 2009, sheep death loss ranged from 5.6 to 6.5 percent. In 2010, sheep death loss for all operations was 5.0 percent of adult sheep inventory on January 1, 2011.

Predator losses were highest in the Central region, where 37.9 percent of operations lost lambs and 22.5 percent lost sheep due to predation in 2010. Nonpredator losses accounted for 3.8 percent of sheep lost on 47.2 percent of all operations during 2010.

Veterinary use

Almost one-fourth of operations (23.9 percent) had a private veterinarian visit for any sheep-related reason during 2010. For operations that did not use a veterinarian during 2010, 68.9 percent indicated they had no health-related problems; 5.1 percent reported there was no veterinarian with sheep experience available; and 11.8 percent claimed veterinarian visits were too expensive.

Sheep shearing

Overall, 80.2 percent of operations with 20 or more ewes sheared lambs and sheep during 2010. A hired individual was used to shear sheep on 50.9 percent of these operations, while 29.2 percent contracted with a shearing crew, and 26.2 percent used employees or the sheep owner to shear.

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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 purpose of the USDA's National Animal Health Monitoring Service (NAHMS) program is to collect and analyze animal health data to provide scientifically sound and current information on the health status of U.S. livestock and poultry. NAHMS 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 and focused on identifying health and productivity issues affecting the U.S. sheep industry. Study results provided an overview of sheep health, productivity, and management on 5,174 U.S. sheep operations.

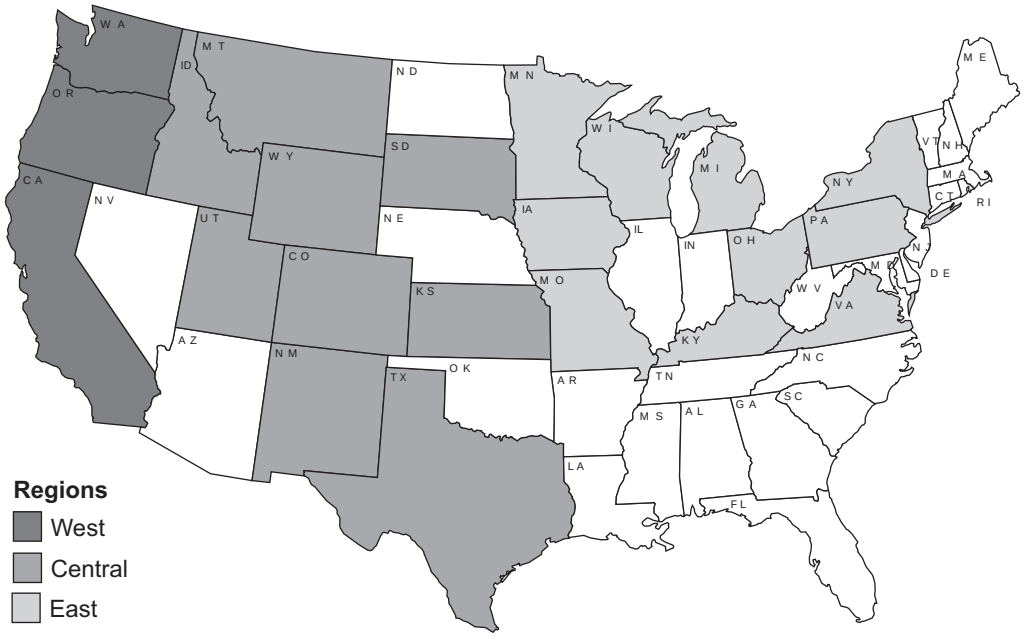
The NAHMS Sheep 2001 study was designed to provide both participants and the industry with information about the U.S. sheep flock on operations with one or more sheep. The USDA's National Agricultural Statistics Service (NASS) collaborated with VS to select a producer sample statistically designed to 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 II: Reference of Sheep Management Practices in the United States, 2011" is the second report containing national information from the NAHMS Sheep 2011 study. Data for this report were collected from two samples totaling 4,920 sheep operations. Producers on 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. Producers on 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

Backgrounder: Someone who takes animals after they are weaned and grows them in preparation for market.

Being on back: Sheep that have rolled onto their backs (sometimes referred to as "cast" sheep). These sheep often need assistance in standing or they will die. Heavily pregnant ewes are most susceptible, but other sheep types might also be vulnerable, including those with full fleeces, stocky builds, or those that have rolled over into a soft spot of ground.

Flock size: Flock sizes are based on the number of ewes for each operation on the NASS list sampling frame on January 1, 2011. Size breakouts are: very small (fewer than 20); small (20–99); medium (100–499); large (500 or more) [see Section II.B, p 141].

Flock type: The following flock types represent only flocks with 20 or more ewes. The majority of operations managed their sheep on more than one land type.

Herded/open range—any unfenced acreage, even if it was a few acres surrounded by residential areas.
Fenced range—any fenced area not specifically cultivated to raise forage or browse.
Pasture—any fenced area specifically cultivated to raise forage or browse.
Dry lot/feedlot—This study enrolled only operations with ewes. It does not include any typical sheep feedlot operations and is not meant to represent the sheep feedlot industry. Rather, the dry lot/feedlot category represents operations that fed ewes in dry lots or in "feedlot situations." In many ways, these operations managed, fed, and marketed their sheep and lambs similarly to the other flock types. Over two-thirds of these operations also kept their sheep on fenced range or pasture.

Greasy basis: Wool as it has been shorn from the sheep and therefore not yet washed or cleaned. It contains lanolin, a thick, yellow, greasy substance in wool, secreted by the sheep's skin.

Lamb: Sheep less than 1 year old.

Operation average: A single value for each operation is summed over all operations reporting and divided by number of operations reporting.

PIGA: Public, industrial, and grazing association land.

Population estimates: Estimates in this report are provided with a measure of precision called the standard error. A 95-percent confidence interval can be created with bounds equal to the estimate, plus or minus two standard errors. If the only error is sampling error, the confidence intervals created in this manner will contain the true population mean 95 out of 100 times. An estimate of 7.5 with a standard error of 1.0 results in limits of 5.5 to 9.5 (two times the standard error above and below the estimate). Alternatively,

the 90-percent confidence interval would be created by multiplying the standard error by 1.65 instead of 2. Most estimates in this report are rounded to the nearest tenth. If rounded to 0, the standard error was reported (0.0). If there were no reports of the event, no standard error was reported (—).

Regions:

West: California, 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

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

A. Marketing

Most sheep operations derive the majority of their income through the sale of lambs or lamb meat. Sheep products are marketed directly to consumers (e.g., at farmers' markets) and through more common channels such as auctions, broker/buyers, wholesalers, feedlots, etc. This section refers to animals that were sold or otherwise permanently removed from the operation (while alive) and marketed through these various channels. Animals that were slaughtered for home consumption are also included. Note that animals sold and slaughtered on the operation by the buyer or the producer might have been included in the "sold directly to consumer or ethnic market" category of this report. This category captures on-farm sales and meat sold at farmers' markets. It is estimated that approximately one-third of the U.S. lamb crop is sold in these nontraditional markets.[1]

To keep U.S. lamb meat in the Nation's large grocery store chains, traditional markets must be adequately supplied. Over the last few decades, the sheep and lamb inventory in the United States has declined for a variety of reasons, and there is concern across the U.S. sheep industry that there is not enough supply to meet demand. As a result, the American Sheep Industry Association is now encouraging producers to grow their flocks through a new program called "Let's Grow with twoPLUS".[2] The program's objective is to increase sheep numbers, thereby ensuring that there is enough lamb meat and wool to sustain the industry.

[1] Shiflett J. 2010. Nontraditional marketing in the United States: characteristics and marketing strategies, Juniper Economic Consulting, Inc.
[2] http://www.sheepusa.org/Rebuild_the_U.S._Sheep_Industry

1. Operations that sold or moved lambs or sheep

Overall, 84.6 percent of all sheep operations sold, moved, or permanently removed lambs or sheep during 2010. The percentage of operations that sold lambs was lower for very small operations (67.4 percent) compared with small (94.2 percent), medium (97.8 percent), and large (99.6 percent) operations. The very small operations accounted for the reduced percentage of lambs sold by all operations with one or more ewes (82.4 percent) compared with operations with 20 or more ewes (95.3 percent). This same trend extends to the cull sheep and breeding or other sheep categories.

A.1.a. Percentage of operations that sold, moved, or permanently removed any sheep or lambs during 2010, by sheep type 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**	
Sheep type	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Lambs	67.4	(1.8)	94.2	(0.7)	97.8	(0.5)	99.6	(0.2)	82.4	(0.9)	95.3	(0.5)
Cull sheep	24.8	(1.6)	62.8	(1.5)	80.7	(1.4)	87.3	(1.2)	48.2	(0.9)	68.0	(1.1)
Breeding or other sheep	13.0	(1.2)	25.2	(1.3)	23.9	(1.5)	26.5	(1.6)	19.5	(0.8)	25.0	(1.0)
Any	71.3	(1.7)	94.9	(0.7)	98.2	(0.5)	98.0	(0.5)	84.6	(0.8)	95.8	(0.5)

A lower percentage of operations in the West region (79.1 percent) sold, moved, or permanently removed any sheep or lambs in 2010 compared with operations in East region (86.7 percent). This regional difference was also seen for cull sheep.

A.1.b. Percentage of operations that sold, moved, or permanently removed any sheep or lambs during 2010, by sheep type and by region:

	Percent Operations (1 or more ewes)					
	Region					
	West		**Central**		**East**	
Sheep type	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Lambs	77.5	(2.0)	83.1	(1.4)	83.8	(1.3)
Cull sheep	37.6	(2.1)	46.7	(1.4)	53.1	(1.5)
Breeding or other sheep	17.9	(1.8)	20.0	(1.3)	19.7	(1.2)
Any	79.1	(2.0)	84.4	(1.4)	86.7	(1.2)

Over three-fourths of dry lot/feedlot operations culled sheep. While dry lot/feedlot management was their primary flock type, two-thirds of these operations also managed their sheep on fenced range or pasture. All of these operations also had ewes and, therefore, do not represent the sheep feedlot industry. A lower percentage of herded/ open range operations (84.0 percent) sold, moved, or permanently removed any sheep compared with fenced range and pasture operations (96.4 and 96.5 percent, respectively).

A.1.c. Percentage of operations that sold, moved, or permanently removed any sheep or lambs during 2010, by sheep type and by flock type:

Percent Operations (20 or more ewes)

	Flock Type							
	Herded/ open range		Fenced range		Pasture		Dry lot/feedlot	
Sheep type	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Lambs	83.8	(5.4)	95.1	(1.0)	95.6	(0.7)	97.8	(0.5)
Cull sheep	71.6	(5.6)	63.0	(2.2)	68.7	(1.5)	78.0	(3.7)
Breeding or other sheep	20.6	(3.6)	21.5	(1.8)	26.3	(1.4)	27.8	(3.8)
Any	84.0	(5.3)	96.4	(0.9)	96.5	(0.6)	92.1	(2.7)

Collectively, 75.3 percent of lambs were moved, sold, or permanently removed during 2010. A higher percentage of lambs were moved from large operations (78.2 percent) compared with very small operations (66.0 percent). Only 11.5 percent of sheep were culled, and 6.5 percent of sheep were sold for breeding or other reasons during 2010.

A.1.d. Percentage of sheep and/or lambs sold, moved, or permanently removed during 2010, by sheep type 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**	
Sheep type	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Lambs	66.0	(1.9)	72.4	(1.5)	75.7	(1.3)	78.2	(3.3)	75.3	(1.5)	76.0	(1.6)
Cull sheep	9.3	(1.7)	11.0	(0.5)	17.2	(4.3)	9.4	(0.4)	11.5	(1.1)	11.7	(1.1)
Breeding or other sheep	6.0	(1.1)	7.3	(1.0)	8.2	(2.2)	5.5	(0.6)	6.5	(0.6)	6.6	(0.7)
Any	42.8	(2.0)	49.8	(1.0)	53.8	(1.2)	50.3	(1.5)	50.5	(0.8)	51.1	(0.9)

*Percentage of sheep inventory on January 1, 2011, and/or lambs born during 2010.

A.1.e. Percentage of sheep and/or lambs sold, moved, or permanently removed during 2010, by sheep type and by region:

	Percent Sheep and Lambs* (1 or more ewes)					
	Region					
	West		**Central**		**East**	
Sheep type	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Lambs	80.0	(2.7)	74.6	(2.6)	74.2	(1.3)
Cull sheep	9.2	(0.5)	11.9	(1.7)	12.1	(0.6)
Breeding or other sheep	5.0	(1.3)	7.2	(1.0)	5.7	(0.5)
Any	48.7	(1.7)	50.2	(1.3)	52.4	(0.8)

*Percentage of sheep inventory on January 1, 2011, and/or lambs born during 2010.

A.1.f. Percentage of sheep and/or lambs sold, moved, or permanently removed during 2010, by sheep type and by flock type:

	Percent Sheep and Lambs* (20 or more ewes)							
	Flock Type							
	Herded/ open range		**Fenced range**		**Pasture**		**Dry lot/feedlot**	
Sheep type	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Lambs	71.7	(1.9)	79.3	(4.9)	76.1	(1.3)	67.2	(9.3)
Cull sheep	13.3	(4.3)	10.5	(0.5)	11.3	(0.4)	14.3	(1.3)
Breeding or other sheep	6.9	(2.2)	5.9	(0.7)	6.9	(0.8)	6.9	(1.5)
Any	49.2	(1.6)	51.2	(2.1)	52.1	(0.9)	35.3	(6.5)

*Percentage of sheep inventory on January 1, 2011, and/or lambs born during 2010.

2. Lambs sold or moved directly to feedlot

Of operations that sold, moved, or permanently removed lambs during 2010, only 20.1 percent moved lambs directly to a feedlot separate from their operation. A higher percentage of large operations (37.0 percent) moved lambs directly to feedlots compared with small and medium operations (18.4 and 21.3 percent, respectively).

Overall, 33.7 percent of the lambs sold, moved, or permanently removed were sent directly to a feedlot separate from the operation. A higher percentage of lambs were sent directly to feedlots separate from the operation on medium (21.5 percent) and large (49.5 percent) operations compared with small operations (16.0 percent).

A.2.a. Of operations that sold, moved, or permanently removed lambs during 2010, percentage that moved lambs directly to a feedlot separate from the operation and percentage of lambs sold, moved, or permanently removed, by flock size:

Percent

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**	
Measure	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Operations			18.4	(1.2)	21.3	(1.3)	37.0	(1.8)			20.1	(0.9)
Lambs			16.0	(1.4)	21.5	(1.7)	49.5	(3.1)			33.7	(1.8)

A higher percentage of operations in the Central region (24.8 percent) moved lambs directly to a feedlot separate from their operation compared with operations in the East region (15.9 percent). Operations in the West and Central regions sent a higher percentage of lambs (35.3 and 43.2 percent, respectively) directly to a feedlot compared with operations in the East region (12.8 percent).

A.2.b. Of operations that sold, moved, or permanently removed lambs during 2010, percentage that moved lambs directly to a feedlot separate from the operation and percentage of lambs sold, moved, or permanently removed, by region:

Percent (20 or more ewes)

	Region					
	West		Central		East	
Measure	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Operations	20.7	(2.6)	24.8	(1.4)	15.9	(1.4)
Lambs	35.3	(3.6)	43.2	(2.6)	12.8	(1.3)

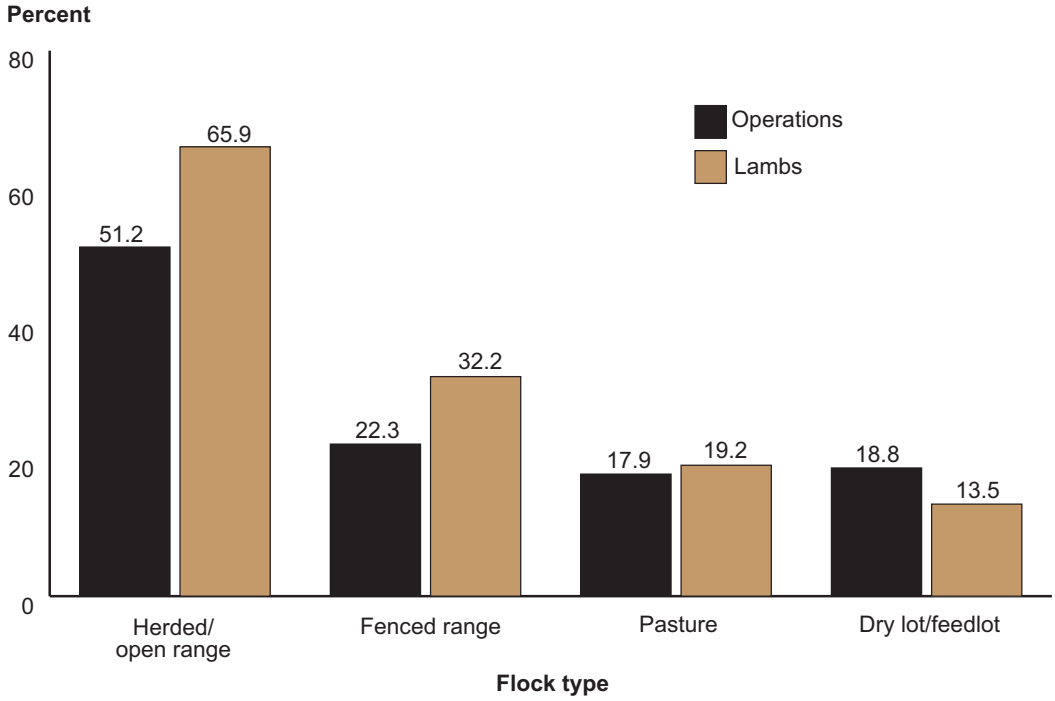
A higher percentage of herded/open range operations (51.2 percent) sold lambs directly to a feedlot compared with fenced range (22.3 percent), pasture (17.9 percent), and dry lot/feedlot (18.8 percent) operations. Herded/open range operations moved 65.9 percent of their lambs directly to a feedlot separate from their operation. A much higher percentage of lambs were moved from herded/open range operations (65.9 percent) than from fenced range (32.2 percent), pasture (19.2 percent), and dry lot/feedlot operations (13.5 percent).

A.2.c. Of operations that sold, moved, or permanently removed lambs during 2010, percentage that moved lambs directly to a feedlot separate from the operation and percentage of lambs sold, moved, or permanently removed, by flock type:

Percent (20 or more ewes)

	Flock Type							
	Herded/ open range		Fenced range		Pasture		Dry lot/feedlot	
Measure	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Operations	51.2	(5.1)	22.3	(1.8)	17.9	(1.2)	18.8	(3.7)
Lambs	65.9	(4.5)	32.2	(4.1)	19.2	(1.3)	13.5	(3.3)

Of operations with 20 or more ewes that sold, moved, or permanently removed lambs during 2010, percentage that moved lambs directly to a feedlot separate from the operation and percentage of lambs sold, moved, or permanently removed, by flock type



3. Lamb ownership

Of the 95.3 percent of operations with 20 or more ewes that sold, moved, or permanently removed lambs (table A.1.a), 94.6 percent retained no ownership of the lambs. Another 5.0 percent retained complete ownership of the lambs, and just 0.4 percent retained partial ownership.

A higher percentage of large operations (10.3 percent) retained complete ownership of lambs compared with medium and small operations (6.2 and 4.2 percent, respectively), which is comparable to a lower percentage of large operations (88.6 percent) retaining no ownership of lambs compared with small operations (95.4 percent). There were no differences in lamb ownership by region or flock type.

A.3. For operations that sold or moved lambs during 2010, percentage of operations by ownership of the majority of lambs sold or moved, 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**	
Lamb ownership	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Retained complete ownership			4.2	(0.7)	6.2	(0.9)	10.3	(1.2)			5.0	(0.5)
Retained partial ownership			0.4	(0.2)	0.1	(0.1)	1.1	(0.4)			0.4	(0.2)
Retained no ownership			95.4	(0.7)	93.7	(0.9)	88.6	(1.2)			94.6	(0.5)
Total			100.0		100.0		100.0				100.0	

4. Marketing channels for lambs

Of operations that sold or permanently removed lambs in 2010, the highest percentage of all operations (1 or more ewes) and operations with 20 or more ewes sold lambs at an auction market or sale barn (49.0 and 52.5 percent respectively). Only 29.6 percent of large operations, however, sold lambs through an auction market or sale barn.

A higher percentage of large operations (29.0 percent) sold lambs directly to buyer/dealers compared with very small (12.5 percent), small (14.9 percent), and medium (19.9 percent) operations. Only 4.2 percent of large operations slaughtered lambs for personal use/euthanized compared with 11.6, 9.6, and 7.8 percent of very small, small, or medium operations, respectively. A higher percentage of very small and small operations (15.0 and 11.8 percent, respectively) sold directly to another operation compared with large operations (5.5 percent).

A.4.a. For operations that sold or permanently removed lambs in 2010, percentage of operations by marketing channel 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**	
Marketing channel	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Sold directly to slaughter	14.6	(1.6)	17.1	(1.2)	23.7	(1.4)	24.4	(1.6)	17.3	(0.8)	19.0	(0.9)
Sold directly to feedlot	3.5	(0.7)	4.2	(0.6)	6.4	(0.7)	20.8	(1.4)	4.8	(0.4)	5.6	(0.5)
Sold directly to backgrounder	1.2	(0.5)	1.9	(0.4)	2.2	(0.4)	4.8	(0.6)	1.8	(0.3)	2.2	(0.3)
Sold directly to consumer or ethnic market	18.0	(1.8)	19.7	(1.2)	12.1	(1.1)	4.5	(0.8)	17.5	(0.9)	17.2	(0.9)
Sold directly to another operation	15.0	(1.6)	11.8	(1.0)	8.1	(1.0)	5.5	(0.8)	12.3	(0.8)	10.7	(0.8)
Sold at auction market/sale barn	43.2	(2.2)	54.6	(1.5)	51.8	(1.5)	29.6	(1.6)	49.0	(1.1)	52.5	(1.1)
Sold directly to buyer/dealer	12.5	(1.4)	14.9	(1.1)	19.9	(1.3)	29.0	(1.7)	15.2	(0.8)	16.8	(0.9)
Slaughtered for personal use/ euthanized	11.6	(1.4)	9.6	(1.0)	7.8	(1.0)	4.2	(0.8)	9.9	(0.7)	8.9	(0.7)
Other	6.7	(1.1)	8.5	(0.9)	5.4	(0.9)	3.7	(0.7)	7.2	(0.6)	7.5	(0.6)

Of operations in the Central and East regions that sold or permanently removed lambs in 2010, the highest percentage marketed lambs at an auction market/sale barn (58.0 and 52.0 percent, respectively). In the West region, similar percentages of operations sold their lambs directly to the consumer or ethnic market (25.1 percent), directly to another operation (21.3 percent), at an auction market or sale barn (22.5 percent), or directly to a buyer or dealer (23.2 percent).

A.4.b. For operations that sold or permanently removed lambs in 2010, percentage of operations by marketing channel used and by region:

Percent Operations (1 or more ewes)

	Region					
	West		Central		East	
Marketing channel	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Sold directly to slaughter	15.6	(1.9)	11.2	(1.0)	22.1	(1.4)
Sold directly to feedlot	3.7	(0.9)	6.4	(0.6)	4.2	(0.6)
Sold directly to backgrounder	4.0	(0.9)	1.8	(0.4)	1.0	(0.4)
Sold directly to consumer or ethnic market	25.1	(2.4)	11.0	(1.2)	19.2	(1.4)
Sold directly to another operation	21.3	(2.3)	9.6	(1.1)	11.0	(1.1)
Sold at auction market/sale barn	22.5	(2.4)	58.0	(1.6)	52.0	(1.7)
Sold directly to buyer/dealer	23.2	(2.3)	15.2	(1.1)	12.4	(1.1)
Slaughtered for personal use/euthanized	18.3	(2.2)	7.6	(1.0)	8.6	(1.0)
Other	5.9	(1.3)	7.1	(0.8)	7.8	(0.9)

The highest percentage of fenced range, pasture, and dry lot/feedlot operations that sold or permanently removed lambs in 2010 sold their lambs at an auction market/sale barn (59.4, 51.3, and 51.8 percent, respectively). Similar percentages of herded/open range operations sold their lambs directly to slaughter (22.9 percent), a buyer/dealer (25.3 percent), or to a feedlot (27.2 percent).

A.4.c. For operations that sold or permanently removed lambs in 2010, percentage of operations by marketing channel used and by flock type:

Percent Operations (20 or more ewes)

	Flock Type							
	Herded/ open range		**Fenced range**		**Pasture**		**Dry lot/feedlot**	
Marketing channel	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Sold directly to slaughter	22.9	(4.0)	11.9	(1.4)	21.0	(1.3)	25.6	(3.9)
Sold directly to feedlot	27.2	(3.9)	5.8	(0.8)	4.9	(0.6)	3.5	(1.8)
Sold directly to backgrounder	8.2	(2.0)	1.5	(0.5)	2.3	(0.4)	1.8	(1.3)
Sold directly to consumer or ethnic market	3.8	(2.1)	11.0	(1.5)	19.9	(1.3)	21.8	(4.0)
Sold directly to another operation	3.1	(0.8)	7.7	(1.3)	12.2	(1.1)	11.0	(3.0)
Sold at auction market/sale barn	14.7	(4.3)	59.4	(2.1)	51.3	(1.5)	51.8	(4.5)
Sold directly to buyer/dealer	25.3	(4.1)	17.0	(1.6)	16.7	(1.2)	13.3	(2.8)
Slaughtered for personal use/ euthanized	9.3	(3.0)	6.4	(1.2)	9.4	(1.0)	13.6	(3.2)
Other	2.2	(0.7)	5.4	(1.1)	8.2	(0.9)	10.6	(3.0)

Of lambs sold or permanently removed in 2010 on all operations (1 or more ewes), 24.9 percent were sold directly to slaughter and 27.3 percent were sold at an auction market/sale barn. These two marketing channels were also used to sell 25.5 and 26.5 percent of lambs sold on operations with 20 or more ewes. More than half of lambs sold by large operations were sold either directly to slaughter (28.1 percent of lambs) or directly to a feedlot (26.0 percent of lambs). Almost two-thirds of lambs sold from medium operations were sold directly to slaughter (30.2 percent) or at the auction market/sale barn (34.3 percent).

A.4.d. For lambs sold or permanently removed in 2010, percentage of lambs by marketing channel used 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**	
Marketing channel	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Sold directly to slaughter	13.9	(2.4)	15.1	(1.5)	30.2	(2.5)	28.1	(3.3)	24.9	(1.7)	25.5	(1.8)
Sold directly to feedlot	4.1	(1.1)	3.3	(0.6)	6.2	(0.8)	26.0	(2.9)	14.5	(1.4)	15.1	(1.4)
Sold directly to backgrounder	1.3	(0.6)	1.4	(0.4)	2.4	(0.5)	6.0	(1.2)	3.8	(0.6)	3.9	(0.6)
Sold directly to consumer or ethnic market	14.1	(2.4)	8.3	(0.8)	5.8	(0.8)	0.7	(0.2)	4.5	(0.3)	3.9	(0.3)
Sold directly to another operation	10.4	(2.0)	5.6	(0.7)	3.6	(0.6)	2.1	(0.5)	3.7	(0.3)	3.4	(0.3)
Sold at auction market/sale barn	41.4	(2.8)	48.4	(2.0)	34.3	(1.8)	11.3	(1.6)	27.3	(1.1)	26.5	(1.2)
Sold directly to buyer/dealer	9.6	(1.4)	12.4	(1.2)	15.3	(1.3)	21.7	(2.1)	17.3	(1.0)	17.7	(1.1)
Slaughtered for personal use/ euthanized	2.1	(0.4)	0.8	(0.2)	0.3	(0.1)	0.2	(0.1)	0.4	(0.1)	0.4	(0.1)
Other	3.0	(1.1)	4.7	(0.7)	2.0	(0.4)	3.8	(1.2)	3.5	(0.6)	3.5	(0.6)
Total	100.0		100.0		100.0		100.0		100.0		100.0	

Of lambs sold or permanently removed in 2010, a lower percentage in the East region (3.4 percent) were sold directly to feedlots compared with operations in the Central and West regions (19.3 and 17.9 percent, respectively). The highest percentages of lambs in the East region were sold at auction markets/sale barns (37.4 percent) and directly to slaughter (31.1 percent). The highest percentages of lambs sold in the West region were sold directly to slaughter (30.9 percent), directly to buyers/dealers (21.8 percent), and directly to feedlots (17.9 percent).

A.4.e. For lambs sold or permanently removed in 2010, percentage of lambs by marketing channel used and by region:

	Percent Lambs (1 or more ewes)					
	Region					
	West		**Central**		**East**	
Marketing channel	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Sold directly to slaughter	30.9	(3.4)	20.1	(2.8)	31.1	(2.2)
Sold directly to feedlot	17.9	(3.4)	19.3	(2.2)	3.4	(0.6)
Sold directly to backgrounder	8.5	(1.8)	4.1	(0.9)	0.5	(0.2)
Sold directly to consumer or ethnic market	6.3	(0.8)	2.0	(0.4)	8.3	(0.8)
Sold directly to another operation	6.0	(0.9)	2.8	(0.4)	4.2	(0.6)
Sold at auction market/sale barn	5.9	(1.2)	28.1	(1.7)	37.4	(1.8)
Sold directly to buyer/dealer	21.8	(3.2)	19.4	(1.5)	10.8	(1.1)
Slaughtered for personal use/ euthanized	0.7	(0.2)	0.4	(0.1)	0.4	(0.1)
Other	1.9	(0.5)	3.8	(1.0)	3.8	(0.7)
Total	100.0		100.0		100.0	

Of lambs sold or permanently removed from herded/open-range operations in 2010, the highest percentage (38.1 percent) were sold directly to a feedlot. Nearly half the lambs sold on dry lot/feedlot operations (49.2 percent) were sold directly to slaughter, possibly because a higher percentage of these operations also fed a high-energy diet. Just 1.1 percent of lambs from these operations were sold directly to a feedlot for finishing.

A.4.f. For lambs sold or permanently removed in 2010, percentage of lambs by marketing channel used and by flock type:

Percent Lambs (20 or more ewes)

	Flock Type							
	Herded/ open range		Fenced range		Pasture		Dry lot/feedlot	
Marketing channel	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Sold directly to slaughter	24.3	(3.6)	20.1	(4.7)	26.4	(1.6)	49.2	(7.4)
Sold directly to feedlot	38.1	(5.0)	11.7	(1.5)	6.4	(0.9)	1.1	(0.6)
Sold directly to backgrounder	8.2	(2.2)	2.4	(0.6)	2.9	(0.5)	2.2	(1.0)
Sold directly to consumer or ethnic market	0.5	(0.3)	3.6	(0.7)	6.4	(0.6)	3.4	(1.0)
Sold directly to another operation	1.5	(0.7)	3.3	(0.6)	4.7	(0.5)	2.3	(0.9)
Sold at auction market/sale barn	4.9	(2.8)	33.5	(2.4)	33.4	(1.6)	29.5	(5.4)
Sold directly to buyer/dealer	16.6	(2.7)	22.5	(2.1)	16.1	(1.4)	9.9	(2.6)
Slaughtered for personal use/ euthanized	0.4	(0.1)	0.3	(0.1)	0.4	(0.1)	0.3	(0.1)
Other	5.4	(2.4)	2.7	(0.5)	3.3	(0.5)	2.1	(0.8)
Total	100.0		100.0		100.0		100.0	

5. Marketing channels for breeding and other sheep

The highest percentage of operations with one or more ewes sold breeding and other sheep directly to another operation (43.4 percent of operations).

A.5.a. For operations that sold or permanently removed breeding and other sheep in 2010, percentage of operations by marketing channel 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**	
Marketing channel	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Sold directly to slaughter	5.5	(2.4)	4.6	(1.3)	3.7	(1.2)	6.4	(2.0)	4.8	(1.0)	4.5	(1.0)
Sold directly to feedlot	0.0	(0.0)	0.9	(0.6)	0.5	(0.4)	0.0	(0.0)	0.5	(0.3)	0.7	(0.4)
Sold directly to backgrounder	0.0	(0.0)	0.5	(0.4)	0.0	(0.0)	0.9	(0.7)	0.3	(0.2)	0.4	(0.3)
Sold directly to consumer or ethnic market	11.5	(3.5)	8.2	(1.7)	2.8	(1.0)	2.1	(0.8)	8.2	(1.4)	6.7	(1.3)
Sold directly to another operation	28.2	(4.7)	49.5	(3.1)	53.7	(3.5)	45.8	(3.8)	43.4	(2.2)	50.1	(2.4)
Sold at auction market/sale barn	33.1	(4.6)	20.9	(2.4)	27.5	(3.3)	31.5	(3.3)	26.0	(1.9)	22.8	(1.9)
Sold directly to buyer/dealer	12.7	(3.3)	12.7	(2.1)	12.4	(2.4)	16.6	(2.9)	12.8	(1.5)	12.9	(1.6)
Slaughtered for personal use/ euthanized	7.7	(2.7)	4.1	(1.2)	0.9	(0.6)	3.8	(1.6)	4.7	(1.1)	3.4	(0.9)
Other	4.8	(2.5)	4.2	(1.2)	2.7	(1.0)	2.6	(0.8)	4.1	(1.0)	3.8	(0.9)

A higher percentage of operations in the West region (20.1 percent) sold their breeding and other sheep directly to a buyer/dealer compared with operations in the Central and East regions (10.5 and 12.0 percent, respectively).

A.5.b. For operations that sold or permanently removed breeding and other sheep in 2010, percentage of operations by marketing channel used and by region:

	Percent Operations (1 or more ewes)					
	Region					
	West		**Central**		**East**	
Marketing channel	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Sold directly to slaughter	2.9	(2.0)	3.0	(1.2)	6.7	(1.7)
Sold directly to feedlot	0.0	(0.0)	0.0	(0.0)	1.0	(0.6)
Sold directly to backgrounder	1.4	(1.4)	0.1	(0.1)	0.0	(0.0)
Sold directly to consumer or ethnic market	11.1	(3.7)	10.2	(2.4)	5.8	(1.9)
Sold directly to another operation	40.0	(5.6)	35.7	(3.3)	50.0	(3.4)
Sold at auction market/sale barn	16.7	(4.3)	37.9	(3.3)	20.8	(2.7)
Sold directly to buyer/dealer	20.1	(4.7)	10.5	(1.8)	12.0	(2.3)
Slaughtered for personal use/euthanized	8.9	(3.4)	2.7	(0.9)	4.7	(1.7)
Other	4.8	(2.6)	5.7	(1.9)	2.7	(1.2)

A.5.c. For operations that sold or permanently removed breeding and other sheep in 2010, percentage of operations by marketing channel used and by flock type:

Percent Operations (20 or more ewes)

	Flock Type							
	Herded/ open range		Fenced range		Pasture		Dry lot/feedlot	
Marketing channel	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Sold directly to slaughter	2.9	(1.4)	4.8	(2.2)	4.0	(1.2)	6.0	(3.7)
Sold directly to feedlot	0.0	(0.0)	0.0	(0.0)	1.0	(0.7)	0.0	(0.0)
Sold directly to backgrounder	0.0	(0.0)	0.2	(0.2)	0.5	(0.5)	0.0	(0.0)
Sold directly to consumer or ethnic market	3.5	(1.9)	5.6	(2.3)	6.8	(1.6)	11.5	(5.1)
Sold directly to another operation	60.9	(8.6)	39.4	(4.7)	52.9	(3.1)	58.7	(7.9)
Sold at auction market/sale barn	22.4	(7.3)	37.8	(4.5)	18.5	(2.3)	15.9	(5.5)
Sold directly to buyer/dealer	8.9	(3.8)	15.2	(3.5)	12.5	(2.0)	11.8	(5.5)
Slaughtered for personal use/ euthanized	4.0	(2.2)	1.0	(0.8)	4.0	(1.3)	1.9	(1.8)
Other	1.3	(0.8)	3.6	(1.4)	3.8	(1.2)	5.1	(3.9)

Over half of all breeding and other sheep sold or permanently removed from operations with 1 or more ewes (51.7 percent) were sold directly to another operation.

A.5.d. For breeding and other sheep sold or permanently removed in 2010, percentage of sheep by marketing channel used and by flock size:

Percent Breeding and Other Sheep

Flock Size (number of ewes)

Marketing channel	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
Sold directly to slaughter	5.3	(3.0)	4.0	(1.5)	1.2	(0.6)	2.9	(1.2)	2.8	(0.7)	2.6	(0.7)
Sold directly to feedlot	0.0	(0.0)	0.5	(0.4)	0.0	(0.0)	0.0	(0.0)	0.1	(0.1)	0.1	(0.1)
Sold directly to backgrounder	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	0.3	(0.2)	0.1	(0.1)	0.1	(0.1)
Sold directly to consumer or ethnic market	14.2	(6.4)	18.0	(9.4)	0.8	(0.5)	0.0	(0.0)	5.3	(2.6)	4.7	(2.8)
Sold directly to another operation	38.6	(9.6)	42.6	(6.4)	67.8	(9.4)	47.4	(6.3)	51.7	(5.0)	52.5	(5.3)
Sold at auction market/sale barn	26.1	(6.1)	20.1	(4.6)	17.1	(5.8)	38.1	(6.3)	27.1	(3.8)	27.2	(4.0)
Sold directly to buyer/dealer	11.7	(4.5)	9.2	(2.4)	11.8	(4.2)	9.6	(2.5)	10.3	(1.7)	10.2	(1.7)
Slaughtered for personal use/ euthanized	1.7	(0.7)	1.7	(0.8)	0.0	(0.0)	0.1	(0.0)	0.6	(0.2)	0.5	(0.2)
Other	2.5	(1.6)	3.9	(1.6)	1.2	(0.7)	1.7	(0.7)	2.1	(0.6)	2.1	(0.6)
Total	100.0		100.0		100.0		100.0		100.0		100.0	

A.5.e. Of breeding and other sheep sold or permanently removed in 2010, percentage sold or removed using the following marketing channels, by region:

Percent Breeding and Other Sheep (1 or more ewes)

	Region					
	West		Central		East	
Marketing channel	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Sold directly to slaughter	1.7	(1.6)	2.1	(0.8)	5.8	(1.7)
Sold directly to feedlot	0.0	(0.0)	0.0	(0.0)	0.6	(0.4)
Sold directly to backgrounder	0.1	(0.1)	0.2	(0.1)	0.0	(0.0)
Sold directly to consumer or ethnic market	25.0	(17.0)	2.0	(0.7)	4.8	(2.0)
Sold directly to another operation	53.9	(13.5)	49.3	(7.1)	58.2	(4.7)
Sold at auction market/sale barn	8.5	(3.5)	33.5	(5.7)	16.7	(4.1)
Sold directly to buyer/dealer	9.0	(3.9)	10.0	(2.2)	11.8	(2.9)
Slaughtered for personal use/euthanized	1.4	(0.9)	0.3	(0.2)	0.8	(0.4)
Other	0.5	(0.3)	2.7	(0.8)	1.2	(0.5)
Total	100.0		100.0		100.0	

6. Marketing channels for cull sheep

For operations that sold or permanently removed cull sheep in 2010, 60.4 percent of all operations (one or more ewes) sold the cull sheep at an auction market/sale barn and 16.5 percent sold them directly to slaughter. A higher percentage of very small operations (12.4 percent) marketed cull sheep directly to the consumer or ethnic market compared with medium and large operations (3.4 and 2.8 percent, respectively).

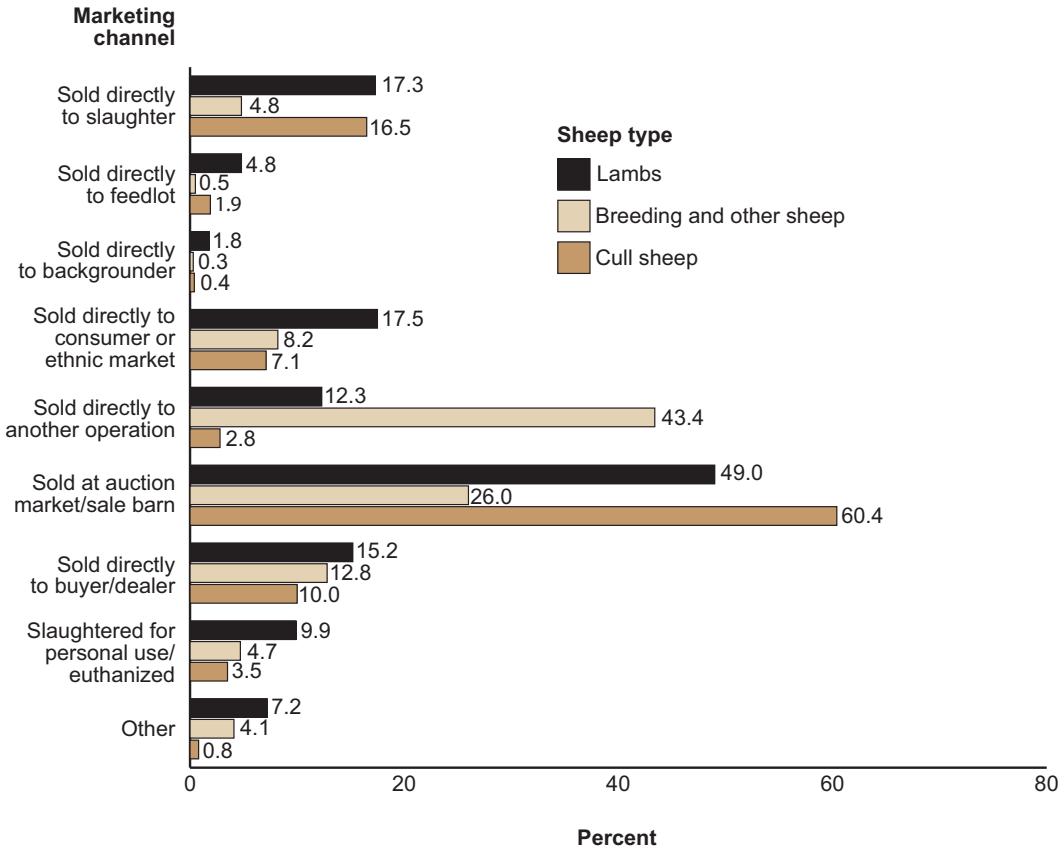
A.6.a. For operations that sold or permanently removed cull sheep in 2010, percentage of operations by marketing channel used and by flock size:

Percent Operations

Flock Size (number of ewes)

Marketing channel	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
Sold directly to slaughter	18.5	(2.9)	16.2	(1.4)	15.6	(1.3)	13.8	(1.3)	16.5	(1.0)	15.9	(1.0)
Sold directly to feedlot	2.3	(1.0)	1.5	(0.5)	1.6	(0.4)	4.4	(0.8)	1.9	(0.3)	1.7	(0.3)
Sold directly to backgrounder	0.6	(0.5)	0.2	(0.2)	0.7	(0.2)	0.9	(0.4)	0.4	(0.2)	0.4	(0.1)
Sold directly to consumer or ethnic market	12.4	(2.6)	6.6	(1.0)	3.4	(0.7)	2.8	(0.6)	7.1	(0.8)	5.5	(0.7)
Sold directly to another operation	4.1	(1.3)	2.4	(0.6)	1.7	(0.5)	4.4	(0.7)	2.8	(0.5)	2.4	(0.4)
Sold at auction market/sale barn	50.6	(3.7)	63.9	(1.8)	65.3	(1.7)	51.8	(1.8)	60.4	(1.3)	63.4	(1.3)
Sold directly to buyer/dealer	5.9	(1.7)	9.6	(1.1)	11.8	(1.2)	25.0	(1.6)	10.0	(0.7)	11.3	(0.8)
Slaughtered for personal use/ euthanized	6.9	(2.0)	2.6	(0.6)	2.4	(0.7)	1.5	(0.4)	3.5	(0.6)	2.5	(0.5)
Other	1.1	(0.7)	0.7	(0.4)	0.7	(0.3)	0.7	(0.3)	0.8	(0.3)	0.7	(0.3)

For all operations (1 or more ewes) that sold or permanently removed sheep or lambs in 2010, percentage of operations by marketing channel used and by sheep type



Across regions, the single highest percentage of operations sold their cull sheep at an auction market or sale barn. A higher percentage of operations in the West region sold their cull sheep directly to a buyer/dealer or to consumer or ethnic markets compared with operations in the Central and East regions.

A.6.b. For operations that sold or permanently removed cull sheep in 2010, percentage of operations by marketing channel used and by region:

	Percent Operations (1 or more ewes)					
	Region					
	West		**Central**		**East**	
Marketing channel	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Sold directly to slaughter	14.9	(2.6)	9.5	(1.1)	21.1	(1.7)
Sold directly to feedlot	3.6	(1.5)	2.4	(0.5)	1.1	(0.4)
Sold directly to backgrounder	1.6	(0.7)	0.1	(0.1)	0.2	(0.2)
Sold directly to consumer or ethnic market	14.2	(2.7)	5.6	(1.2)	6.2	(1.1)
Sold directly to another operation	4.5	(1.6)	3.1	(0.7)	2.1	(0.6)
Sold at auction market/sale barn	38.1	(3.7)	69.2	(1.8)	60.9	(2.0)
Sold directly to buyer/dealer	19.5	(2.9)	10.2	(0.9)	7.4	(1.0)
Slaughtered for personal use/euthanized	6.4	(2.0)	2.9	(0.7)	3.1	(0.9)
Other	2.8	(1.2)	0.1	(0.1)	0.7	(0.4)

The highest percentage of fenced-range (71.5 percent), pasture (63.0 percent), and dry lot/feedlot (57.6 percent) operations sold their cull sheep at an auction market/sale barn. Similar percentages of herded/open-range operations sold their cull sheep at an auction market/sale barn (27.5 percent) or directly to a buyer/dealer (25.8 percent).

A.6.c. For operations that sold or permanently removed cull sheep in 2010, percentage of operations by marketing channel used and by flock type:

Percent Operations (20 or more ewes)

	Flock Type							
	Herded/ open range		**Fenced range**		**Pasture**		**Dry lot/feedlot**	
Marketing channel	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Sold directly to slaughter	16.3	(2.9)	12.7	(1.8)	16.2	(1.3)	20.9	(4.0)
Sold directly to feedlot	14.1	(4.7)	2.0	(0.6)	1.0	(0.3)	1.5	(1.4)
Sold directly to backgrounder	1.1	(0.6)	0.3	(0.2)	0.2	(0.1)	1.5	(1.4)
Sold directly to consumer or ethnic market	5.1	(2.3)	3.5	(1.0)	6.7	(1.0)	3.5	(2.0)
Sold directly to another operation	6.6	(2.4)	2.8	(1.0)	2.0	(0.5)	2.6	(1.7)
Sold at auction market/sale barn	27.5	(4.9)	71.5	(2.4)	63.0	(1.7)	57.6	(4.9)
Sold directly to buyer/dealer	25.8	(3.4)	8.7	(1.3)	11.4	(1.1)	11.9	(3.1)
Slaughtered for personal use/ euthanized	9.8	(4.5)	1.9	(0.7)	2.3	(0.6)	2.9	(1.7)
Other	1.8	(0.9)	0.1	(0.1)	1.0	(0.4)	0.4	(0.4)

On all operations (1 or more ewes) nearly half of cull sheep (46.6 percent) sold or permanently removed were marketed at an auction market/sale barn. Large and medium operations marketed nearly one-fourth of their cull sheep (24.4 percent each) directly to a buyer/dealer. Medium operations also marketed about one-fourth of their cull sheep (26.5 percent) directly to slaughter.

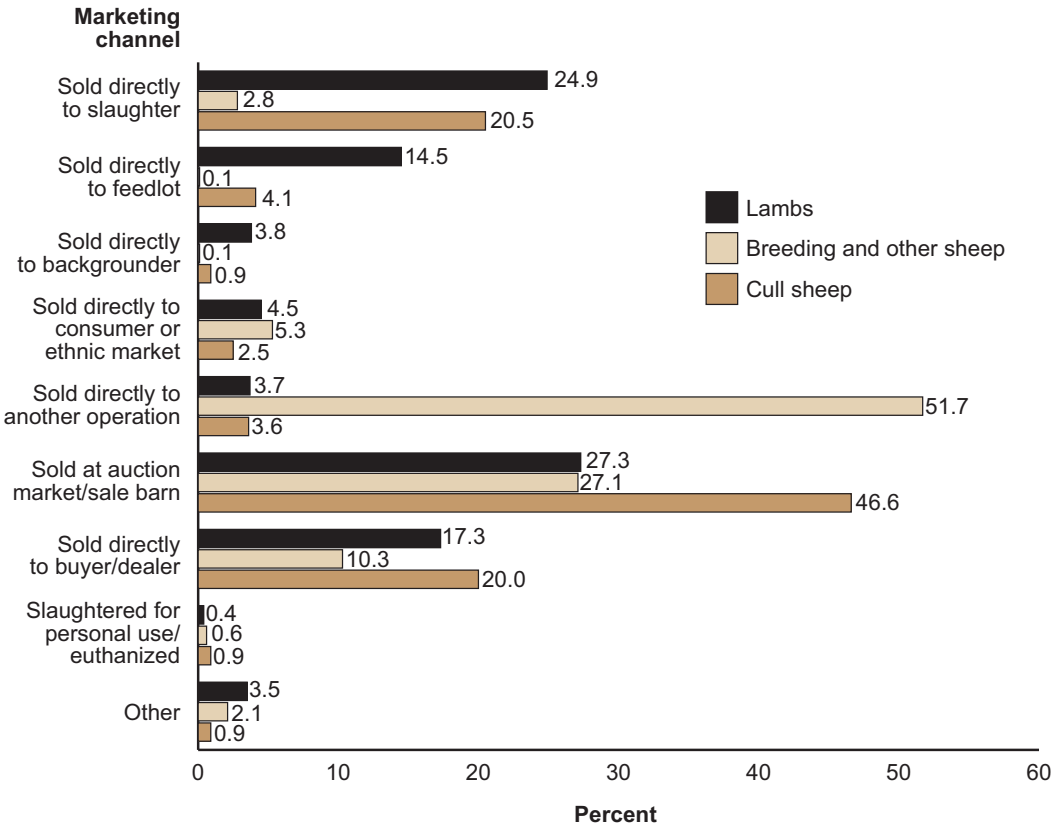
A.6.d. Of cull sheep sold or permanently removed in 2010, percentage sold or removed using the following marketing channels, by flock size:

Percent Cull Sheep

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**	
Marketing channel	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Sold directly to slaughter	13.9	(3.9)	16.8	(2.1)	26.5	(6.3)	18.0	(2.7)	20.5	(3.0)	20.8	(3.1)
Sold directly to feedlot	2.2	(1.7)	1.6	(0.7)	0.9	(0.4)	8.5	(2.5)	4.1	(1.1)	4.2	(1.2)
Sold directly to backgrounder	0.2	(0.2)	0.1	(0.1)	0.7	(0.4)	1.6	(0.7)	0.9	(0.3)	1.0	(0.4)
Sold directly to consumer or ethnic market	16.2	(8.3)	4.4	(0.9)	1.2	(0.4)	1.0	(0.2)	2.5	(0.6)	1.8	(0.3)
Sold directly to another operation	8.5	(4.1)	2.5	(0.8)	2.4	(1.3)	4.5	(1.1)	3.6	(0.7)	3.3	(0.7)
Sold at auction market/sale barn	51.8	(7.1)	65.6	(2.5)	42.8	(11.3)	39.6	(3.0)	46.6	(4.5)	46.3	(4.7)
Sold directly to buyer/dealer	4.2	(1.6)	7.6	(1.1)	24.4	(6.8)	24.4	(2.5)	20.0	(2.9)	20.8	(3.0)
Slaughtered for personal use/ euthanized	2.7	(1.0)	0.9	(0.3)	0.6	(0.3)	0.9	(0.3)	0.9	(0.2)	0.8	(0.2)
Other	0.3	(0.2)	0.5	(0.3)	0.6	(0.3)	1.5	(0.9)	0.9	(0.4)	1.0	(0.4)
Total	100.0		100.0		100.0		100.0		100.0		100.0	

Of lambs, breeding or other sheep, and cull sheep sold or permanently removed in 2010, percentage sold or removed using the following marketing channels



A lower percentage of cull sheep on operations in the West region (24.3 percent) were sold to an auction market/sale barn compared with cull sheep on operations in the Central or East regions (46.5 and 57.8 percent, respectively). In the West region, similar percentages of cull sheep sold were sold directly to slaughter (28.8 percent), at an auction market/sale barn (24.3 percent), and directly to buyer/dealer (28.2 percent).

A.6.e. Of cull sheep sold or permanently removed in 2010, percentage sold or removed using the following by marketing channels, by region:

Percent Cull Sheep (1 or more ewes)

	Region					
	West		Central		East	
Marketing channel	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Sold directly to slaughter	28.8	(4.3)	16.6	(5.0)	26.2	(2.8)
Sold directly to feedlot	1.0	(0.5)	6.0	(1.8)	1.1	(0.4)
Sold directly to backgrounder	4.3	(2.0)	0.7	(0.4)	0.0	(0.0)
Sold directly to consumer or ethnic market	4.9	(1.2)	1.9	(0.8)	3.1	(0.6)
Sold directly to another operation	5.1	(1.3)	3.8	(1.1)	2.1	(1.0)
Sold at auction market/sale barn	24.3	(3.3)	46.5	(7.0)	57.8	(2.7)
Sold directly to buyer/dealer	28.2	(3.7)	22.9	(4.2)	8.7	(1.3)
Slaughtered for personal use/euthanized	0.7	(0.2)	0.9	(0.3)	0.8	(0.2)
Other	2.6	(0.9)	0.9	(0.6)	0.2	(0.1)
Total	100.0		100.0		100.0	

A higher percentage of cull sheep on herded/open range operations were marketed directly to buyer/dealers (38.9 percent) compared with cull sheep from other flock types. The highest percentage of cull sheep sold or permanently removed from the other flock types were marketed at an auction market or sale barn. A lower percentage of herded/open range operations sold or permanently removed cull sheep at auction market/sale barn compared with the other flock types.

A.6.f. For operations that sold or permanently removed cull sheep in 2010, percentage of cull sheep sold or removed using the following marketing channels, by flock type:

Percent Cull Sheep (1 or more ewes)

Flock Type

	Herded/ open range		Fenced range		Pasture		Dry lot/feedlot	
Marketing channel	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Sold directly to slaughter	31.4	(6.7)	9.7	(1.9)	19.4	(1.8)	28.4	(6.5)
Sold directly to feedlot	10.1	(4.8)	3.3	(1.0)	0.7	(0.2)	0.3	(0.3)
Sold directly to backgrounder	1.3	(0.9)	1.4	(0.8)	0.5	(0.2)	0.6	(0.5)
Sold directly to consumer or ethnic market	0.5	(0.2)	1.3	(0.3)	3.6	(0.6)	0.5	(0.4)
Sold directly to another operation	3.7	(1.8)	3.8	(1.4)	3.0	(0.7)	0.8	(0.6)
Sold at auction market/sale barn	10.2	(3.9)	66.7	(2.8)	57.8	(2.4)	54.4	(6.2)
Sold directly to buyer/dealer	38.9	(4.8)	13.3	(1.9)	14.0	(1.5)	13.7	(3.6)
Slaughtered for personal use/ euthanized	1.7	(0.8)	0.3	(0.1)	0.4	(0.1)	1.1	(0.7)
Other	2.3	(1.5)	0.2	(0.2)	0.7	(0.2)	0.2	(0.2)
Total	100.0		100.0		100.0		100.0	

7. Cull rams and ewes

Overall, 16.2 percent of rams and 14.0 percent of ewes were culled during 2010 (as a percentage of ram and ewe inventory on January 1, 2011). A higher percentage of rams and ewes on small operations (21.6 and 16.6 percent, respectively) were culled compared with rams and ewes on large operations (12.2 and 10.1 percent, respectively).

A.7.a. Of cull sheep sold or permanently removed during 2010, percentage of cull sheep by gender and by flock size :

Percent Cull Sheep*

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**	
Gender	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Rams			21.6	(2.0)	19.7	(1.8)	12.2	(0.8)			16.2	(0.8)
Ewes			16.6	(0.6)	21.5	(5.6)	10.1	(0.4)			14.0	(1.4)

*Number of culled rams and ewes sold or permanently removed as a percentage of the January 1, 2011, inventory, respectively.

A.7.b. Of cull sheep sold or permanently removed during 2010, percentage of cull sheep by gender and by region:

Percent Cull Sheep* (20 or more ewes)

Region

	West		**Central**		**East**	
Gender	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Rams	15.1	(1.8)	15.3	(1.1)	19.6	(1.6)
Ewes	11.2	(0.6)	14.6	(2.2)	14.2	(0.5)

*Number of culled rams and ewes sold or permanently removed as a percentage of the January 1, 2011, inventory, respectively.

A.7.c. Of cull sheep sold or permanently removed during 2010, percentage of cull sheep by gender and by flock type:

Percent Cull Sheep* (20 or more ewes)

	Flock Type							
	Herded/ open range		Fenced range		Pasture		Dry lot/feedlot	
Gender	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Rams	15.8	(1.9)	12.6	(0.9)	21.0	(1.5)	17.4	(3.5)
Ewes	14.2	(4.7)	13.3	(0.6)	14.2	(0.5)	17.3	(1.5)

*Number of culled rams and ewes sold or permanently removed as a percentage of the January 1, 2011, inventory, respectively.

A.7.d. For operations that sold or permanently removed cull sheep during 2010, percentage of operations by quarter cull sheep were sold or removed, and by gender:

Percent Operations (20 or more ewes)

	Gender			
	Rams		Ewes	
Quarter	Percent	Std. error	Percent	Std. error
January–March	14.0	(1.6)	15.4	(1.0)
April–June	27.1	(2.1)	40.2	(1.4)
July–September	34.1	(2.2)	36.7	(1.4)
October–December	33.6	(2.2)	29.6	(1.3)

The first quarter of 2010 (January-March) had the lowest percentage of cull rams or ewes sold or permanently removed (13.2 and 9.5 percent, respectively).

A.7.e. Of cull sheep sold or permanently removed during 2010, percentage of cull sheep by quarter sheep were sold or removed, and by gender:

	Percent Cull Rams and Ewes			
	Gender			
	Rams		**Ewes**	
Quarter	**Percent**	**Std. error**	**Percent**	**Std. error**
January–March	13.2	(1.5)	9.5	(1.3)
April–June	23.1	(1.8)	28.5	(1.2)
July–September	29.7	(2.2)	30.2	(1.5)
October–December	34.0	(2.6)	31.9	(1.4)
Total	100.0		100.0	

Overall, rams were culled at a younger average age (4.9 years) than ewes (6.3 years). Rams on large operations were culled at a slightly older average age than rams on small operations (5.5 and 4.6 years, respectively).

A.7.f. Operation average age (in years) of cull sheep at culling, by gender and by flock size:

	Operation Average Age (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**	
Gender	**Avg.**	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**
Rams			4.6	(0.2)	5.2	(0.1)	5.5	(0.1)			4.9	(0.1)
Ewes			6.2	(0.1)	6.3	(0.1)	6.8	(0.2)			6.3	(0.1)

A.7.g. Operation average age (in years) of cull sheep at culling, by gender and by flock type:

Operation Average Age (years) (20 or more ewes)

Flock Type

	Herded/ open range		Fenced range		Pasture		Dry lot/feedlot	
Gender	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Rams	5.6	(0.3)	5.4	(0.2)	4.6	(0.1)	5.0	(0.3)
Ewes	6.7	(0.3)	6.4	(0.1)	6.3	(0.1)	5.9	(0.2)

Of operations that culled at least one ewe during 2010, 80.9 percent had any cull ewes that had flock identification when they left the operation. A higher percentage of large operations (90.1 percent) than small operations (78.5 percent) had any cull ewes that had flock identification when they left the operation.

A.7.h. For operations that culled at least one ewe during 2010, percentage of operations in which any cull ewes had flock identification when they left the operation, 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**
		78.5	(1.7)	84.9	(1.4)	90.1	(1.2)			80.9	(1.2)

A.7.i. For operations that culled at least one ewe during 2010, percentage of operations in which any ewes had flock identification when they left the operation, by region:

Percent Operations (20 or more ewes)

Region

West		Central		East	
Percent	**Std. error**	**Percent**	**Std. error**	**Percent**	**Std. error**
77.4	(3.3)	81.1	(1.8)	81.9	(1.7)

A.7.j. For operations that culled at least one ewe during 2010, percentage of operations in which any ewes had flock identification when they left the operation, by flock type:

Percent Operations (20 or more ewes)

Flock Type							
Herded/ open range		**Fenced range**		**Pasture**		**Dry lot/feedlot**	
Pct.	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
79.9	(5.4)	76.4	(2.5)	81.6	(1.5)	90.1	(2.9)

8. Reasons for culling rams and ewes

Over half of operations that culled rams (54.7 percent) and over two-thirds of operations that culled ewes (69.7 percent) culled them because of old age. The next most common reasons for culling ewes were hard-bag syndrome (24.1 percent), poor mothering (22.3 percent), failure to lamb (22.0 percent), and mastitis (20.9 percent). The majority of "other" reasons for culling rams were related to genetics and the potential for inbreeding.

A.8.a. For operations that culled any sheep during 2010, percentage of operations by primary reason for culling and by gender:

	Percent Operations (20 or more ewes)			
	Gender			
	Rams		**Ewes**	
Primary reason for culling	**Percent**	**Std. error**	**Percent**	**Std. error**
Old age	54.7	(2.4)	69.7	(1.3)
Teeth problems	1.8	(0.4)	8.0	(0.6)
Poor mothering			22.3	(1.2)
Hard-bag syndrome			24.1	(1.1)
Mastitis			20.9	(1.1)
Failure to lamb (open or aborted)			22.0	(1.1)
Single lamb births			3.9	(0.5)
Ram breeding soundness	20.0	(1.8)		
Other reproductive problems	2.9	(0.8)	3.3	(0.5)
Chronic weight loss	2.2	(0.6)	3.6	(0.5)
Other illness	1.3	(0.5)	2.4	(0.4)
Economic issues (e.g., drought, flock reduction, market conditions)	6.4	(1.2)	2.8	(0.5)
Other	20.8	(2.0)	7.6	(0.8)

Of the rams and ewes culled in 2010, 49.3 percent of rams and 55.6 percent of ewes were culled because of old age. Breeding-soundness issues accounted for the second highest percentage of rams culled (17.0 percent).

A.8.b. Of sheep culled in 2010, percentage cull sheep by primary reason for culling and by gender:

Percent Rams and Ewes (20 or more ewes)

	Gender			
	Rams		**Ewes**	
Primary reason for culling	**Percent**	**Std. error**	**Percent**	**Std. error**
Old age	49.3	(2.5)	55.6	(1.4)
Teeth problems	3.0	(0.9)	7.6	(1.3)
Poor mothering			4.7	(0.3)
Hard bag syndrome			7.1	(0.8)
Mastitis			6.7	(0.5)
Failure to lamb (open or aborted)			7.7	(0.5)
Single lamb births			1.1	(0.2)
Ram breeding soundness	17.0	(2.3)		
Other reproductive problems	3.1	(1.4)	0.9	(0.3)
Chronic weight loss	1.2	(0.3)	2.1	(0.6)
Other illness	1.9	(0.6)	1.2	(0.4)
Economic issues (e.g., drought, flock reduction, market conditions)	10.2	(2.2)	1.7	(0.4)
Other	14.3	(1.7)	3.7	(0.6)
Total	100.0		100.0	

B. Lamb and Sheep Deaths and Losses

Death and loss of sheep and lambs must be minimized for an operation to stay viable. Usually the most vulnerable sheep are newborn lambs. Often, large range operations in the West do not visualize or count lambs until the flock is processed and the lambs are docked, marked, or branded. As a result, it is difficult to estimate true lamb losses in some Western States. While some operations were not able to measure lamb losses prior to docking, those that could were asked to provide the number lost and the cause of loss.

1. Lamb and sheep losses

As flock size increased so did the percentage of operations that lost lambs and adult sheep. Over half of all operations with one or more ewes (53.8 percent) had adult sheep that died or were lost during 2010. Nearly half of all operations (49.2 percent) had lambs that died or were lost before being marked, docked, or branded. Over one-third of all operations (36.8 percent) lost lambs after marking, docking, or branding. A higher percentage of all operations lost lambs than lost adult sheep (65.1 and 53.8 percent, respectively).

B.1.a. Percentage of operations that lost lambs and/or sheep during 2010 from all causes, by age group 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**	
Age group	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Lambs before marked, docked or branded	33.2	(1.7)	58.5	(1.5)	73.0	(1.6)	84.1	(1.4)	49.2	(1.0)	62.9	(1.2)
Lambs after marked, docked, or branded	16.8	(1.4)	45.8	(1.5)	72.5	(1.5)	90.3	(1.2)	36.8	(0.9)	53.8	(1.2)
Any lambs	45.9	(1.9)	77.9	(1.3)	92.1	(1.0)	98.1	(0.5)	65.1	(1.0)	82.0	(1.0)
Adult sheep	31.8	(1.8)	67.1	(1.5)	85.7	(1.3)	94.4	(0.9)	53.8	(1.0)	72.5	(1.1)
Any sheep or lambs	58.5	(1.9)	88.1	(1.0)	95.4	(0.8)	98.7	(0.4)	75.6	(1.0)	90.2	(0.8)

A higher percentage of operations in the Central region lost lambs and sheep from all age groups compared with operations in the West or East regions.

B.1.b. Percentage of operations that lost sheep and/or lambs to all causes during 2010, by age group and by region:

	Percent Operations (1 or more ewes)					
	Region					
	West		**Central**		**East**	
Age group	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Lambs before marked, docked or branded	37.9	(2.2)	58.7	(1.6)	47.0	(1.6)
Lambs after marked, docked, or branded	34.8	(2.1)	43.0	(1.4)	33.2	(1.4)
Total lambs	56.8	(2.3)	72.7	(1.5)	63.1	(1.6)
Adult sheep	49.6	(2.3)	61.3	(1.7)	50.1	(1.5)

Death-loss evaluations in 1994, 1999, 2004, and 2009 have shown lamb death loss ranged from 9.5 to 10.8 percent of lambs born. In 2010, lamb death loss for all operations was 11.2 percent of lambs born. In 1994, 1999, 2004, and 2009, sheep death loss ranged from 5.6 to 6.5 percent. In 2010, sheep death loss for all operations was 5.0 percent of adult sheep inventory on January 1, 2011. Overall, 6.3 percent of lambs were lost before they were marked, docked, or branded. Large operations lost the highest percentage of lambs (7.2 percent) before they were marked, docked, or branded. Overall, sheep operations with 20 or more ewes lost 4.9 percent of adult sheep in 2010.

B.1.c. Percentage of sheep and lambs lost to all causes during 2010, by age group and by flock size:

Percent Sheep[1] and Lambs[2]

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**	
Age group	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Lambs before marked, docked or branded	6.6	(0.5)	5.4	(0.3)	5.4	(0.3)	7.2	(0.5)	6.3	(0.2)	6.3	(0.3)
Lambs after marked, docked, or branded	3.8	(0.6)	4.3	(0.4)	5.0	(0.3)	5.4	(0.3)	4.9	(0.2)	5.0	(0.2)
Total lambs	10.4	(0.7)	9.7	(0.5)	10.4	(0.3)	12.6	(0.6)	11.2	(0.3)	11.2	(0.3)
Adult sheep	6.3	(0.7)	6.0	(0.4)	5.0	(0.2)	4.4	(0.2)	5.0	(0.2)	4.9	(0.2)

[1]Percentage of January 1, 2011, inventory.
[2]Percentage of lambs born alive or dead in 2010.

The Central region lost the highest percentage of lambs (7.6 percent) before they were marked, docked, or branded compared with operations in the West or East regions (4.4 and 4.7 percent, respectively).

B.1.d. Percentage of sheep and lambs lost to all causes during 2010, by age group and by region:

Percent Sheep[1] and Lambs[2] (1 or more ewes)

	Region					
	West		Central		East	
Age group	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Lambs before marked, docked or branded	4.4	(0.3)	7.6	(0.4)	4.7	(0.3)
Lambs after marked, docked, or branded	4.5	(0.4)	5.5	(0.3)	4.0	(0.2)
Total lambs	8.9	(0.6)	13.1	(0.5)	8.7	(0.3)
Adult sheep	4.9	(0.3)	4.9	(0.2)	5.2	(0.3)

[1]Percentage of January 1, 2011, inventory.
[2]Percentage of lambs born alive or dead in 2010.

Herded/open-range flocks lost the highest percentage of lambs (8.7 percent) before they were marked, docked, or branded.

B.1.e. Percentage of sheep and lambs lost to all causes during 2010, by age group and by flock type:

Percent Sheep[1] and Lambs[2] (20 or more ewes)

	Flock Type							
	Herded/ open range		Fenced range		Pasture		Dry lot/feedlot	
Age group	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Lambs before marked, docked or branded	8.7	(0.8)	6.3	(0.3)	4.8	(0.2)	5.6	(2.2)
Lambs after marked, docked, or branded	5.2	(0.3)	5.7	(0.4)	4.5	(0.2)	1.0	(0.9)
Total lambs	13.9	(0.9)	12.0	(0.5)	9.3	(0.3)	6.6	(0.3)
Adult sheep	5.0	(0.3)	4.0	(0.2)	5.5	(0.3)	6.5	(0.6)

[1]Percentage of January 1, 2011, inventory.
[2]Percentage of lambs born alive or dead in 2010.

2. Predator and nonpredator losses

As flock size increased so did the percentage of operations that lost sheep to predator and nonpredator causes. Only 7.4 percent of very small operations lost sheep to predators during 2010 while 52.7 percent of large operations lost sheep to predators. While 25.8 percent of very small operations lost sheep to nonpredator causes, 85.7 percent of large operations did so. Overall, a higher percentage of operations (47.2 percent) lost sheep to nonpredator causes compared with 13.2 percent of all operations that lost sheep to predators.

B.2.a. Percentage of operations that lost sheep during 2010, by cause of loss 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**	
Cause of loss	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Predator	7.4	(1.0)	13.4	(1.0)	26.4	(1.5)	52.7	(1.8)	13.2	(0.6)	18.3	(0.8)
Nonpredator	25.8	(1.6)	60.3	(1.5)	78.4	(1.4)	85.7	(1.3)	47.2	(1.0)	65.5	(1.2)

A higher percentage of operations in the Central region (22.5 percent) lost sheep to predators than operations in the West and East regions (13.9 and 6.6 percent, respectively)

B.2.b. Percentage of operations that lost sheep during 2010, by cause of loss and by region:

Percent Operations* (1 or more ewes)

Region

	West		**Central**		**East**	
Cause of loss	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Predator	13.9	(1.5)	22.5	(1.4)	6.6	(0.7)
Nonpredator	42.2	(2.3)	49.7	(1.5)	47.3	(1.5)

*Percentage of January 1, 2011, inventory.

A higher percentage of dry lot/feedlot operations (79.4 percent) lost sheep to nonpredator causes than herded/open-range (60.5 percent), fenced-range (62.1 percent), and pasture (65.4 percent) operations. Conversely, a lower percentage of dry lot/feedlot operations (11.4 percent) lost sheep to predators compared with herded/open-range (57.0 percent) and fenced-range (23.6 percent) operations. As expected, herded/open range flocks had the highest percentage of operations that lost sheep to predators.

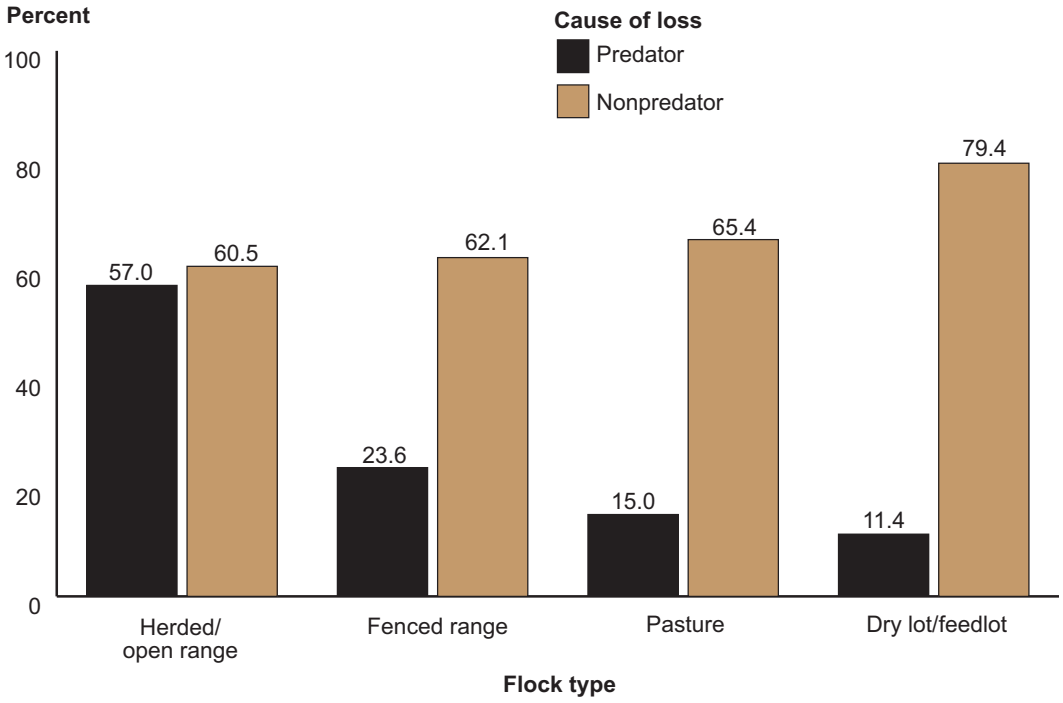
B.2.c. Percentage of operations that lost sheep during 2010, by cause of loss and by flock type:

Percent Operations* (20 or more ewes)

	Flock Type							
	Herded/ open range		Fenced range		Pasture		Dry lot/feedlot	
Cause of loss	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Predator	57.0	(5.4)	23.6	(1.8)	15.0	(1.0)	11.4	(2.6)
Nonpredator	60.5	(5.5)	62.1	(2.3)	65.4	(1.5)	79.4	(3.7)

*Percentage of January 1, 2011, inventory.

Percentage of operations* that lost sheep during 2010, by cause of loss and by flock type



*Percentage of January 1, 2011, inventory.

On very small operations, 2.3 percent of sheep were lost to predators during 2010 compared with 1.2 percent of sheep on large operations. Overall, 1.2 and 3.8 percent of sheep were lost to predator and nonpredator causes, respectively.

B.2.d. Percentage of sheep lost during 2010, by cause of loss and by flock size:

Percent Sheep*

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**	
Cause of loss	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Predator	2.3	(0.6)	1.2	(0.1)	1.0	(0.1)	1.2	(0.1)	1.2	(0.1)	1.1	(0.1)
Nonpredator	3.9	(0.3)	4.9	(0.4)	4.1	(0.2)	3.2	(0.2)	3.8	(0.1)	3.8	(0.1)

*Percentage of January 1, 2011, inventory.

Compared with the other regions, the East region lost the highest percentage of sheep to nonpredator causes and the lowest percentage to predator causes.

B.2.e. Percentage of sheep lost during 2010, by cause of loss and by region:

Percent Sheep* (1 or more ewes)

Region

	West		**Central**		**East**	
Cause of loss	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Predator	1.2	(0.2)	1.4	(0.1)	0.7	(0.1)
Nonpredator	3.7	(0.2)	3.5	(0.2)	4.6	(0.2)

*Percentage of January 1, 2011, inventory.

B.2.f. Percentage of sheep lost during 2010, by cause of loss and by flock type:

	Percent Sheep* (20 or more ewes)							
	Flock Type							
	Herded/ open range		**Fenced range**		**Pasture**		**Dry lot/feedlot**	
Cause of loss	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Predator	1.5	(0.1)	1.1	(0.1)	1.0	(0.1)	0.8	(0.2)
Nonpredator	3.5	(0.3)	2.9	(0.1)	4.5	(0.3)	5.7	(0.6)

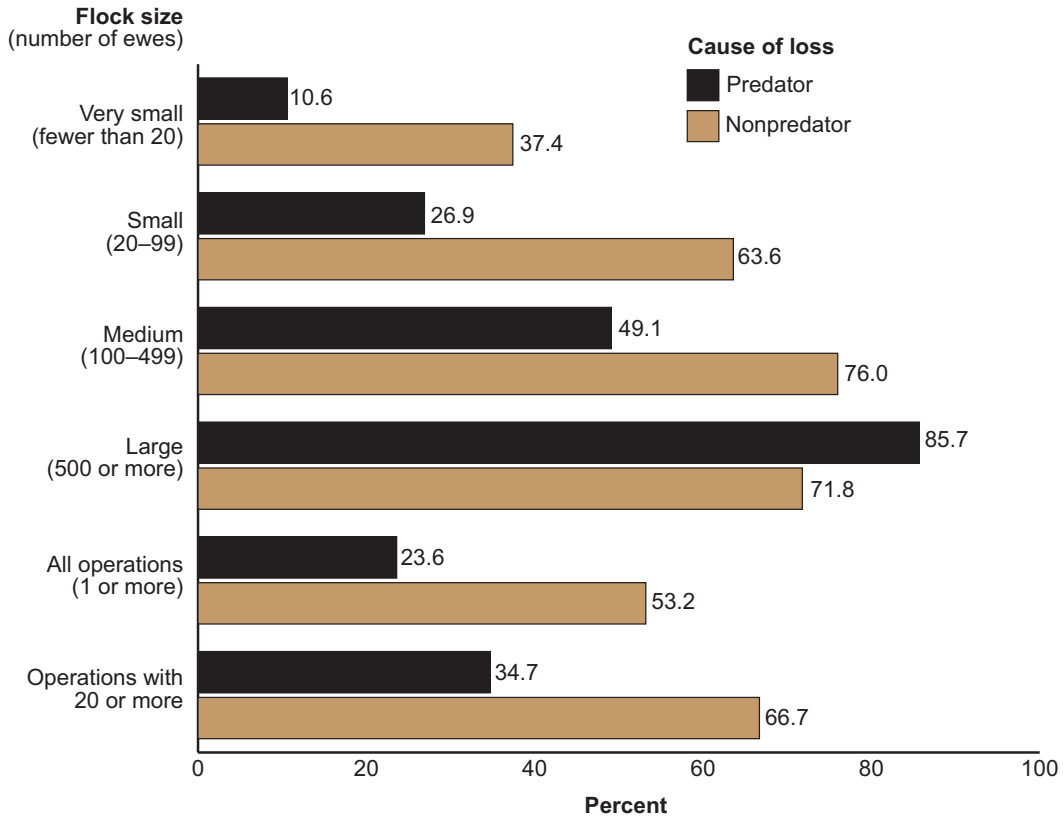
*Percentage of January 1, 2011, inventory.

Lamb losses include all deaths of lambs born alive. Typically, large operations under report lamb losses because they do not see lambs for days or weeks after the lambs are born. Nearly three-fourths of large operations (71.8 percent) lost lambs to nonpredator causes and 85.7 percent lost lambs to predators during 2010. As expected, a higher percentage of large and medium operations lost lambs due to nonpredator and predator causes compared with small and very small operations.

B.2.g. Percentage of operations that lost lambs during 2010, by cause of loss 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**	
Cause of loss	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Predator	10.6	(1.2)	26.9	(1.3)	49.1	(1.6)	85.7	(1.4)	23.6	(0.8)	34.7	(1.0)
Nonpredator	37.4	(1.8)	63.6	(1.5)	76.0	(1.4)	71.8	(1.5)	53.2	(1.0)	66.7	(1.1)

Percentage of operations that lost lambs during 2010, by cause of loss and by flock size



Overall, 4.9 percent of lambs born in 2010 were lost to predators and 6.3 percent were lost to nonpredator causes.

B.2.h. Percentage of lambs born and lost during 2010, by cause of loss 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**	
Cause of loss	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Predator	3.3	(0.6)	3.9	(0.4)	4.4	(0.3)	6.0	(0.3)	4.9	(0.2)	5.0	(0.2)
Nonpredator	7.1	(0.5)	5.8	(0.3)	6.0	(0.2)	6.6	(0.5)	6.3	(0.3)	6.2	(0.2)

*Percentage of lambs born alive for most recent lamb crop.

A higher percentage of operations in the Central region (37.9 percent) lost lambs to predators compared with operations in the West and East regions (27.6 and 12.3 percent, respectively). A lower percentage of operations in the West region lost lambs to nonpredator causes than operations in the Central and East regions.

B.2.i. Percentage of operations that lost lambs during 2010, by cause of loss and by region:

Percent Operations (1 or more ewes)

Region

	West		**Central**		**East**	
Cause of loss	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Predator	27.6	(2.0)	37.9	(1.5)	12.3	(1.0)
Nonpredator	40.8	(2.3)	52.8	(1.6)	58.1	(1.6)

B.2.j. Percentage of lambs born alive and lost during 2010, by cause of loss and by region:

	Percent Lambs* (1 or more ewes)					
	Region					
	West		**Central**		**East**	
Cause of loss	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Predator	4.8	(0.5)	6.6	(0.3)	1.8	(0.3)
Nonpredator	4.1	(0.3)	6.6	(0.4)	6.9	(0.3)

*Percentage of lambs born alive for most recent lamb crop.

A higher percentage of herded/open-range operations (78.5 percent) lost lambs to predators compared with fenced-range (54.8 percent), pasture (26.0 percent), and dry lot/feedlot (19.1 percent) operations.

B.2.k. Percentage of operations that lost lambs during 2010, by cause of loss and by flock type:

	Percent Operations (20 or more ewes)							
	Flock Type							
	Herded/ open range		**Fenced range**		**Pasture**		**Dry lot/feedlot**	
Cause of loss	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Predator	78.5	(5.4)	54.8	(2.3)	26.0	(1.3)	19.1	(3.5)
Nonpredator	62.4	(5.6)	53.9	(2.2)	71.0	(1.5)	77.3	(4.0)

B.2.l. Percentage of lambs born alive lost during 2010, by cause of loss and by flock type:

	Percent Lambs* (20 or more ewes)							
	Flock Type							
	Herded/ open range		**Fenced range**		**Pasture**		**Dry lot/feedlot**	
Cause of loss	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Predator	6.1	(0.5)	7.0	(0.4)	3.2	(0.3)	4.4	(2.0)
Nonpredator	7.8	(0.7)	4.9	(0.3)	6.2	(0.2)	2.3	(1.1)

*Percentage of lambs born alive for most recent lamb crop.

3. Sheep predator losses

In total, 13.2 percent of operations lost sheep to predators during 2010 (table B.2.a.). Of those, 59.7 percent lost sheep to coyotes. While 23.8 percent of all operations lost sheep to dogs during 2010, a higher percentage of very small and small operations (32.4 and 27.1 percent, respectively) lost sheep to dog predation than medium or large operations (15.1 and 10.0 percent, respectively). This finding could be due to the closer proximity of small and very small operations to neighborhoods, which creates a greater chance of sheep coming into contact with domestic dogs unfamiliar with farm animals.

B.3.a. Of operations that lost sheep to predators during 2010, percentage that lost sheep to the following predators, 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**	
Predator	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Bears	2.7	(1.9)	2.9	(1.4)	6.1	(1.5)	26.0	(1.9)	6.2	(0.9)	7.5	(0.9)
Bobcats or lynx	0.0	(0.0)	1.9	(1.3)	3.4	(1.1)	7.2	(1.4)	2.3	(0.6)	3.2	(0.8)
Coyotes	47.9	(7.6)	57.5	(4.2)	68.8	(3.1)	75.4	(2.2)	59.7	(2.7)	63.7	(2.5)
Dogs	32.4	(6.9)	27.1	(3.8)	15.1	(2.3)	10.0	(1.7)	23.8	(2.4)	20.8	(2.2)
Mountain lions, cougars, or pumas	15.2	(5.4)	10.7	(2.6)	7.2	(1.5)	19.5	(1.9)	12.1	(1.8)	11.0	(1.5)
Foxes	0.0	(0.0)	2.2	(1.5)	0.0	(0.0)	2.8	(0.9)	1.2	(0.6)	1.6	(0.8)
Wolves	1.6	(1.1)	1.0	(0.7)	1.5	(0.7)	5.1	(0.9)	1.8	(0.4)	1.8	(0.5)
Eagles	0.0	(0.0)	0.0	(0.0)	2.4	(1.1)	3.0	(0.9)	0.9	(0.3)	1.2	(0.4)
Other predators	3.9	(2.6)	0.0	(0.0)	3.4	(1.3)	7.1	(1.5)	2.6	(0.8)	2.1	(0.5)
Unknown predators	10.2	(4.9)	12.7	(2.9)	6.9	(1.5)	5.2	(1.0)	9.9	(1.7)	9.7	(1.6)

In the Central and East regions, wolves accounted for losses on 2.1 and 2.4 percent of operations, respectively, that lost sheep to predators; there were no losses due to wolves in the West region in 2010, probably because there were very few wolves present in the eastern counties of the States that make up the West region (California, Oregon, and Washington).

For operations with predator losses during 2010, a higher percentage of operations in the West and Central regions (26.8 and 11.7 percent, respectively) lost sheep to mountain lions (cougars, pumas) than operations in the East region (1.3 percent).

B.3.b. Of operations that lost sheep to predators during 2010, percentage that lost sheep to the following predators, by region:

Percent Operations (1 or more ewes)

	Region					
	West		Central		East	
Predator	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Bears	5.7	(2.8)	7.0	(0.8)	5.0	(2.2)
Bobcats or lynx	2.6	(1.7)	3.1	(0.9)	0.3	(0.3)
Coyotes	59.0	(5.9)	57.6	(3.7)	64.9	(5.4)
Dogs	19.0	(4.6)	25.9	(3.4)	22.5	(4.8)
Mountain lions, cougars, or pumas	26.8	(5.2)	11.7	(2.5)	1.3	(1.3)
Foxes	0.0	(0.0)	2.1	(1.1)	0.0	(0.0)
Wolves	0.0	(0.0)	2.1	(0.6)	2.4	(1.2)
Eagles	1.7	(1.2)	0.8	(0.2)	0.4	(0.3)
Other predators	2.9	(2.3)	1.7	(0.4)	4.4	(2.4)
Unknown predators	10.1	(3.6)	11.5	(2.6)	5.8	(2.7)

For operations with predator losses during 2010, a higher percentage of herded/open-range operations (5.4 percent) lost sheep to wolves compared with fenced range (1.4 percent) and pasture (1.0 percent) operations. The dry lot/feedlot operations that lost sheep to wolves also managed their sheep on pasture. Over one-third of herded/open-range operations lost sheep to bears.

B.3.c. Of operations that lost sheep to predators during 2010, percentage that lost sheep to the following predators, by flock type:

Percent Operations (20 or more ewes)

	Flock Type							
	Herded/ open range		Fenced range		Pasture		Dry lot/feedlot	
Predator	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Bears	34.9	(4.7)	4.8	(0.9)	4.6	(1.6)	2.6	(2.3)
Bobcats or lynx	1.7	(1.1)	5.8	(1.9)	1.9	(0.9)	0.0	(0.0)
Coyotes	65.1	(7.0)	63.0	(4.3)	63.7	(3.6)	65.6	(11.2)
Dogs	18.8	(6.9)	12.7	(3.2)	27.0	(3.4)	17.8	(7.5)
Mountain lions, cougars, or pumas	19.9	(3.3)	11.1	(2.7)	10.2	(2.2)	0.0	(0.0)
Foxes	1.0	(0.4)	3.8	(2.3)	0.4	(0.2)	0.0	(0.0)
Wolves	5.4	(1.3)	1.4	(0.5)	1.0	(0.6)	6.2	(5.7)
Eagles	0.6	(0.4)	2.0	(0.6)	0.9	(0.6)	0.0	(0.0)
Other predators	1.2	(1.1)	3.1	(0.7)	1.6	(0.8)	2.7	(2.4)
Unknown predators	11.3	(5.0)	10.0	(2.9)	8.2	(2.0)	22.5	(12.9)

Overall, 1.2 percent of sheep were lost to predators during 2010 (table B.2.d.). Over half of these sheep (51.8 percent) were lost to coyotes. Only 13.0 percent of sheep lost during 2010 were lost to dog predation; however, 39.3 percent of sheep on very small operations and 19.8 percent of sheep on small operations were lost to dog predation. Small flocks are often housed close to urban areas and thus are more likely to have contact with dogs, especially dogs that do not commonly interact with sheep and lambs. Likewise, larger flocks are more likely to be located in areas where large predators (bears, bobcats or lynx, and mountain lions) reside. A higher percentage of sheep on large operations (14.7 percent) were lost to bear predation compared with sheep on very small (2.2 percent), small (1.7 percent), or medium (7.2 percent) operations.

B.3.d. Of sheep lost to predators during 2010, percentage lost to the following predators, by flock size:

Percent Sheep*

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**	
Predator	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Bears	2.2	(1.5)	1.7	(0.9)	7.2	(3.0)	14.7	(1.7)	9.1	(1.1)	10.0	(1.2)
Bobcats or lynx	0.0	(0.0)	2.8	(2.4)	6.5	(4.8)	3.4	(1.1)	3.4	(1.2)	3.9	(1.3)
Coyotes	33.2	(7.7)	57.4	(5.5)	61.0	(5.0)	50.6	(3.0)	51.8	(2.4)	54.4	(2.4)
Dogs	39.3	(10.1)	19.8	(4.0)	11.2	(2.4)	4.1	(1.0)	13.0	(2.0)	9.3	(1.2)
Mountain lions, cougars, or pumas	6.7	(2.9)	6.3	(1.8)	2.9	(0.8)	8.2	(1.1)	6.7	(0.8)	6.7	(0.8)
Foxes	0.0	(0.0)	3.0	(2.1)	0.0	(0.0)	0.6	(0.2)	0.9	(0.4)	1.0	(0.5)
Wolves	3.9	(2.8)	0.4	(0.3)	1.4	(1.1)	2.5	(0.7)	2.1	(0.5)	1.8	(0.4)
Eagles	0.0	(0.0)	0.0	(0.0)	1.1	(0.7)	1.1	(0.4)	0.7	(0.2)	0.8	(0.3)
Other predators	0.9	(0.7)	0.0	(0.0)	2.5	(0.9)	7.9	(2.9)	4.4	(1.5)	4.9	(1.7)
Unknown predators	13.7	(9.2)	8.7	(2.7)	6.1	(1.9)	6.9	(1.6)	8.0	(1.6)	7.2	(1.1)
Total	100.0		100.0		100.0		100.0		100.0		100.0	

*Percentage of total sheep predator loss.

Across regions, over half of sheep lost to predators during 2010 were lost to coyotes: 56.8 percent in the West region, 50.5 percent in the Central region, and 52.6 percent in the East region. In the East region, nearly one-third of sheep predator losses (32.0 percent) were due to dogs.

B.3.e. For sheep lost to predators during 2010, percentage lost to the following predators, by region:

	Percent Sheep* (1 or more ewes)					
	Region					
	West		**Central**		**East**	
Predator	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Bears	3.0	(1.0)	10.9	(1.3)	6.2	(4.1)
Bobcats or lynx	0.8	(0.5)	4.6	(1.6)	0.2	(0.2)
Coyotes	56.8	(5.5)	50.5	(2.7)	52.6	(8.3)
Dogs	14.5	(4.2)	9.2	(1.6)	32.0	(9.6)
Mountain lions, cougars, or pumas	12.8	(2.7)	6.5	(0.9)	0.3	(0.3)
Foxes	0.0	(0.0)	1.2	(0.6)	0.0	(0.0)
Wolves	0.0	(0.0)	2.7	(0.7)	0.7	(0.4)
Eagles	0.3	(0.2)	0.9	(0.3)	0.1	(0.1)
Other predators	0.7	(0.4)	5.4	(2.0)	3.1	(1.4)
Unknown predators	11.2	(3.4)	7.9	(2.0)	4.8	(2.6)
Total	100.0		100.0		100.0	

*Percentage of total sheep predator loss.

A higher percentage of sheep were lost to bears in herded/open-range operations (23.1 percent) than in fenced-range (3.4 percent), pasture (4.5 percent), or dry lot/feedlot (0.9 percent) operations. Pasture operations had the highest percentage of sheep lost to dogs.

B.3.f. Percentage of sheep lost during 2010 to the following predators, by flock type:

Percent Sheep* (20 or more ewes)

	Flock Type							
	Herded/ open range		Fenced range		Pasture		Dry lot/feedlot	
Predator	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Bears	23.1	(2.4)	3.4	(0.8)	4.5	(2.2)	0.9	(0.8)
Bobcats or lynx	0.1	(0.1)	8.3	(3.4)	3.2	(1.8)	0.0	(0.0)
Coyotes	53.9	(3.6)	53.3	(4.6)	54.3	(4.3)	74.1	(10.0)
Dogs	2.1	(0.8)	7.0	(1.5)	20.3	(3.3)	5.8	(2.9)
Mountain lions, cougars, or pumas	8.2	(1.2)	6.2	(1.4)	6.1	(1.4)	0.0	(0.0)
Foxes	0.3	(0.2)	2.4	(1.4)	0.3	(0.2)	0.0	(0.0)
Wolves	3.5	(1.1)	1.5	(0.7)	0.3	(0.2)	1.0	(1.0)
Eagles	0.0	(0.0)	2.2	(0.8)	0.1	(0.1)	0.0	(0.0)
Other predators	0.3	(0.3)	10.4	(4.2)	3.7	(2.0)	1.3	(1.2)
Unknown predators	8.3	(2.2)	5.4	(1.4)	7.2	(2.1)	16.9	(11.2)
Total	100.0		100.0		100.0		100.0	

*Percentage of total sheep predator loss.

4. Lamb predator losses (before and after docking)

In total, 23.6 percent of operations lost lambs to predators during 2010 (table B.2.g.).Of these operations, 71.6 percent lost lambs to coyotes; 84.9 percent of large operations lost lambs to coyotes. Bears accounted for lamb losses on 17.3 percent of large operations, but on only 3.5 percent of all operations that lost lambs to predation.

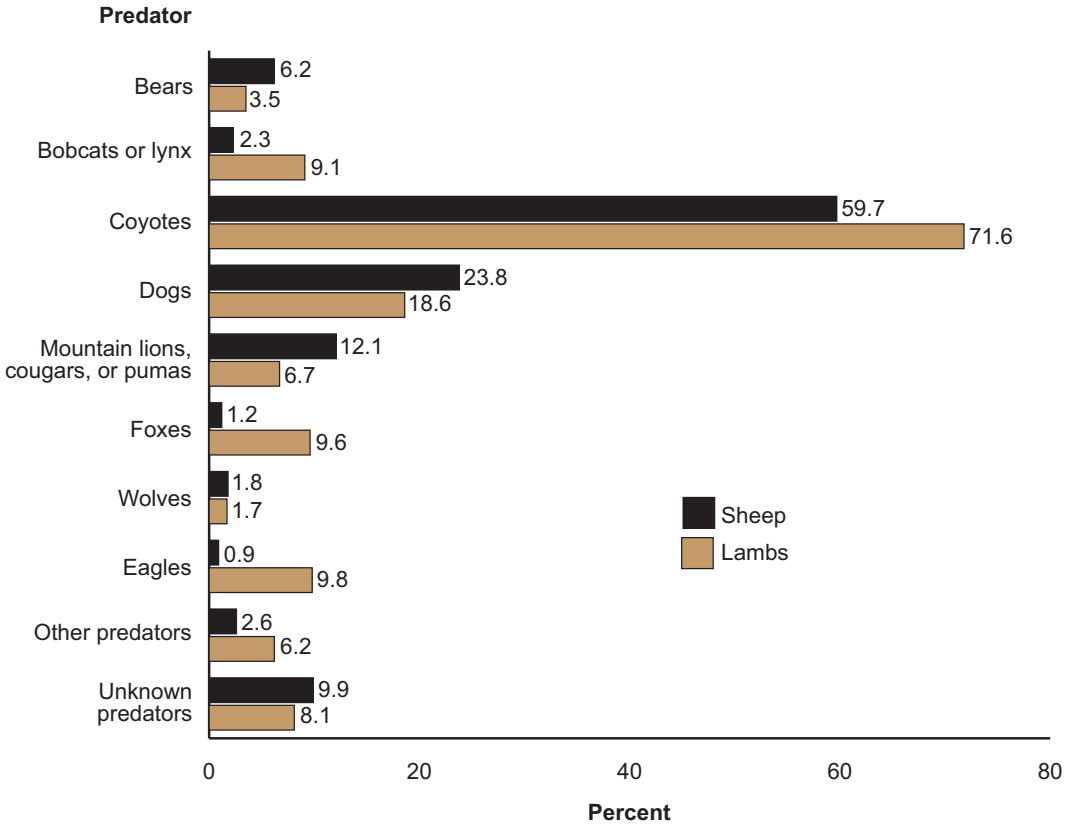
B.4.a. Of operations that lost lambs to predators during 2010, percentage that lost lambs to the following predators, by flock size:

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**	
Predator	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Bears	1.9	(1.8)	1.4	(0.7)	2.9	(0.5)	17.3	(1.2)	3.5	(0.5)	3.9	(0.5)
Bobcats or lynx	0.0	(0.0)	7.0	(1.7)	12.5	(1.5)	28.1	(1.6)	9.1	(0.9)	11.5	(1.1)
Coyotes	57.6	(5.7)	69.4	(2.9)	82.0	(1.8)	84.9	(1.4)	71.6	(1.8)	75.2	(1.7)
Dogs	28.6	(5.3)	20.5	(2.6)	10.2	(1.5)	10.1	(1.3)	18.6	(1.7)	16.0	(1.5)
Mountain lions, cougars, or pumas	7.2	(2.6)	4.8	(1.3)	6.0	(0.9)	15.2	(1.3)	6.7	(0.8)	6.5	(0.8)
Foxes	4.2	(2.5)	8.8	(1.8)	11.3	(1.3)	19.7	(1.5)	9.6	(1.1)	11.0	(1.1)
Wolves	3.2	(1.7)	1.2	(0.7)	0.2	(0.2)	3.8	(0.6)	1.7	(0.5)	1.2	(0.4)
Eagles	2.7	(1.5)	6.7	(1.6)	14.1	(1.6)	26.9	(1.7)	9.8	(0.9)	11.6	(1.0)
Other predators	5.0	(2.8)	4.9	(1.4)	7.0	(1.2)	12.7	(1.4)	6.2	(0.9)	6.6	(0.9)
Unknown predators	6.3	(3.1)	8.9	(1.8)	7.4	(1.1)	9.3	(1.1)	8.1	(1.1)	8.5	(1.1)

Of operations that lost sheep or lambs to predators during 2010, percentage that lost sheep or lambs to the following predators



Of operations that lost lambs to predators during 2010, a higher percentage of operations in the West region (16.5 percent) lost lambs to mountain lions (cougars, pumas) compared with operations in the Central or East regions (5.5 and 1.0 percent, respectively). Foxes accounted for lamb losses on 13.7 percent of operations in the Central region and on 4.1 and 5.6 percent of operations in the West and East regions, respectively.

B.4.b. Of operations that lost lambs to predators during 2010, percentage that lost lambs to the following predators, by region:

Percent Operations (1 or more ewes)

	Region					
	West		Central		East	
Predator	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Bears	1.0	(0.2)	4.8	(0.5)	2.8	(1.7)
Bobcats or lynx	3.1	(1.2)	15.5	(1.6)	0.5	(0.3)
Coyotes	66.1	(4.2)	74.6	(2.3)	69.9	(4.1)
Dogs	18.4	(3.4)	20.4	(2.3)	15.1	(3.3)
Mountain lions, cougars, or pumas	16.5	(3.1)	5.5	(0.8)	1.0	(0.7)
Foxes	4.1	(1.3)	13.7	(1.7)	5.6	(1.8)
Wolves	0.0	(0.0)	2.3	(0.7)	1.8	(1.0)
Eagles	12.8	(2.6)	10.9	(1.1)	4.7	(1.6)
Other predators	2.9	(1.2)	6.7	(1.1)	8.0	(2.5)
Unknown predators	4.8	(1.8)	11.8	(1.7)	2.8	(1.4)

Of operations that lost lambs to predators during 2010, a higher percentage of herded/open-range operations lost lambs to bears, mountain lions, eagles, and wolves than fenced-range, pasture, and dry lot/feedlot operations. However, a higher percentage of fenced-range operations (21.0 percent) lost lambs to bobcats or lynx than herded/open-range (10.2 percent), pasture (3.8 percent), or dry lot/feedlot (0.0 percent) operations.

B.4.c. Of operations that lost lambs to predators during 2010, percentage that lost lambs to the following predators, by flock type:

Percent Operations (1 or more ewes)

	Flock Type							
	Herded/ open range		Fenced range		Pasture		Dry lot/feedlot	
Predator	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Bears	33.3	(4.4)	2.6	(0.6)	1.1	(0.5)	0.0	(—)
Bobcats or lynx	10.2	(2.1)	21.0	(2.2)	3.8	(1.1)	0.0	(—)
Coyotes	85.3	(5.0)	74.2	(2.7)	74.7	(2.6)	74.5	(8.3)
Dogs	16.9	(5.0)	14.4	(2.4)	17.8	(2.3)	11.1	(4.7)
Mountain lions, cougars, or pumas	23.6	(3.9)	6.6	(1.3)	4.6	(1.1)	0.0	(—)
Foxes	17.9	(3.8)	14.2	(2.0)	6.9	(1.4)	13.7	(8.3)
Wolves	5.3	(1.1)	1.0	(0.5)	1.0	(0.7)	0.0	(—)
Eagles	27.6	(4.1)	12.3	(1.4)	8.5	(1.6)	12.6	(7.6)
Other predators	6.7	(1.5)	7.7	(1.4)	6.1	(1.4)	0.0	(—)
Unknown predators	11.2	(3.3)	10.5	(1.9)	6.2	(1.4)	9.2	(5.6)

Coyotes accounted for about 60 percent of lambs lost to predators during 2010. Dogs accounted for 27.4 percent of predator lamb losses on very small operations, but on only 1.4 percent on large operations.

B.4.d. Percentage of lambs lost to the following predators during 2010, by flock size:

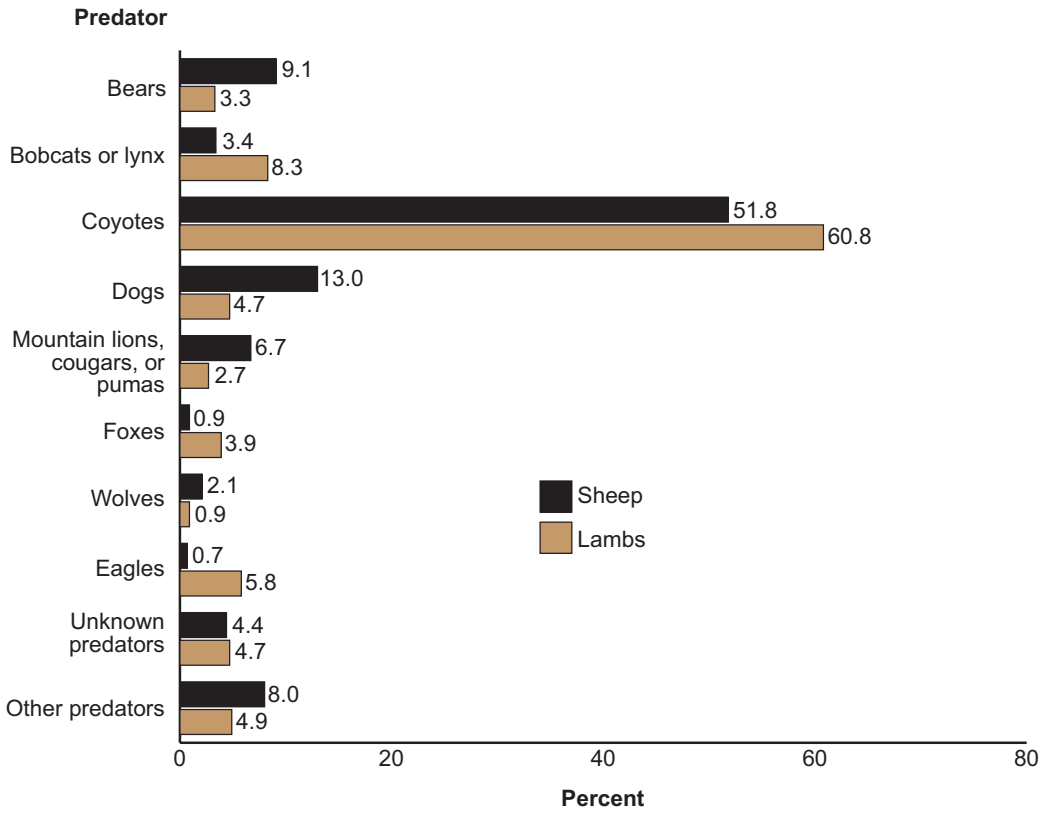
Percent Lambs*

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**	
Predator	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Bears	0.4	(0.4)	1.0	(0.5)	1.6	(0.4)	4.8	(0.6)	3.3	(0.4)	3.4	(0.4)
Bobcats or lynx	0.0	(0.0)	5.2	(1.9)	8.3	(1.5)	9.9	(1.0)	8.3	(0.8)	8.7	(0.8)
Coyotes	55.8	(7.9)	63.2	(3.3)	68.3	(2.6)	57.4	(1.7)	60.8	(1.3)	61.0	(1.3)
Dogs	27.4	(8.1)	12.9	(3.0)	2.5	(0.5)	1.4	(0.4)	4.7	(0.7)	3.8	(0.6)
Mountain lions, cougars, or pumas	7.1	(3.0)	1.8	(0.6)	1.6	(0.3)	3.2	(0.5)	2.7	(0.3)	2.6	(0.3)
Foxes	0.8	(0.5)	4.6	(1.4)	3.5	(0.6)	4.0	(0.5)	3.9	(0.4)	4.0	(0.4)
Wolves	2.3	(1.1)	0.9	(0.7)	0.0	(0.0)	1.1	(0.3)	0.9	(0.2)	0.8	(0.2)
Eagles	1.6	(0.9)	4.6	(1.5)	4.8	(0.7)	6.9	(0.6)	5.8	(0.5)	6.0	(0.5)
Other predators	2.0	(1.3)	1.7	(0.6)	4.1	(1.0)	6.1	(1.2)	4.7	(0.7)	4.8	(0.7)
Unknown predators	2.7	(1.7)	4.1	(1.5)	5.2	(1.2)	5.1	(1.2)	4.9	(0.8)	5.0	(0.8)
Total	100.0		100.0		100.0		100.0		100.0		100.0	

*Percentage of total lamb predator loss.

Percentage of sheep and lambs lost to the following predators during 2010 on operations with one or more ewes



About three-fourths of the predator lamb losses in the West and East regions were due to coyotes.

B.4.e. Percentage of lambs lost to the following predators during 2010, by region:

	Percent Lambs* (1 or more ewes)					
	Region					
	West		**Central**		**East**	
Predator	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Bears	1.0	(0.2)	4.0	(0.5)	0.9	(0.6)
Bobcats or lynx	1.0	(0.3)	10.8	(1.0)	0.1	(0.1)
Coyotes	70.0	(3.4)	56.8	(1.4)	77.9	(4.1)
Dogs	7.8	(3.3)	3.6	(0.6)	9.3	(3.5)
Mountain lions, cougars, or pumas	5.2	(0.9)	2.6	(0.4)	0.3	(0.2)
Foxes	1.6	(0.4)	4.3	(0.4)	3.8	(1.8)
Wolves	0.0	(0.0)	1.1	(0.3)	0.5	(0.3)
Eagles	8.1	(1.9)	5.8	(0.5)	2.8	(0.9)
Other predators	1.6	(0.4)	5.5	(0.9)	3.3	(1.6)
Unknown predators	3.6	(0.9)	5.6	(1.0)	1.2	(0.6)
Total	100.0		100.0		100.0	

*Percentage of total lamb predator loss.

B.4.f. Percentage of lambs lost to the following predators during 2010, by flock type:

	Percent Lambs Lost* (20 or more ewes)							
	Flock Type							
	Herded/ open range		**Fenced range**		**Pasture**		**Dry lot/feedlot**	
Predator	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Bears	9.3	(1.0)	1.2	(0.3)	0.6	(0.3)	0.0	(0.0)
Bobcats or lynx	3.0	(0.6)	16.1	(1.5)	3.3	(1.1)	0.0	(0.0)
Coyotes	58.8	(2.2)	55.1	(2.1)	72.5	(2.2)	77.1	(5.9)
Dogs	1.3	(0.6)	4.0	(1.2)	6.2	(1.2)	6.0	(3.1)
Mountain lions, cougars, or pumas	4.6	(0.9)	1.9	(0.3)	1.5	(0.4)	0.0	(0.0)
Foxes	3.7	(0.6)	4.6	(0.7)	3.4	(0.9)	3.1	(1.8)
Wolves	1.8	(0.5)	0.4	(0.1)	0.6	(0.5)	0.0	(0.0)
Eagles	7.3	(0.9)	5.7	(0.7)	4.8	(1.1)	8.3	(4.0)
Other predators	2.5	(0.6)	7.4	(1.5)	3.3	(0.9)	0.0	(0.0)
Unknown predators	7.6	(2.1)	3.7	(0.7)	3.8	(1.1)	5.4	(3.5)
Total	100.0		100.0		100.0		100.0	

5. Nonpredator sheep losses

For the 47.2 percent of operations with 1 or more ewes that lost sheep to nonpredator causes (table B.2.a.), the highest percentages of operations lost sheep due to old age (36.7 percent), lambing problems (24.0 percent), and unknown nonpredator causes (19.1 percent). A higher percentage of large operations (40.2 percent) lost sheep to lambing problems than very small (17.8 percent), small (23.4 percent), and medium (29.4 percent) operations.

B.5.a. For operations that lost sheep to nonpredator causes during 2010, percentage of operations by cause of loss 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**	
Nonpredator cause	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Enterotoxemia (overeating)	3.2	(1.3)	3.6	(0.7)	5.2	(0.9)	6.9	(1.1)	4.0	(0.5)	4.2	(0.6)
Internal parasites	6.0	(1.8)	13.9	(1.4)	18.7	(1.4)	20.0	(1.7)	13.1	(0.9)	15.5	(1.0)
Other digestive problems	5.8	(1.5)	7.0	(1.0)	8.0	(1.0)	14.1	(1.4)	7.3	(0.7)	7.8	(0.7)
Respiratory problems	4.5	(1.3)	10.5	(1.2)	16.7	(1.4)	20.4	(1.6)	10.7	(0.8)	12.8	(0.9)
Metabolic problems	1.2	(0.6)	2.1	(0.6)	3.9	(0.8)	3.2	(0.7)	2.3	(0.4)	2.7	(0.4)
Other disease problems	2.3	(0.8)	6.1	(0.9)	12.0	(1.1)	22.5	(1.7)	7.1	(0.6)	8.7	(0.7)
Weather-related causes	2.9	(1.0)	4.4	(0.8)	8.1	(1.0)	21.9	(1.7)	5.7	(0.5)	6.6	(0.6)
Lambing problems	17.8	(2.8)	23.4	(1.7)	29.4	(1.7)	40.2	(2.0)	24.0	(1.2)	26.1	(1.2)
Old age	36.8	(3.5)	32.6	(1.9)	44.5	(1.9)	47.5	(2.0)	36.7	(1.3)	36.7	(1.3)
Being on back	4.9	(1.4)	4.0	(0.7)	13.3	(1.3)	27.0	(1.7)	7.2	(0.6)	8.0	(0.6)
Poisoning	1.1	(0.6)	2.6	(0.7)	4.1	(0.8)	18.9	(1.4)	3.4	(0.4)	4.1	(0.5)
Theft	0.0	(0.0)	0.4	(0.3)	0.9	(0.3)	2.2	(0.6)	0.5	(0.2)	0.7	(0.2)
Other nonpredator causes	9.5	(2.1)	11.3	(1.3)	7.7	(1.0)	7.6	(1.1)	10.0	(0.9)	10.2	(0.9)
Unknown nonpredator causes	22.9	(3.1)	16.1	(1.5)	21.3	(1.6)	22.1	(1.6)	19.1	(1.1)	17.8	(1.1)

Of operations with 20 or more ewes that lost sheep to nonpredator causes (table B.2.a.), a higher percentage of herded/open-range operations (25.9 percent) lost sheep to weather-related causes compared with fenced-range (9.4 percent), pasture (4.8 percent), and dry lot/feedlot (5.5 percent) operations. A higher percentage of herded/open-range operations (25.6 percent) also lost sheep due to sheep being on their backs compared with the other flock types. Internal parasites caused sheep losses on a higher percentage of fenced-range and pasture operations (15.9 and 16.9 percent, respectively) compared with herded/open-range and dry lot/feedlot operations (5.0 and 6.6 percent, respectively).

B.5.b. For operations that lost sheep to nonpredator causes during 2010, percentage of operations by cause of loss and by flock type:

Percent Operations (20 or more ewes)

	Flock Type							
	Herded/ open range		Fenced range		Pasture		Dry lot/feedlot	
Nonpredator cause	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Enterotoxemia (overeating)	6.5	(3.7)	3.2	(1.0)	4.2	(0.7)	6.2	(2.3)
Internal parasites	5.0	(2.7)	15.9	(2.0)	16.9	(1.4)	6.6	(2.4)
Other digestive problems	13.5	(2.4)	5.9	(1.1)	7.8	(1.0)	11.9	(3.1)
Respiratory problems	16.8	(3.7)	9.0	(1.4)	13.6	(1.2)	15.9	(3.2)
Metabolic problems	1.2	(0.7)	1.5	(0.6)	3.0	(0.6)	4.2	(1.9)
Other disease problems	19.5	(3.0)	11.6	(1.5)	7.2	(0.8)	7.5	(2.2)
Weather-related causes	25.9	(4.6)	9.4	(1.3)	4.8	(0.8)	5.5	(2.0)
Lambing problems	33.6	(4.2)	23.4	(2.2)	26.7	(1.6)	28.9	(4.4)
Old age	48.0	(5.2)	39.5	(2.6)	35.5	(1.8)	33.3	(4.5)
Being on back	25.6	(3.5)	8.7	(1.0)	7.6	(0.8)	4.1	(1.8)
Poisoning	25.7	(3.4)	5.9	(1.1)	2.7	(0.6)	2.8	(1.7)
Theft	3.3	(1.3)	0.3	(0.1)	0.5	(0.2)	1.9	(1.8)
Other nonpredator causes	5.0	(1.2)	9.3	(1.6)	10.4	(1.2)	12.0	(3.2)
Unknown nonpredator causes	24.7	(3.7)	21.8	(2.3)	15.2	(1.3)	24.8	(4.2)

The top four known causes of nonpredator sheep loss on all operations were old age (22.1 percent of sheep), lambing problems (13.6 percent), internal parasites (9.6 percent), and weather-related causes (8.5 percent).

B.5.c. For sheep lost to nonpredator causes during 2010, percentage of sheep by cause of loss and by flock size:

Percent Sheep Lost*

Flock Size (number of ewes)

Nonpredator cause	Very small (fewer than 20) Pct.	Std. error	Small (20–99) Pct.	Std. error	Medium (100–499) Pct.	Std. error	Large (500 or more) Pct.	Std. error	All operations (1 or more) Pct.	Std. error	Operations with 20 or more Pct.	Std. error
Enterotoxemia (overeating)	2.7	(1.2)	2.4	(0.7)	2.4	(0.7)	1.8	(0.5)	2.2	(0.3)	2.1	(0.3)
Internal parasites	3.5	(1.0)	14.4	(2.7)	12.6	(1.4)	5.4	(1.0)	9.6	(0.9)	10.0	(1.0)
Other digestive problems	7.1	(2.4)	4.3	(1.1)	4.8	(1.3)	3.8	(0.6)	4.4	(0.5)	4.2	(0.5)
Respiratory problems	6.3	(1.9)	6.0	(1.2)	7.5	(0.9)	5.2	(0.7)	6.1	(0.5)	6.1	(0.5)
Metabolic problems	1.0	(0.5)	1.0	(0.3)	1.2	(0.2)	1.3	(0.8)	1.2	(0.3)	1.2	(0.4)
Other disease problems	2.6	(1.1)	4.0	(1.2)	4.2	(0.5)	10.1	(1.6)	6.4	(0.8)	6.7	(0.9)
Weather-related causes	4.0	(1.8)	4.5	(1.8)	5.6	(1.0)	13.7	(2.3)	8.5	(1.1)	8.8	(1.2)
Lambing problems	11.7	(2.0)	11.9	(1.7)	13.5	(1.1)	15.2	(1.6)	13.6	(0.9)	13.8	(0.9)
Old age	30.9	(3.4)	23.0	(2.6)	27.7	(1.7)	16.6	(1.3)	22.1	(1.0)	21.5	(1.1)
Being on back	3.3	(1.0)	1.3	(0.3)	3.5	(0.4)	3.5	(0.3)	2.9	(0.2)	2.9	(0.2)
Poisoning	0.7	(0.4)	2.4	(0.9)	1.2	(0.2)	4.9	(0.6)	3.0	(0.3)	3.1	(0.4)
Theft	0.0	(0.0)	0.2	(0.2)	2.5	(1.1)	2.0	(1.0)	1.5	(0.5)	1.6	(0.5)
Other nonpredator causes	6.9	(2.2)	7.4	(1.6)	3.3	(0.6)	2.8	(0.7)	4.5	(0.6)	4.3	(0.6)
Unknown nonpredator causes	19.4	(3.0)	17.0	(6.0)	10.3	(1.1)	13.6	(2.0)	14.1	(1.9)	13.7	(2.1)
Total	100.0		100.0		100.0		100.0		100.0		100.0	

*Percentage of total sheep nonpredator loss.

Internal parasites were a leading cause of nonpredator sheep losses on fenced-range and pasture operations (11.9 and 15.3 percent of lost sheep, respectively), but not for herded/open-range or dry lot/feedlot operations (0.4 and 4.6 percent of sheep, respectively). Lambing problems, weather-related causes, old age, and other disease problems accounted for the highest percentages of nonpredator sheep losses on herded/open-range operations. Old age was the leading nonpredator cause of sheep losses on fenced-range, pasture, and dry lot/feedlot operations.

B.5.d. For sheep lost to nonpredator causes during 2010, percentage of sheep by cause of loss and by flock type:

Percent Sheep Lost* (20 or more ewes)

Flock Type

	Herded/ open range		Fenced range		Pasture		Dry lot/feedlot	
Nonpredator cause	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Enterotoxemia (overeating)	1.1	(0.6)	2.4	(0.8)	2.2	(0.4)	4.6	(2.6)
Internal parasites	0.4	(0.1)	11.9	(1.7)	15.3	(2.0)	4.6	(1.6)
Other digestive problems	4.9	(1.0)	2.7	(0.6)	4.7	(1.1)	6.1	(2.3)
Respiratory problems	4.1	(1.0)	5.4	(0.9)	7.2	(0.9)	9.2	(2.5)
Metabolic problems	0.1	(0.1)	0.5	(0.2)	1.2	(0.2)	2.1	(0.8)
Other disease problems	10.2	(1.8)	4.3	(0.6)	5.9	(1.6)	4.6	(1.5)
Weather-related causes	16.9	(3.7)	12.3	(2.5)	3.2	(0.6)	3.7	(1.5)
Lambing problems	17.5	(2.7)	10.3	(1.1)	13.5	(1.3)	13.1	(2.7)
Old age	12.8	(1.6)	25.0	(1.8)	22.8	(1.8)	29.0	(5.1)
Being on back	3.0	(0.4)	3.2	(0.4)	3.0	(0.4)	0.9	(0.3)
Poisoning	5.9	(0.9)	4.1	(0.9)	1.4	(0.3)	1.7	(1.1)
Theft	3.1	(1.8)	0.4	(0.2)	1.8	(0.7)	0.3	(0.3)
Other nonpredator causes	2.2	(0.9)	4.4	(1.1)	5.6	(1.1)	4.0	(1.1)
Unknown nonpredator causes	17.7	(3.4)	13.0	(1.5)	12.3	(4.4)	16.0	(3.7)
Total	100.0		100.0		100.0		100.0	

*Percentage of total sheep nonpredator loss.

6. Nonpredator lamb losses (before and after docking)

For the 53.2 percent of operations that lost lambs to nonpredator causes during 2010 (table B.2.g.), 25.6 percent lost lambs to lambing problems. Respiratory causes of lamb loss were seen by 22.7 percent of all operations with losses. A higher percentage of medium and large operations lost lambs to respiratory problems than very small and small operations. A higher percentage of large operations lost lambs to poisoning and theft compared with the other operation sizes.

B.6.a. For operations that lost lambs to nonpredator causes during 2010, percentage of operations by cause of loss 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**	
Nonpredator cause	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Enterotoxemia (overeating)	4.4	(1.3)	13.6	(1.3)	25.8	(1.6)	31.9	(2.0)	13.3	(0.8)	17.6	(1.0)
Internal parasites	6.2	(1.6)	15.2	(1.4)	20.0	(1.6)	16.8	(1.8)	13.1	(0.9)	16.4	(1.1)
Other digestive problems	6.2	(1.3)	15.3	(1.3)	25.0	(1.6)	24.6	(1.9)	14.3	(0.8)	18.2	(1.0)
Respiratory problems	9.6	(1.6)	25.8	(1.6)	35.5	(1.8)	40.3	(2.1)	22.7	(1.0)	29.0	(1.2)
Metabolic problems	1.8	(0.9)	3.8	(0.8)	6.0	(0.9)	4.8	(1.0)	3.6	(0.5)	4.4	(0.6)
Other disease problems	0.9	(0.5)	4.5	(0.8)	5.8	(0.9)	6.5	(1.0)	3.5	(0.4)	4.9	(0.6)
Weather-related causes	19.7	(2.3)	20.1	(1.5)	36.1	(1.8)	58.8	(2.1)	24.1	(1.1)	26.2	(1.2)
Lambing problems	23.8	(2.5)	25.1	(1.6)	28.0	(1.6)	36.6	(2.0)	25.6	(1.2)	26.5	(1.2)
Being on back	1.2	(0.6)	1.1	(0.4)	1.8	(0.5)	2.8	(0.8)	1.3	(0.3)	1.3	(0.3)
Poisoning	0.9	(0.6)	1.9	(0.5)	1.6	(0.3)	16.1	(1.5)	2.1	(0.3)	2.6	(0.4)
Theft	0.2	(0.1)	0.6	(0.3)	1.0	(0.3)	4.2	(1.0)	0.7	(0.2)	0.9	(0.2)
Other nonpredator causes	17.9	(2.3)	19.1	(1.5)	15.3	(1.4)	18.7	(1.7)	18.1	(1.1)	18.2	(1.1)
Unknown nonpredator causes	26.3	(2.7)	23.1	(1.6)	26.4	(1.7)	32.8	(2.0)	25.0	(1.2)	24.4	(1.2)

Of operations that lost lambs to nonpredator causes during 2010 (table B.2.g.), a higher percentage in the Central region lost lambs to weather-related causes and enterotoxemia compared with operations in the West and East regions.

B.6.b. For operations that lost lambs to nonpredator causes during 2010, percentage of operations by cause of loss and by region:

	Percent Operations (1 or more ewes)					
	Region					
	West		**Central**		**East**	
Nonpredator cause	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Enterotoxemia (overeating)	9.1	(2.0)	18.1	(1.4)	11.5	(1.1)
Internal parasites	7.2	(1.7)	7.5	(1.0)	18.1	(1.4)
Other digestive problems	7.0	(1.7)	13.7	(1.1)	16.5	(1.3)
Respiratory problems	21.1	(2.8)	19.1	(1.3)	25.3	(1.6)
Metabolic problems	2.7	(1.2)	1.7	(0.5)	4.9	(0.8)
Other disease problems	4.0	(1.4)	4.7	(0.8)	2.9	(0.5)
Weather-related causes	15.5	(2.4)	32.9	(1.8)	20.9	(1.5)
Lambing problems	27.1	(3.3)	24.6	(1.5)	25.8	(1.8)
Being on back	0.7	(0.6)	1.3	(0.3)	1.5	(0.5)
Poisoning	0.4	(0.1)	3.2	(0.4)	1.9	(0.5)
Theft	0.7	(0.6)	1.0	(0.2)	0.4	(0.2)
Other nonpredator causes	19.4	(2.9)	17.9	(1.7)	17.8	(1.5)
Unknown nonpredator causes	34.2	(3.6)	29.2	(2.0)	20.1	(1.6)

Of operations with 20 or more ewes that lost lambs due to nonpredator causes during 2010 (table B.2.g.), a higher percentage of herded/open-range operations lost lambs to weather-related causes and poisoning compared with fenced-range and pasture flock types. Respiratory problems and enterotoxemia caused lamb losses for a higher percentage of dry lot/feedlot operations (42.4 and 32.3 percent, respectively) than for the other flock types.

B.6.c. For operations that lost lambs to nonpredator causes during 2010, percentage of operations by cause of loss and by flock type:

Percent Operations (1 or more ewes)

	Flock Type							
	Herded/ open range		**Fenced range**		**Pasture**		**Dry lot/feedlot**	
Nonpredator cause	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Enterotoxemia (overeating)	19.4	(4.4)	15.3	(1.8)	16.7	(1.2)	32.3	(4.3)
Internal parasites	5.2	(2.7)	11.2	(1.8)	19.7	(1.4)	6.4	(2.4)
Other digestive problems	20.5	(3.6)	15.1	(1.8)	18.0	(1.3)	27.5	(4.3)
Respiratory problems	28.3	(4.3)	20.1	(2.1)	30.1	(1.6)	42.4	(4.3)
Metabolic problems	4.1	(2.6)	3.2	(1.0)	4.7	(0.7)	3.5	(1.5)
Other disease problems	10.2	(3.1)	5.3	(1.3)	4.9	(0.7)	2.6	(1.6)
Weather-related causes	54.4	(5.3)	35.8	(2.6)	22.4	(1.4)	23.3	(3.9)
Lambing problems	33.6	(4.5)	27.0	(2.4)	25.9	(1.6)	26.8	(4.1)
Being on back	2.7	(0.9)	1.1	(0.4)	1.5	(0.4)	0.4	(0.3)
Poisoning	24.0	(3.7)	3.5	(0.8)	1.6	(0.5)	1.3	(0.9)
Theft	7.0	(2.9)	1.4	(0.6)	0.6	(0.3)	0.0	(0.0)
Other nonpredator causes	13.2	(4.1)	14.5	(1.9)	18.8	(1.4)	21.4	(3.9)
Unknown nonpredator causes	31.7	(4.5)	30.3	(2.7)	22.8	(1.5)	21.3	(3.8)

For the 6.3 percent of lambs lost to nonpredator causes (table B.2.h.), weather-related causes accounted for the highest percentage of nonpredator lamb losses, especially on large operations where 37.5 percent of nonpredator lamb losses were due to weather-related causes.

B.6.d. For lambs lost to nonpredator causes during 2010, percentage of lambs by cause of loss and by flock size:

Percent Lambs*

Flock Size (number of ewes)

Nonpredator cause	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
Enterotoxemia (overeating)	4.0	(1.3)	6.1	(0.8)	7.2	(0.7)	6.1	(1.3)	6.2	(0.6)	6.4	(0.7)
Internal parasites	5.0	(1.5)	12.7	(1.6)	10.0	(1.3)	3.6	(0.7)	7.4	(0.6)	7.5	(0.7)
Other digestive problems	3.2	(0.8)	6.9	(1.0)	9.8	(1.1)	4.3	(0.6)	6.2	(0.5)	6.4	(0.5)
Respiratory problems	10.0	(2.2)	14.0	(1.2)	15.5	(1.2)	9.4	(1.0)	12.0	(0.7)	12.1	(0.7)
Metabolic problems	0.7	(0.3)	1.8	(0.4)	1.7	(0.3)	0.7	(0.3)	1.2	(0.2)	1.2	(0.2)
Other disease problems	0.9	(0.6)	2.7	(0.6)	2.3	(0.6)	1.8	(0.4)	2.1	(0.3)	2.1	(0.3)
Weather-related causes	16.8	(2.3)	13.8	(1.5)	23.8	(1.8)	37.5	(2.1)	27.3	(1.3)	28.1	(1.4)
Lambing problems	19.7	(2.6)	14.4	(1.2)	11.1	(0.8)	11.5	(1.5)	12.6	(0.8)	12.1	(0.8)
Being on back	0.6	(0.3)	0.3	(0.1)	0.2	(0.1)	0.2	(0.1)	0.3	(0.0)	0.2	(0.0)
Poisoning	0.7	(0.4)	1.4	(0.8)	0.8	(0.2)	3.1	(0.5)	2.0	(0.3)	2.1	(0.3)
Theft	0.1	(0.1)	1.5	(1.0)	0.6	(0.2)	1.3	(0.5)	1.1	(0.3)	1.2	(0.4)
Other nonpredator causes	12.5	(2.3)	8.2	(0.9)	6.1	(0.9)	5.2	(0.8)	6.6	(0.5)	6.2	(0.5)
Unknown nonpredator causes	25.8	(4.3)	16.2	(1.7)	11.0	(1.1)	15.3	(2.5)	15.2	(1.3)	14.4	(1.3)
Total	100.0		100.0		100.0		100.0		100.0		100.0	

*Percentage of total lamb nonpredator loss.

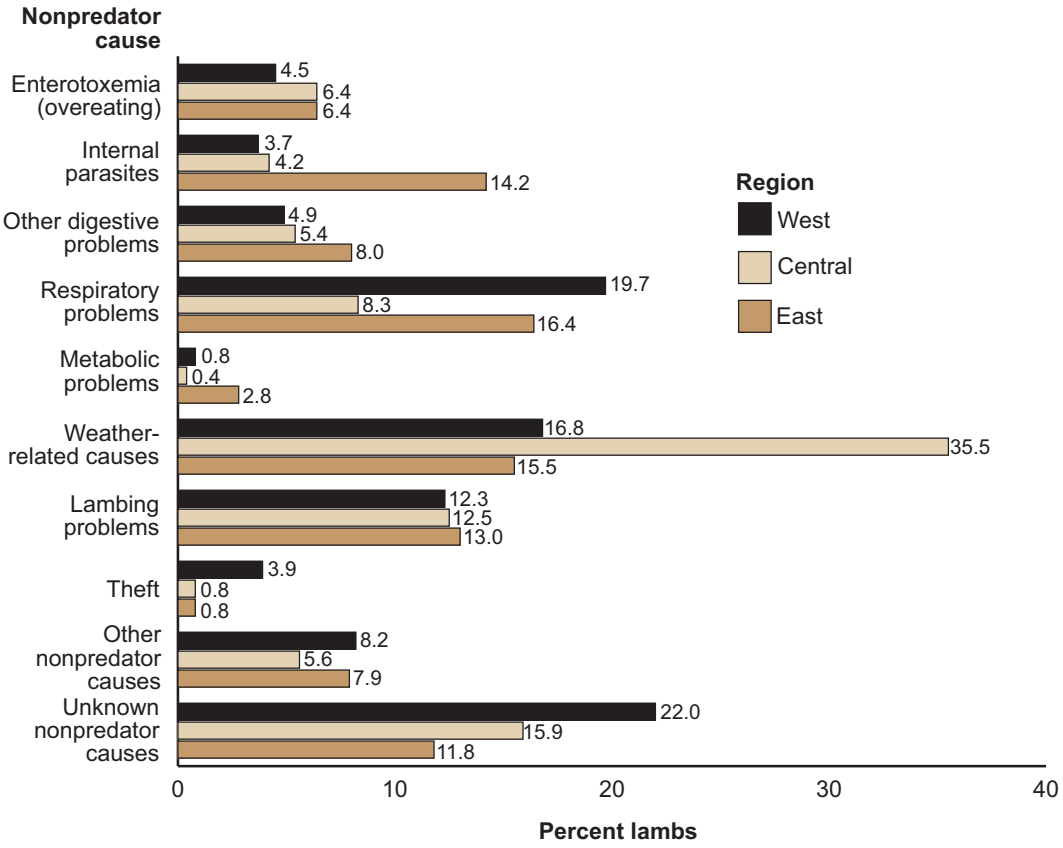
For lambs lost to nonpredator causes (table B.2.h.), the percentage of lamb losses due to weather-related causes were higher in the Central region (35.5 percent) compared with the West and East regions (16.8 and 15.5 percent, respectively). However, respiratory problems caused a lower percentage of lamb losses in the Central region (8.3 percent) than in the West and the East regions (19.7 and 16.4 percent, respectively). A higher percentage of lamb losses in the East region (14.2 percent) were due to internal parasites compared with the West and Central regions (3.7 and 4.2 percent, respectively).

B.6.e. For lambs lost to nonpredator causes during 2010, percentage of lambs by cause of loss and by region:

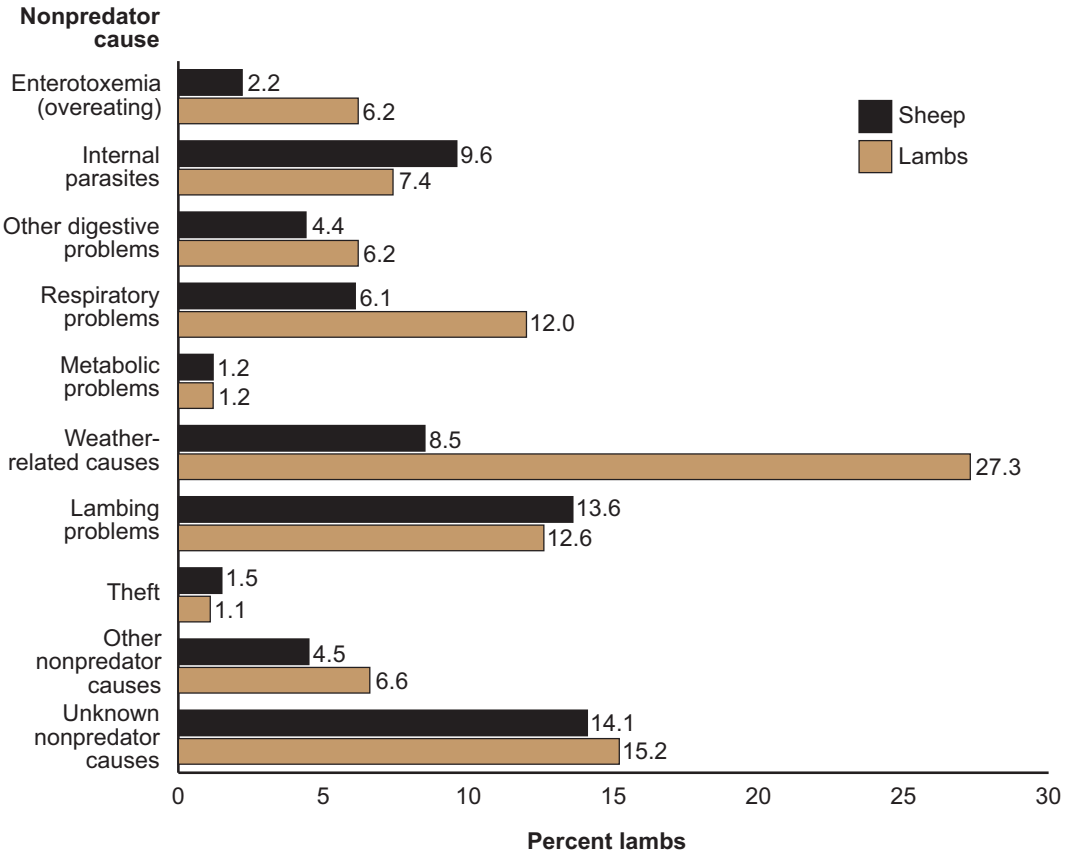
	Percent Lambs* (1 or more ewes)					
	Region					
	West		**Central**		**East**	
Nonpredator cause	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Enterotoxemia (overeating)	4.5	(1.3)	6.4	(1.0)	6.4	(0.6)
Internal parasites	3.7	(1.1)	4.2	(0.8)	14.2	(1.2)
Other digestive problems	4.9	(1.0)	5.4	(0.6)	8.0	(0.8)
Respiratory problems	19.7	(2.5)	8.3	(0.7)	16.4	(1.2)
Metabolic problems	0.8	(0.3)	0.4	(0.1)	2.8	(0.6)
Other disease problems	2.7	(1.0)	2.0	(0.4)	1.9	(0.5)
Weather-related causes	16.8	(2.0)	35.5	(1.8)	15.5	(1.4)
Lambing problems	12.3	(1.5)	12.5	(1.2)	13.0	(1.0)
Being on back	0.2	(0.1)	0.2	(0.1)	0.3	(0.1)
Poisoning	0.4	(0.2)	2.7	(0.4)	1.1	(0.6)
Theft	3.9	(2.5)	0.8	(0.2)	0.8	(0.7)
Other nonpredator causes	8.2	(1.3)	5.6	(0.7)	7.9	(0.9)
Unknown nonpredator causes	22.0	(2.8)	15.9	(2.0)	11.8	(1.4)
Total	100.0		100.0		100.0	

*Percentage of total lamb nonpredator loss.

For lambs lost to nonpredator causes during 2010, percentage of lambs by cause of loss, and by region



For sheep and lambs lost to nonpredator causes during 2010, percentage of sheep and lambs on operations with one or more ewes, by cause of loss



For lambs lost to nonpredator causes on operations with 20 or more ewes (table B.2.g.), respiratory problems accounted for a higher percentage of nonpredator lamb losses on pasture and dry lot/feedlot operations (15.4 and 23.6 percent, respectively) than on herded/open-range and fenced-range operations (6.9 and 9.4 percent, respectively).

B.6.f. For lambs lost to nonpredator causes during 2010, percentage of lambs by cause of loss and by flock type:

Percent Lambs* (20 or more ewes)

Flock Type

	Herded/ open range		Fenced range		Pasture		Dry lot/feedlot	
Nonpredator cause	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Enterotoxemia (overeating)	4.4	(1.9)	6.2	(1.4)	6.8	(0.5)	14.2	(2.2)
Internal parasites	0.6	(0.3)	8.2	(1.8)	13.3	(1.1)	3.7	(1.5)
Other digestive problems	4.4	(0.9)	4.8	(0.6)	8.2	(0.9)	10.4	(1.9)
Respiratory problems	6.9	(1.2)	9.4	(1.4)	15.4	(0.9)	23.6	(3.6)
Metabolic problems	0.2	(0.1)	0.7	(0.2)	1.7	(0.3)	1.9	(0.8)
Other disease problems	2.1	(0.6)	1.8	(0.4)	2.6	(0.5)	0.2	(0.1)
Weather-related causes	42.8	(2.9)	33.1	(2.3)	17.1	(1.3)	13.0	(2.6)
Lambing problems	12.3	(2.4)	10.9	(1.0)	12.6	(0.9)	13.1	(2.9)
Being on back	0.2	(0.1)	0.2	(0.1)	0.3	(0.1)	0.0	(0.0)
Poisoning	3.8	(0.7)	2.1	(0.5)	0.9	(0.5)	0.9	(0.6)
Theft	0.5	(0.2)	1.8	(0.6)	1.5	(0.8)	0.0	(0.0)
Other nonpredator causes	4.6	(1.1)	6.0	(0.8)	7.3	(0.8)	6.0	(1.5)
Unknown nonpredator causes	17.2	(3.9)	14.7	(1.6)	12.3	(1.2)	12.8	(3.1)
Total	100.0		100.0		100.0		100.0	

*Percentage of total lamb nonpredator loss.

7. Carcass disposal methods

Carcass disposal can be a challenge to producers and depends on local, county, and State laws regarding carcass disposal; a producer's skill/knowledge of disposal methods (e.g., incinerations and composting); and equipment availability (e.g., for burying and rendering). The cost of different carcass- disposal methods also influences a producer's decision.

Burial and leaving for scavengers were the most common methods used to dispose of carcasses on 38.5 and 27.1 percent of operations that had any losses, respectively. Almost half of all lamb carcasses (49.1 percent) were left for scavengers (table B.7.g.), and 21.9 percent were buried (table B.7.g.). The difference between disposal methods by operation percentage and by sheep/lamb percentage is likely due to larger operations having a greater number of carcasses for disposal.

Of operations that had any sheep deaths during 2010 (table B.1.a.), 38.5 percent buried at least one sheep carcass. A higher percentage of very small operations (50.7 percent) buried sheep carcasses compared with small (36.0 percent), medium (30.0 percent), and large (27.4 percent) operations. A higher percentage of large operations (65.5 percent) left sheep carcasses for scavengers compared with very small (19.1 percent), small (25.3 percent), and medium operations (32.9 percent). The majority of "other" methods of disposal included putting the carcasses in a bone pile or feeding to dogs.

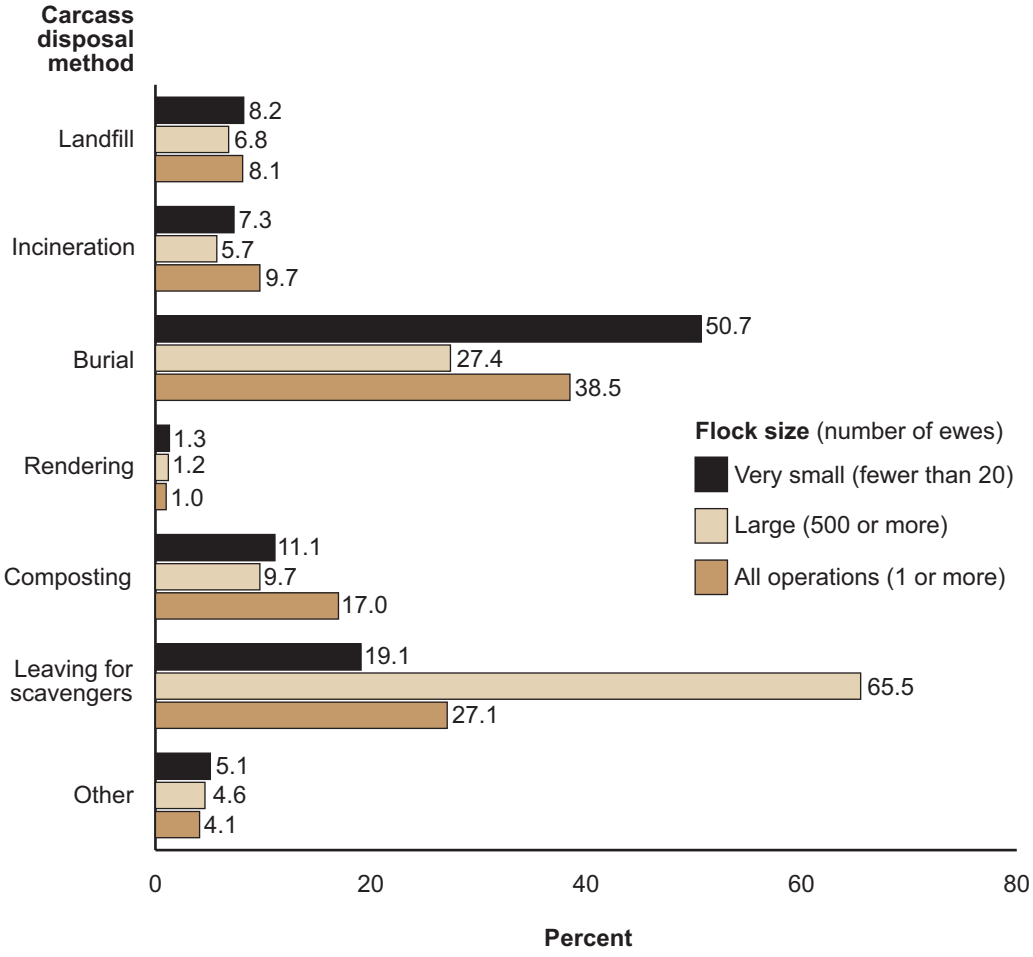
B.7.a. For operations that had any **sheep** deaths during 2010, percentage of operations by carcass disposal method used and by flock size:

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**	
Carcass disposal method	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Landfill	8.2	(1.7)	8.5	(1.0)	7.2	(0.9)	6.8	(0.9)	8.1	(0.7)	8.1	(0.7)
Incineration	7.3	(1.5)	10.9	(1.2)	11.3	(1.2)	5.7	(0.9)	9.7	(0.7)	10.7	(0.9)
Burial	50.7	(3.3)	36.0	(1.8)	30.0	(1.7)	27.4	(1.6)	38.5	(1.3)	33.9	(1.3)
Rendering	1.3	(0.8)	0.9	(0.3)	1.0	(0.3)	1.2	(0.4)	1.0	(0.3)	1.0	(0.2)
Composting	11.1	(2.2)	19.2	(1.4)	22.1	(1.4)	9.7	(1.2)	17.0	(1.0)	19.2	(1.0)
Leaving for scavengers	19.1	(2.6)	25.3	(1.6)	32.9	(1.6)	65.5	(1.7)	27.1	(1.1)	30.0	(1.2)
Other	5.1	(1.6)	3.5	(0.7)	4.2	(0.8)	4.6	(0.8)	4.1	(0.6)	3.8	(0.5)

For operations that had any sheep deaths during 2010, percentage of operations by carcass disposal method used and by flock size



Of operations that had any sheep deaths during 2010 (table B.1.a.) a lower percentage in the Central region (30.3 percent) buried sheep carcasses than operations in the East region (44.5 percent). Conversely, a higher percentage of operations in the Central region (44.1 percent) left carcasses for scavengers compared with operations in the West and East regions (29.9 and 11.6 percent, respectively). A higher percentage of operations in the East region (29.1 percent) composted sheep carcasses compared with operations in the West and Central regions (9.5 and 6.0 percent, respectively).

B.7.b. For operations that had any **sheep** deaths during 2010, percentage of operations by carcass disposal method and by region:

	Percent Operations (1 or more ewes)					
	Region					
	West		**Central**		**East**	
Carcass disposal method	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Landfill	12.3	(2.2)	12.5	(1.3)	2.9	(0.7)
Incineration	6.6	(1.5)	7.3	(1.0)	13.0	(1.3)
Burial	40.7	(3.3)	30.3	(1.8)	44.5	(2.1)
Rendering	0.9	(0.5)	0.4	(0.2)	1.7	(0.6)
Composting	9.5	(1.9)	6.0	(1.0)	29.1	(1.8)
Leaving for scavengers	29.9	(3.1)	44.1	(2.0)	11.6	(1.2)
Other	5.7	(1.6)	6.1	(1.1)	2.0	(0.6)

Overall, 40.1 percent of sheep that died during 2010 were left for scavengers. On large operations, a higher percentage of sheep carcasses were left for scavengers (54.6 percent) than on very small operations (19.4 percent). On very small operations, 35.9 percent of sheep carcasses were buried.

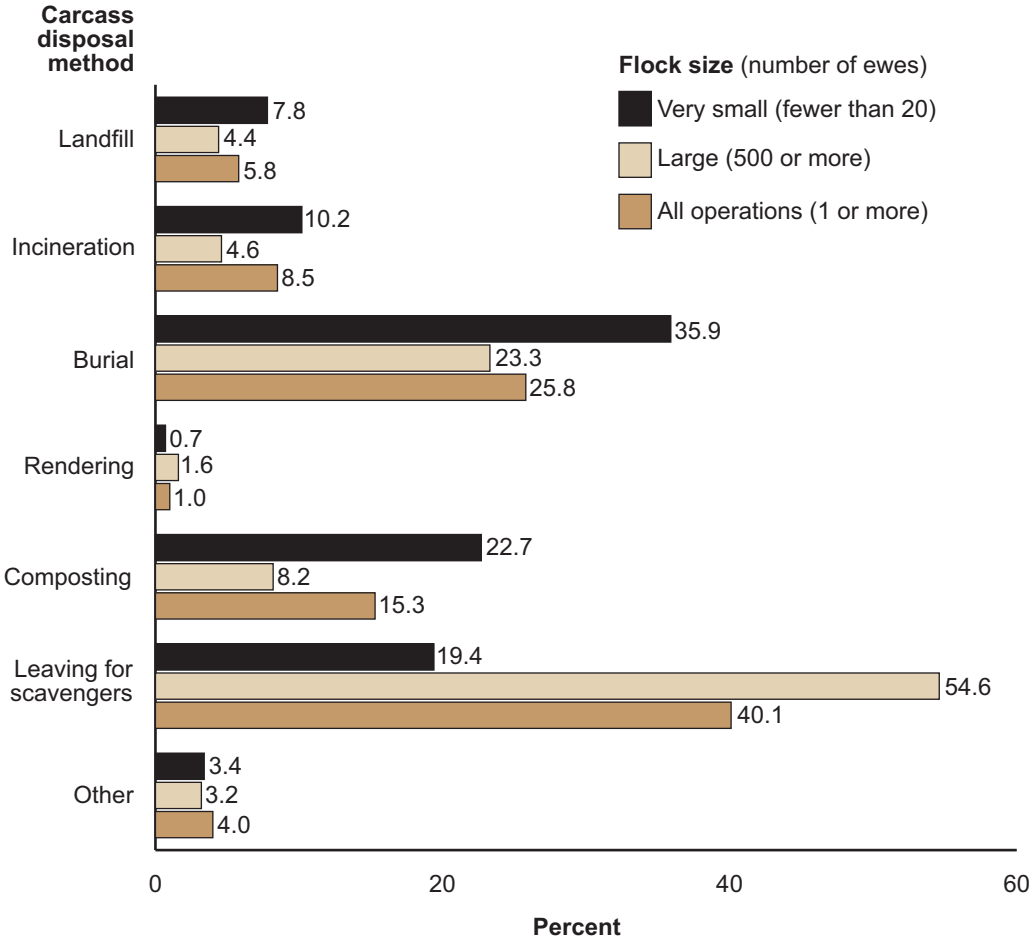
B.7.c. Of **sheep** that died during 2010, percentage of dead sheep by carcass disposal method used and by flock size:

Percent Dead Sheep (1 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**	
Carcass disposal method	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Landfill	7.8	(2.0)	6.5	(1.1)	7.0	(1.1)	4.4	(1.2)	5.8	(0.7)	5.6	(0.7)
Incineration	10.2	(3.7)	12.8	(2.8)	10.0	(1.3)	4.6	(1.3)	8.5	(1.0)	8.3	(1.1)
Burial	35.9	(4.5)	29.3	(3.0)	23.1	(1.8)	23.3	(2.5)	25.8	(1.4)	25.0	(1.5)
Rendering	0.7	(0.4)	0.5	(0.2)	0.6	(0.3)	1.6	(0.9)	1.0	(0.4)	1.0	(0.4)
Composting	22.7	(6.7)	17.0	(2.2)	23.7	(2.3)	8.2	(2.4)	15.3	(1.4)	14.6	(1.4)
Leaving for scavengers	19.4	(4.2)	30.4	(4.6)	31.4	(2.1)	54.6	(3.1)	40.1	(1.8)	41.9	(1.9)
Other	3.4	(1.4)	3.6	(1.1)	4.2	(1.0)	3.2	(0.7)	4.0	(0.5)	3.6	(0.5)
Total	100.0		100.0		100.0		100.0		100.0		100.0	

Of sheep that died during 2010, percentage of dead sheep by carcass disposal method used and by flock size



The method of carcass disposal used is largely a factor of locale. In the Central region, the highest percentage of sheep carcasses (55.8 percent) were left for scavengers, while in the East region, the highest percentage of sheep carcasses (41.6 percent) were composted. In the West region, the highest percentage of sheep carcasses were either by buried (29.5 percent) or by left for scavengers (24.8 percent).

B.7.d. Of **sheep** that died during 2010, percentage of dead sheep by carcass disposal method used and by region:

Percent Dead Sheep (1 or more ewes)

	Region					
	West		Central		East	
Carcass disposal method	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Landfill	12.8	(3.1)	5.2	(0.6)	3.1	(0.8)
Incineration	9.7	(3.3)	7.1	(1.3)	11.1	(1.7)
Burial	29.5	(3.3)	23.5	(1.9)	29.2	(2.3)
Rendering	4.3	(2.4)	0.1	(0.0)	1.1	(0.3)
Composting	14.0	(2.9)	4.5	(1.0)	41.6	(3.4)
Leaving for scavengers	24.8	(2.8)	55.8	(2.5)	12.0	(1.7)
Other	4.9	(1.4)	3.9	(0.7)	2.0	(0.8)
Total	100.0		100.0		100.0	

Of the 65.1 percent of operations which had lamb losses (very few operations lost lambs only to theft and therefore would not have had a carcass) [table B.1.a.), about half of very small operations that had any lamb deaths during 2010 (50.2 percent) buried lamb carcasses, while over two-thirds of large operations (68.6 percent) left lamb carcasses for scavengers.

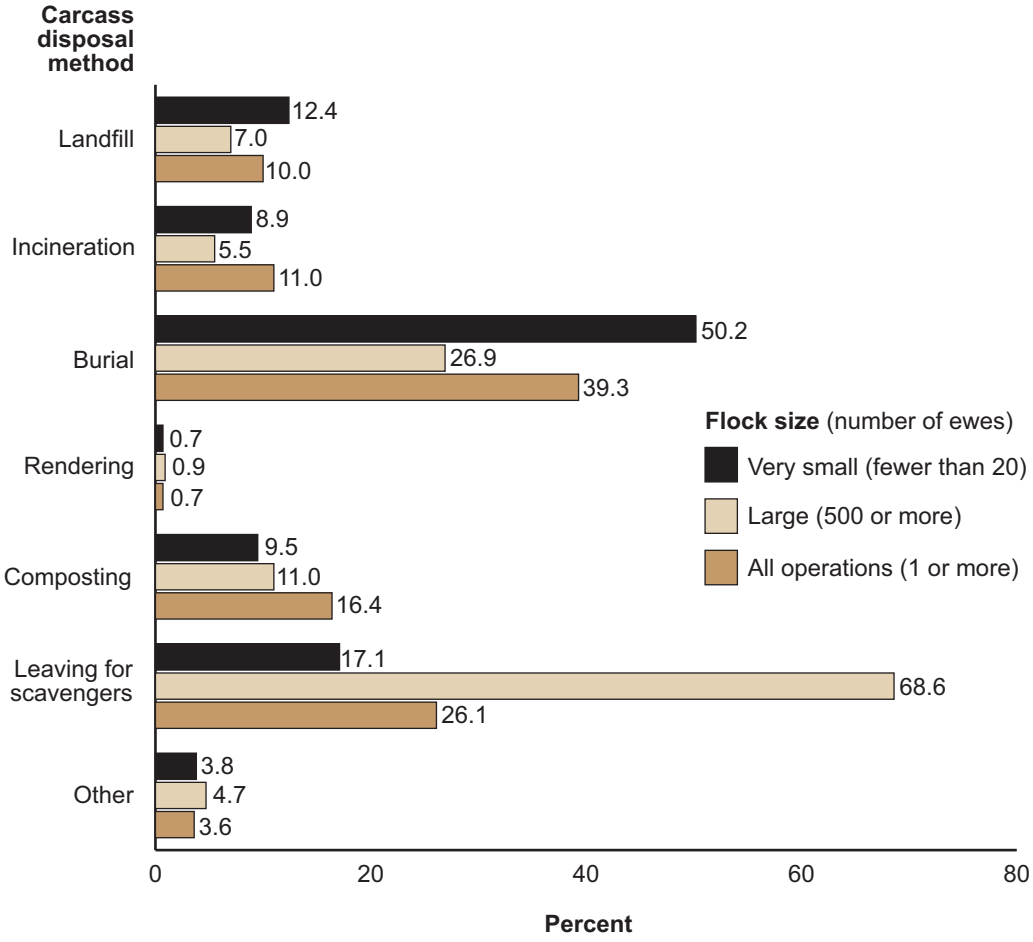
B.7.e. For operations that had any **lambs** deaths during 2010, percentage of operations by carcass disposal method used and by flock size:

Percent Operations

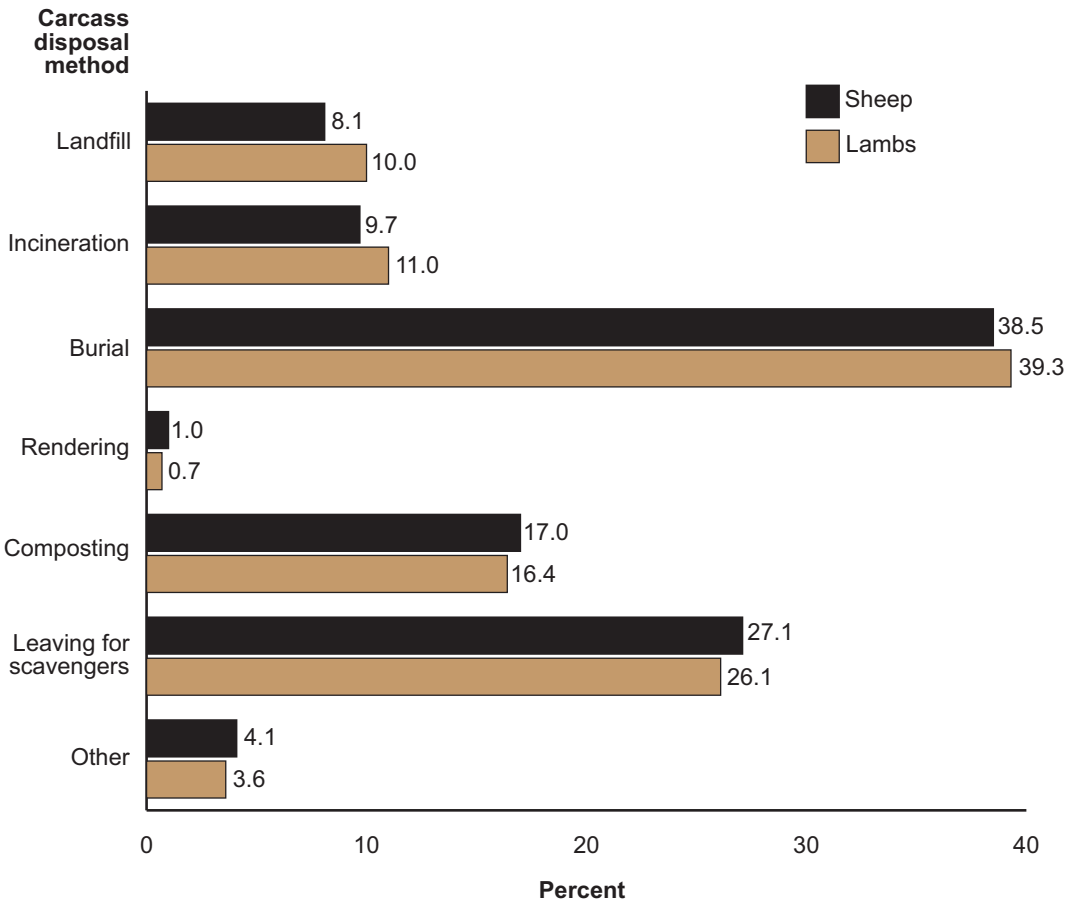
Flock Size (number of ewes)

	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**	
Carcass disposal method	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Landfill	12.4	(1.7)	9.5	(1.0)	7.3	(0.9)	7.0	(0.9)	10.0	(0.7)	8.8	(0.7)
Incineration	8.9	(1.5)	12.1	(1.1)	13.4	(1.2)	5.5	(0.9)	11.0	(0.7)	12.0	(0.8)
Burial	50.2	(2.7)	36.1	(1.7)	30.4	(1.6)	26.9	(1.6)	39.3	(1.2)	34.2	(1.2)
Rendering	0.7	(0.4)	0.8	(0.3)	0.5	(0.2)	0.9	(0.3)	0.7	(0.2)	0.7	(0.2)
Composting	9.5	(1.6)	19.3	(1.3)	23.2	(1.3)	11.0	(1.2)	16.4	(0.9)	19.7	(1.0)
Leaving for scavengers	17.1	(2.0)	25.6	(1.5)	33.8	(1.5)	68.6	(1.7)	26.1	(1.0)	30.3	(1.1)
Other	3.8	(1.1)	3.6	(0.7)	3.0	(0.7)	4.7	(0.8)	3.6	(0.5)	3.5	(0.5)

For operations that had any lambs deaths during 2010, percentage of operations by carcass disposal method used and by flock size



For operations that had any sheep or lamb deaths during 2010, percentage of operations by carcass disposal method used



B.7.f. For operations that had any **lamb** deaths during 2010, percentage of operations by carcass disposal method used and by region:

	Percent Operations (1 or more ewes)					
	Region					
	West		**Central**		**East**	
Carcass disposal method	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Landfill	13.5	(2.2)	13.9	(1.2)	5.7	(1.0)
Incineration	7.0	(1.6)	10.0	(1.2)	13.1	(1.2)
Burial	39.7	(3.1)	32.7	(1.7)	44.4	(1.9)
Rendering	1.0	(0.6)	0.2	(0.1)	1.1	(0.3)
Composting	9.9	(1.8)	5.3	(0.7)	27.4	(1.6)
Leaving for scavengers	32.3	(2.9)	41.2	(1.8)	12.1	(1.2)
Other	4.5	(1.3)	4.9	(0.9)	2.3	(0.6)

Nearly half of lamb carcasses (49.1 percent) were left for scavengers during 2010. A higher percentage of lamb carcasses on large operations (65.3 percent) were left for scavengers compared with lamb carcasses on very small (22.3 percent), small (30.9 percent), and medium (36.7 percent) operations. A higher percentage of lamb carcasses on very small operations were buried (41.5 percent) compared with small (28.7 percent), medium (22.3 percent), and large (16.8 percent) operations.

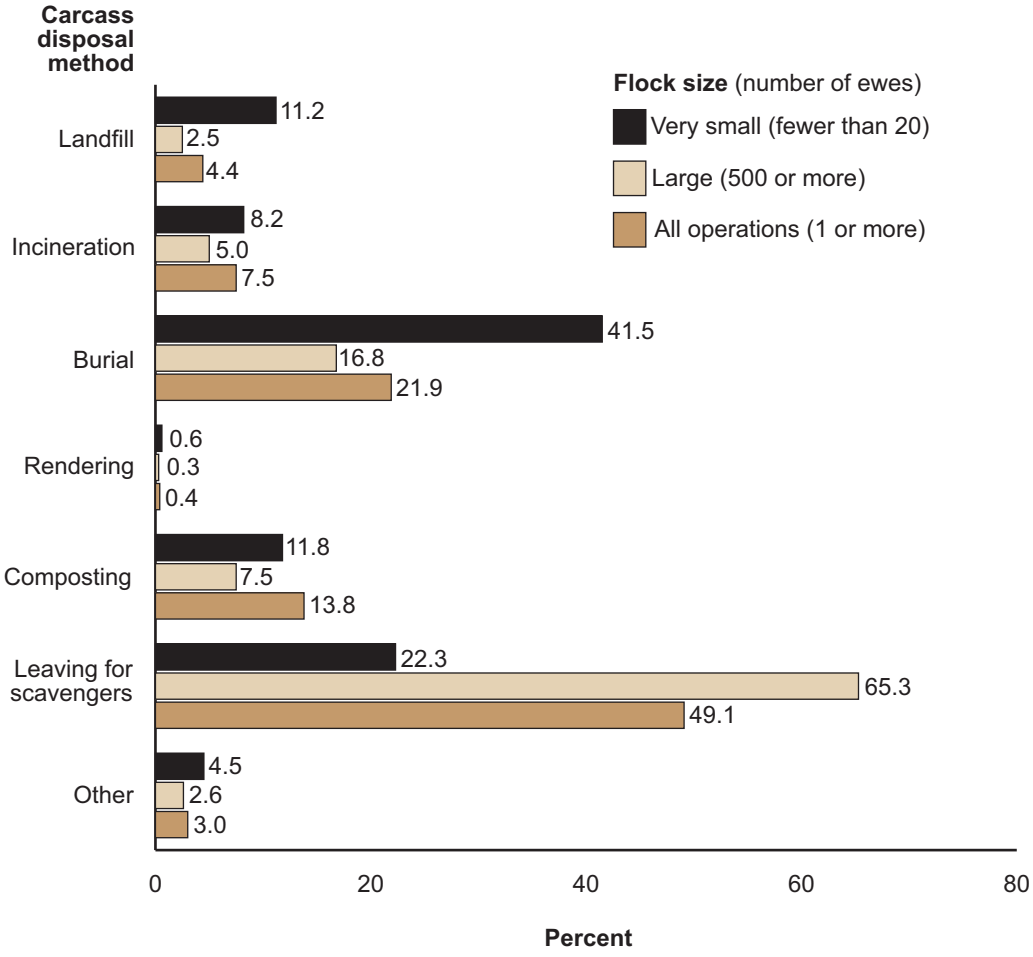
B.7.g. Of lambs that died during 2010, percentage of dead lambs by carcass disposal method used and by flock size:

Percent Dead 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**	
Carcass disposal method	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Landfill	11.2	(2.1)	6.2	(0.9)	5.5	(0.8)	2.5	(0.4)	4.4	(0.4)	4.0	(0.4)
Incineration	8.2	(1.7)	10.9	(1.5)	9.5	(1.3)	5.0	(1.5)	7.5	(0.9)	7.4	(0.9)
Burial	41.5	(3.8)	28.7	(2.1)	22.3	(1.6)	16.8	(1.8)	21.9	(1.1)	20.8	(1.1)
Rendering	0.6	(0.4)	0.9	(0.4)	0.2	(0.1)	0.3	(0.1)	0.4	(0.1)	0.4	(0.1)
Composting	11.8	(3.5)	18.8	(2.3)	23.2	(1.9)	7.5	(1.2)	13.8	(1.0)	13.9	(1.0)
Leaving for scavengers	22.3	(3.8)	30.9	(2.8)	36.7	(2.4)	65.3	(2.3)	49.1	(1.6)	50.6	(1.7)
Other	4.5	(2.3)	3.7	(1.0)	2.7	(0.8)	2.6	(0.7)	3.0	(0.5)	2.9	(0.4)
Total	100.0		100.0		100.0		100.0		100.0		100.0	

Of lambs that died during 2010, percentage of dead lambs by carcass disposal method used and by flock size



The majority of lamb carcasses in the Central region (62.7 percent) were left for scavengers, while only 38.0 percent of lamb carcasses in the West region and 14.7 percent in the East region were left for scavengers. Nearly 4 of 10 lamb carcasses in the East region (39.1 percent) were composted.

B.7.h. Of **lambs** that died during 2010, percentage of dead lambs by carcass disposal method used and by region:

	Percent Dead Lambs (1 or more ewes)					
	Region					
	West		**Central**		**East**	
Carcass disposal method	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Landfill	7.6	(1.5)	4.4	(0.5)	2.9	(0.6)
Incineration	5.8	(1.6)	6.5	(1.2)	11.2	(1.3)
Burial	25.3	(2.6)	19.0	(1.4)	28.6	(2.0)
Rendering	1.4	(0.6)	0.1	(0.1)	0.9	(0.3)
Composting	17.4	(3.8)	4.4	(0.7)	39.1	(2.5)
Leaving for scavengers	38.0	(3.5)	62.7	(1.9)	14.7	(2.5)
Other	4.6	(1.4)	2.8	(0.5)	2.6	(0.8)
Total	100.0		100.0		100.0	

C. Sheep and Lambs on Feed

1. Sheep and lambs on a high-energy diet

The NAHMS Sheep 2011 study included only operations with ewes and, therefore, was not meant to characterize the sheep feedlot industry. As was found in this study, many operations feed high-energy diets to sheep or lambs to finish them but also have a regular ewe/lamb operation.

Overall, 31.4 percent of operations fed a high-energy diet to sheep or lambs to finish them for slaughter during 2010. A higher percentage of small and medium operations (31.1 and 34.4 percent, respectively) fed a high-energy diet compared with large operations (23.4 percent).

C.1.a. Percentage of operations that fed a high-energy diet to sheep or lambs to finish them for slaughter 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**
		31.1	(1.3)	34.4	(1.5)	23.4	(1.6)			31.4	(1.0)

A higher percentage of operations in the East region (47.2 percent) fed a high-energy diet to sheep or lambs to finish them for slaughter compared with operations in the West or Central regions (18.7 and 18.3 percent, respectively).

C.1.b. Percentage of operations that fed a high-energy diet to sheep or lambs to finish them for slaughter during 2010, by region:

Percent Operations (20 or more ewes)

Region

West		**Central**		**East**	
Percent	**Std. error**	**Percent**	**Std. error**	**Percent**	**Std. error**
18.7	(2.5)	18.3	(1.2)	47.2	(1.8)

Compared with the other flock types, a higher percentage of dry lot/feedlot operations fed a high-energy diet to sheep or lambs to finish them for slaughter; however, only about half of the dry lot/feedlot operations (52.4 percent) fed a high-energy diet to finish sheep and lambs, which is indicative of the many operations in this category that are primarily dry lots rather than primarily feedlots.

C.1.c. Percentage of operations that fed a high-energy diet to sheep or lambs to finish them for slaughter during 2010, by flock type:

Percent Operations (20 or more ewes)

Flock Type

Herded/ open range		Fenced range		Pasture		Dry lot/feedlot	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
8.1	(1.5)	20.3	(1.7)	35.0	(1.4)	52.4	(4.4)

Overall, 27.3 percent of lambs were fed a high-energy diet to finish them for slaughter during 2010 compared with only 1.0 percent of sheep.

C.1.d. Percentage of sheep and lambs fed a high-energy diet to finish them for slaughter during 2010, by flock size:

Percent Sheep[1] and Lambs[2]

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
Sheep			1.1	(0.3)	2.0	(0.5)	0.5	(0.2)			1.0	(0.2)
Lambs			25.2	(1.8)	40.9	(9.6)	20.9	(3.7)			27.3	(3.2)

[1]Percentage of January 1, 2011, inventory.
[2]Percentage of lambs weaned in 2010.

On operations in the East region, 44.7 percent of lambs were fed a high-energy diet compared with 13.9 and 23.3 percent of lambs in the West and Central regions, respectively.

C.1.e. Percentage of sheep and lambs fed a high-energy diet to finish them for slaughter in 2010, by region:

Percent Sheep[1] and Lambs[2] (20 or more ewes)

	Region					
	West		Central		East	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Sheep	0.7	(0.3)	0.7	(0.2)	2.3	(0.6)
Lambs	13.9	(2.5)	23.3	(5.3)	44.7	(2.1)

[1]Percentage of January 1, 2011, inventory.
[2]Percentage of lambs weaned in 2010.

C.1.f. Percentage of sheep and lambs fed a high-energy diet to finish them for slaughter in 2010, by flock type:

Percent Sheep[1] and Lambs[2] (20 or more ewes)

	Flock Type							
	Herded/ open range		Fenced range		Pasture		Dry lot/feedlot	
	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Sheep	0.0	(0.0)	1.0	(0.3)	1.6	(0.4)	2.5	(0.9)
Lambs	24.2	(10.8)	20.9	(5.1)	34.0	(1.8)	25.8	(9.9)

[1]Percentage of January 1, 2011, inventory.
[2]Percentage of lambs weaned in 2010.

2. Weight of market lambs

Overall, 43.7 percent of market lambs fed a high-energy diet weighed less than 65 lb when placed on feed. A higher percentage of market lambs from large operations (28.5 percent) weighed more than 105 lb when placed on feed compared with market lambs from small and medium operations (14.4 and 11.1 percent, respectively).

C.2.a. For market lambs fed a high-energy diet in 2010, percentage of lambs by weight when placed on feed and by flock size:

Percent Lambs

Flock Size (number of ewes)

Weight (lb)	**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**
Less than 65			52.8	(4.3)	47.9	(8.5)	32.6	(4.7)			43.7	(3.6)
65–84			24.0	(3.7)	17.9	(2.5)	22.7	(5.1)			21.1	(2.4)
85–105			8.8	(1.6)	23.1	(9.8)	16.1	(4.8)			17.2	(4.8)
More than 105			14.4	(2.6)	11.1	(1.7)	28.5	(6.7)			18.0	(2.3)
Total			100.0		100.0		100.0				100.0	

Of market lambs fed a high-energy diet, 62.9 percent in the East region were less than 65 lb when placed on feed. In the West region, 41.9 percent of lambs weighed more than 105 lb when placed on feed.

C.2.b. For market lambs fed a high-energy diet in 2010, percentage of lambs by weight when placed on feed and by region:

	Percent Lambs (20 or more ewes)					
	Region					
	West		**Central**		**East**	
Weight (lb)	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Less than 65	8.8	(3.0)	32.7	(5.4)	62.9	(3.3)
65–84	19.2	(11.3)	22.3	(3.9)	20.1	(2.6)
85–105	30.1	(14.4)	24.3	(8.6)	6.9	(1.0)
More than 105	41.9	(12.4)	20.7	(4.4)	10.0	(1.7)
Total	100.0		100.0		100.0	

For market lambs fed a high-energy diet on dry lot/feedlot operations in 2010, nearly two thirds (61.4 percent) weighed less than 65 lb when placed on feed, while more than three-fourths of market lambs on herded/open range operations (76.6 percent) weighed 85 lb or more when placed on feed.

C.2.c. For market lambs fed a high-energy diet in 2010, percentage of lambs by weight when placed on feed and by flock type:

	Percent Lambs (20 or more ewes)							
	Flock Type							
	Herded/ open range		**Fenced range**		**Pasture**		**Dry lot/feedlot**	
Weight (lb)	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Less than 65	4.7	(2.4)	45.4	(4.0)	53.7	(3.6)	61.4	(9.2)
65–84	18.7	(7.7)	27.3	(4.5)	20.0	(2.3)	18.1	(6.2)
85–105	42.2	(13.3)	12.7	(2.0)	11.8	(3.2)	7.8	(4.5)
More than 105	34.4	(12.6)	14.5	(5.4)	14.5	(2.3)	12.7	(5.3)
Total	100.0		100.0		100.0		100.0	

For operations that fed market lambs a high-energy diet in 2010, the average weight of market lambs when sent to slaughter was 123.6 lb. The average weight of market lambs from small flocks was lighter (111.6 lb) than the market lambs from large operations when sent to slaughter (130.1 lb).

C.2.d. For operations that fed market lambs a high-energy diet in 2010, average weight of market lambs when sent to slaughter, by flock size:

Average Weight (lb)

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**
		111.6	(1.9)	124.5	(4.9)	130.1	(3.0)			123.6	(2.5)

C.2.e. For operations that fed market lambs a high-energy diet in 2010, average weight of market lambs when sent to slaughter, by region:

Average Weight (lb) (20 or more ewes)

Region

West		**Central**		**East**	
Average	**Std. error**	**Average**	**Std. error**	**Average**	**Std. error**
129.5	(8.6)	129.2	(3.9)	116.6	(1.4)

Market lambs on herded/open range operations that were fed a high-energy diet in 2010 weighed an average of 18.7 lb more when sent to slaughter than market lambs from dry lot/feedlot operations and an average of 28.7 lb more than market lambs from pasture operations.

C.2.f. For operations that fed market lambs a high-energy diet in 2010, average weight of market lambs when sent to slaughter, by flock type:

Average Weight (lb) (20 or more ewes)

Flock Type							
Herded/ open range		**Fenced range**		**Pasture**		**Dry lot/feedlot**	
Avg.	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**
144.2	(2.0)	122.0	(5.0)	115.5	(2.1)	125.5	(2.9)

D. Biosecurity

Biosecurity is a system of management practices designed to prevent the introduction of disease to an operation or to animals in a flock or herd. Biosecurity practices that reduce an operation's risk for disease introduction include prohibiting the introduction of new animals to the operation and isolating any animals that leave the operation and return. Some diseases such as tuberculosis, Johne's, and salmonellosis can be spread from one species to another; thus, sheep or lambs exposed to other domestic animals or to wildlife can introduce disease to the flock.

1. Flock management

The Bureau of Land Management and the U.S. Forest Service manage grazing on public lands with the objective of maximizing public land health and productivity. Public land grazing permits and leases are given to livestock owners for a fee, once they meet certain requirements. There has been a gradual decline in the amount of grazing that takes place on public lands. Other grazing options are available through grazing association land, leased private land, and harvested fields (often referred to as crop aftermath).

A higher percentage of large operations grazed sheep or lambs on each of the land types listed compared with small and medium operations. Overall, leased, private land was the land type used for grazing sheep or lambs by the highest percentage of operations (26.3 percent); only 3.9 percent of operations grazed any sheep or lambs on public land during 2010. The percentage of operations that did graze on public lands increased as the size of the operation increased; 37.3 percent of large operations grazed their sheep on public lands in 2010 compared with 5.3 percent of medium operations and 1.0 percent of small operations.

D.1.a. Percentage of operations that grazed any sheep or lambs on the following types of land, 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**	
Land type	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Public land			1.0	(0.3)	5.3	(0.6)	37.3	(1.4)			3.9	(0.3)
Grazing association			0.2	(0.2)	0.7	(0.2)	8.1	(0.9)			0.8	(0.1)
Leased, private land			21.7	(1.3)	32.8	(1.5)	62.7	(1.7)			26.3	(1.0)
Harvested fields			15.7	(1.1)	32.4	(1.5)	48.9	(1.6)			21.1	(0.9)

D.1.b. Percentage of operations that grazed any sheep or lambs on the following types of land, and by region:

Percent Operations (20 or more ewes)

Region

	West		**Central**		**East**	
Land type	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Public land	1.7	(0.3)	8.8	(0.6)	0.5	(0.3)
Grazing association	0.8	(0.6)	1.3	(0.2)	0.2	(0.2)
Leased, private land	23.6	(2.5)	35.2	(1.6)	19.7	(1.4)
Harvested fields	13.8	(1.9)	28.6	(1.4)	17.2	(1.3)

About 5 of 10 herded/open range operations (52.2 percent) grazed sheep on public land and about 6 of 10 (63.0 percent) grazed sheep or lambs on leased, private land. Less than 1 of 10 fenced-range operations (6.5 percent) grazed sheep or lambs on public land and about 3 of 10 (28.4 percent) leased private land for grazing.

D.1.c. Percentage of operations that grazed any sheep or lambs on the following types of land, and by flock type:

Percent Operations (20 or more ewes)

	Flock Type							
	Herded/ open range		Fenced range		Pasture		Dry lot/feedlot	
Land type	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Public land	52.2	(5.1)	6.5	(0.7)	0.8	(0.2)	0.3	(0.2)
Grazing association	10.0	(1.6)	0.7	(0.2)	0.4	(0.2)	0.0	(0.0)
Leased, private land	63.0	(5.5)	28.4	(1.9)	23.9	(1.3)	23.6	(3.6)
Harvested fields	47.0	(4.9)	16.7	(1.3)	22.7	(1.2)	12.3	(2.4)

2. Flock additions

Keeping a closed flock is one of the best ways to maintain a healthy flock, as introducing new animals poses one of the greatest threats to biosecurity. In a closed flock, replacement females are selected from within the flock, and genetic improvements are made through artificial insemination. Artificial insemination is economically unfeasible for most U.S. sheep operations.

Each age group introduced to the flock poses its own biosecurity risks. Bred ewes can harbor reproductive pathogens that are detectible only when ewes abort or lamb. Replacement lambs can introduce new strains of respiratory and enteric pathogens to other lambs. Overall, 28.6 percent of operations added new sheep or lambs (other than those born of the operation) to the flock during 2010, with the percentage increasing as flock size increased.

D.2.a. Percentage of operations that added any sheep or lambs during 2010, by type of sheep added 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**	
Sheep type	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Replacement ewe lambs less than 1 year old	7.7	(1.0)	9.0	(0.9)	9.0	(0.9)	11.9	(1.3)	8.5	(0.6)	9.2	(0.7)
Replacement ewes 1 year or older	7.5	(1.0)	9.5	(0.9)	11.9	(1.1)	15.7	(1.4)	9.0	(0.6)	10.3	(0.7)
Replacement ram lambs less than 1 year old	5.6	(0.9)	11.3	(1.0)	15.4	(1.2)	17.7	(1.4)	9.4	(0.6)	12.5	(0.8)
Replacement rams 1 year and older	6.7	(0.9)	12.3	(1.0)	18.1	(1.3)	29.8	(1.7)	10.9	(0.6)	14.5	(0.8)
All other sheep and lambs	1.4	(0.4)	2.2	(0.4)	2.7	(0.5)	4.6	(0.7)	1.9	(0.3)	2.4	(0.3)
Any sheep or lambs	22.4	(1.5)	31.5	(1.4)	38.5	(1.6)	48.4	(1.8)	28.6	(0.9)	33.9	(1.1)

D.2.b. For operations that added sheep or lambs during 2010, percentage of sheep and lambs by type of sheep added to inventory, 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**	
Sheep type	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Replacement ewe lambs less than 1 year old	4.9	(1.1)	2.0	(0.3)	1.7	(0.3)	4.4	(0.7)	3.4	(0.4)	3.3	(0.4)
Replacement ewes 1 year or older	15.0	(6.2)	4.5	(0.9)	4.1	(0.5)	3.9	(0.5)	4.6	(0.5)	4.1	(0.4)
Replacement ram lambs less than 1 year old	1.0	(0.2)	0.6	(0.1)	0.3	(0.0)	0.3	(0.1)	0.4	(0.0)	0.3	(0.0)
Replacement rams 1 year and older	2.1	(0.9)	0.7	(0.1)	0.4	(0.0)	0.3	(0.0)	0.5	(0.0)	0.4	(0.0)
All other	8.6	(6.5)	14.5	(4.8)	13.2	(5.3)	5.5	(1.3)	8.8	(1.7)	8.8	(1.7)

*Percentage of January 1, 2011, inventory.

D.2.c. For operations that added sheep or lambs during 2010, percentage of sheep and lambs by type of sheep added to inventory, and by flock type:

	Percent Sheep and Lambs* (20 or more ewes)							
	Flock Type							
	Herded/ open range		**Fenced range**		**Pasture**		**Dry lot/feedlot**	
Sheep type	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Replacement ewe lambs less than 1 year old	3.4	(0.6)	5.1	(1.3)	1.9	(0.3)	2.2	(0.9)
Replacement ewes 1 year or older	4.6	(0.9)	3.2	(0.5)	4.1	(0.4)	6.7	(2.6)
Replacement ram lambs less than 1 year old	0.2	(0.0)	0.3	(0.1)	0.4	(0.0)	0.5	(0.1)
Replacement rams 1 year and older	0.4	(0.0)	0.4	(0.0)	0.4	(0.0)	0.4	(0.1)
All other	1.6	(0.6)	2.6	(1.8)	13.6	(3.1)	52.9	(23.3)

*Percentage of January 1, 2011, inventory.

Many outwardly healthy animals carry infectious organisms that can affect flock productivity. For this reason, quarantining new additions is always recommended. Quarantining animals provides an opportunity to detect diseases in the new additions without risking disease introduction and transmission to the rest of the flock. For the purpose of this report, quarantine is defined as the physical separation of an animal or group of animals from other sheep on the operation.

General recommendations for the minimum length of quarantine vary from 14 to 28 days. Quarantining should provide sufficient time for the incubation and detection of infectious diseases. Diseases for which quarantining is most effective have incubation periods shorter than the quarantine period; thus, animals will show signs of infection prior to introduction to the flock. Quarantining is not effective for diseases with long incubation periods or for diseases in which animals can be silent carriers. Diseases for which quarantine is not effective include Johne's, scrapie, sore mouth, and others. For these diseases, it is especially important to purchase new additions from known, disease-free flocks. These are likely to be closed flocks which have not brought new animals into the flock for a number of years.

Quarantine areas should be separate from other housing and should be far enough away from resident sheep to prevent airborne disease transmission. Quarantined animals should have no physical contact with other animals; therefore, producers should ensure that quarantined animals do not share fence lines, waterers, or feeders, all of which allow disease transmission.

D.2.d. For operations that added any sheep or lambs during 2010, percentage of operations that quarantined any sheep or lamb additions, 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**
26.5	(3.4)	50.2	(2.8)	47.4	(2.7)	29.9	(2.4)	40.2	(1.8)	47.9	(2.0)

D.2.e. For operations that added any sheep or lambs during 2010, percentage of operations that quarantined any sheep or lamb additions, by region:

Percent Operations (1 or more ewes)

Region

West		**Central**		**East**	
Percent	**Std. error**	**Percent**	**Std. error**	**Percent**	**Std. error**
38.7	(4.6)	30.3	(2.5)	46.8	(2.8)

D.2.f. For operations that added any sheep or lambs during 2010, percentage of operations that quarantined any sheep or lamb additions, by flock type:

Percent Operations (20 or more ewes)

Flock Type

Herded/ open range		Fenced range		Pasture		Dry lot/feedlot	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
29.5	(4.1)	37.6	(3.9)	51.3	(2.6)	54.1	(6.7)

Collectively, 27.9 percent of sheep and lambs added in 2010 were quarantined. A higher percentage of added sheep and lambs were quarantined on small operations compared with sheep and lambs added to any other size operation.

D.2.g. Percentage of sheep or lamb additions quarantined during 2010, by sheep type and by flock size:

Percent Sheep or 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	
Sheep type	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Replacement ewe lambs less than 1 year old	30.4	(8.1)	38.6	(8.3)	44.9	(8.2)	15.7	(5.4)	22.1	(4.4)	21.5	(4.7)
Replacement ewes 1 year or older	7.4	(4.3)	41.7	(10.1)	39.3	(6.3)	11.9	(3.2)	21.6	(3.3)	24.0	(3.5)
Replacement ram lambs less than 1 year old	38.3	(8.1)	50.0	(5.0)	47.4	(4.8)	23.4	(7.0)	37.0	(4.5)	36.8	(5.0)
Replacement rams 1 year or older	15.3	(7.9)	41.0	(7.0)	39.8	(5.0)	18.2	(3.2)	27.2	(3.3)	30.1	(2.9)
All other added sheep and lambs	1.1	(1.0)	88.8	(6.6)	8.9	(6.4)	28.2	(9.1)	33.4	(8.0)	35.0	(8.5)
Any added sheep or lambs	10.7	(4.0)	69.1	(7.5)	19.5	(6.5)	19.7	(4.2)	27.9	(4.2)	29.5	(4.6)

*As a percentage of sheep or lambs added during 2010.

D.2.h. Percentage of sheep or lamb additions quarantined during 2010, by sheep type and by region:

	Percent Sheep or Lambs* (1 or more ewes)					
	Region					
	West		**Central**		**East**	
Sheep type	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Replacement ewe lambs less than 1 year old	23.1	(10.1)	12.9	(5.0)	53.1	(7.7)
Replacement ewes 1 year or older	25.3	(6.6)	11.5	(2.6)	44.8	(8.6)
Replacement ram lambs less than 1 year old	46.0	(7.0)	24.7	(6.0)	51.3	(4.4)
Replacement rams 1 year and older	28.1	(6.0)	18.4	(3.5)	48.2	(7.8)
All other added sheep and lambs	39.5	(12.3)	13.2	(8.1)	42.3	(18.0)
Any added sheep or lambs	34.5	(8.7)	13.0	(3.0)	44.5	(11.7)

*As a percentage of sheep or lambs added during 2010.

Large operations quarantined replacement ewes longer (average of 38.9 days) than very small operations (average of 19.5 days). In aggregate, the operation average number of days replacement ewes were quarantined was 25.6 days.

D.2.i. For operations that added sheep or lambs during 2010 and quarantined the new arrivals, operation average number of days sheep and lambs were quarantined, by sheep type and by flock size:

Operation Average Number 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**	
Sheep type	**Avg.**	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**
Replacement ewe lambs less than 1 year old	27.3	(3.7)	29.0	(4.4)	28.9	(2.7)	31.3	(4.3)	28.5	(2.5)	29.0	(3.2)
Replacement ewes 1 year or older	19.5	(2.4)	26.9	(4.2)	27.7	(2.8)	38.9	(4.5)	25.6	(2.4)	27.6	(3.1)
Replacement ram lambs less than 1 year old	43.2	(11.8)	37.8	(4.0)	35.3	(3.1)	27.1	(3.1)	38.0	(3.3)	36.6	(2.9)
Replacement rams 1 year and older	23.7	(3.8)	21.3	(2.0)	30.3	(3.1)	24.8	(2.0)	23.9	(1.5)	24.0	(1.6)
All other sheep and lambs	6.0	(2.8)	77.3	(17.0)	14.7	(4.4)	47.5	(7.8)	57.0	(12.8)	65.4	(13.6)

D.2.j. For operations that added sheep or lambs during 2010 and quarantined the new arrivals, operation average number of days sheep and lambs were quarantined, by sheep type by flock type:

Operation Average Number of Days (20 or more ewes)

	Flock Type							
	Herded/ open range		Fenced range		Pasture		Dry lot/feedlot	
Sheep type	**Avg.**	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**
Replacement ewe lambs less than 1 year old	34.1	(9.4)	22.2	(2.6)	29.3	(4.1)	35.7	(7.3)
Replacement ewes 1 year or older	51.2	(9.1)	22.3	(4.0)	29.0	(4.3)	28.3	(6.0)
Replacement ram lambs less than 1 year old	25.6	(3.2)	27.5	(4.3)	38.2	(3.7)	37.4	(6.5)
Replacement rams 1 year and older	27.4	(2.8)	20.3	(3.5)	24.9	(2.0)	25.9	(6.0)
All other sheep and lambs	40.0	(13.0)	20.2	(3.8)	67.5	(17.3)	50.6	(30.9)

Over half of operations had all new additions vaccinated and dewormed prior to their arrival (58.4 and 56.0 percent of operations, respectively). About one-third of operations (31.4 percent) had all new additions genotyped for scrapie susceptibility. Overall, 84.4 percent of operations had at least one health-related management practice performed on new additions prior to arrival.

D.2.k. For operations that added sheep or lambs during 2010, percentage of operations that performed the following health management practices on all, some, or none of the sheep or lambs—**before** they arrived at the operation:

	Percent Operations (1 or more ewes)						
	All sheep		**Some sheep**		**No sheep**		
Health management practice	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Total**
Any vaccinations	58.4	(2.2)	9.0	(1.2)	32.6	(2.1)	100.0
Shearing	37.9	(2.0)	7.0	(1.0)	55.1	(2.0)	100.0
Foot trim	30.4	(2.0)	4.0	(0.7)	65.6	(2.1)	100.0
Medicated footbath	7.9	(1.2)	1.4	(0.5)	90.7	(1.2)	100.0
Deworm	56.0	(2.2)	5.2	(1.0)	38.8	(2.2)	100.0
External parasite treatment	23.5	(1.9)	2.6	(0.7)	73.9	(2.0)	100.0
OPP testing	5.8	(1.0)	0.5	(0.3)	93.7	(1.1)	100.0
Johne’s testing	5.6	(0.9)	0.8	(0.4)	93.6	(1.0)	100.0
Scrapie susceptibility testing (genotyping)	31.4	(2.0)	4.1	(0.8)	64.6	(2.0)	100.0
Other	3.8	(0.9)	1.0	(0.5)	95.2	(1.0)	100.0
Any practice		84.4	(1.6)		15.6	(1.6)	100.0

If not done before animals arrive at the operation, vaccinating, shearing, deworming, and testing new additions should be done during the quarantine period, before introduction to the flock. In addition, feet should be trimmed, examined, and soaked in a footbath to reduce the risk for introducing footrot to the operation.

A lower percentage of operations (73.7 percent) had at least one health-related management practice performed on some or all new additions after arrival compared to the percentage of operations that had one performed prior to arrival (84.4 percent) [table D.2.k.]. Deworming was performed on over one-half of the operations (58.6 percent).

D.2.l. For operations that added sheep or lambs during 2010, percentage of operations that performed the following health management practices on all, some, or none of the sheep or lambs—**after** they arrived at the operation:

	Percent Operations (1 or more ewes)						
	All sheep		**Some sheep**		**No sheep**		
Health management practice	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Total**
Any vaccinations	34.2	(1.9)	6.7	(1.0)	59.1	(1.9)	100.0
Shearing	26.2	(1.7)	5.8	(1.0)	67.9	(1.8)	100.0
Foot trim	30.1	(1.9)	6.2	(0.8)	63.7	(1.9)	100.0
Medicated footbath	12.3	(1.3)	1.5	(0.4)	86.2	(1.3)	100.0
Deworm	58.6	(2.0)	4.0	(0.8)	37.4	(1.9)	100.0
External parasite treatment	22.9	(1.7)	2.2	(0.4)	74.9	(1.7)	100.0
OPP testing	1.6	(0.6)	0.6	(0.3)	97.8	(0.6)	100.0
Johne’s testing	1.4	(0.6)	0.3	(0.2)	98.3	(0.6)	100.0
Scrapie susceptibility testing (genotyping)	5.9	(0.9)	2.5	(0.5)	91.6	(1.1)	100.0
Other	2.2	(0.7)	0.8	(0.3)	97.0	(0.8)	100.0
Any practice		73.7	(1.8)		26.3	(1.8)	100.0

3. Contact with other animal species

On the majority of operations, a dog or cat had access to sheep or lamb areas (69.1 and 63.5 percent, respectively), and on almost one-fourth of operations, goats had access to sheep or lamb areas (23.3 percent).

D.3.a. Percentage of operations by type of animals that had access to sheep or lamb areas (i.e., grazing areas, sheds, holding pens, food, or water) during 2010, and by type of access:

	Percent Operations (1 or more ewes)			
	Type of Access			
	On operation		**Fence-line access**	
Animal type	**Percent**	**Std. error**	**Percent**	**Std. error**
Domestic goats	23.3	(0.9)	4.4	(0.5)
Wild goats	0.6	(0.1)	1.2	(0.2)
Cattle	39.5	(1.0)	16.9	(1.0)
Horses, donkeys	37.3	(1.0)	12.4	(0.9)
Llamas, alpacas	16.4	(0.7)	2.7	(0.4)
Pigs	7.4	(0.5)	2.7	(0.4)
Poultry (chickens, turkeys, etc.)	26.5	(0.9)	4.0	(0.5)
Dogs	69.1	(1.0)	14.1	(1.5)
Cats	63.5	(1.0)	9.6	(1.1)
Any of the above	89.1	(0.7)	20.4	(0.8)

Deer, elk, moose, or antelope were observed at least monthly on 58.8 percent of operations, and wild pigs were observed on 5.2 percent of operations.

D.3.b. Percentage of operations by frequency that the following wild animals and/or signs of wild animals (scat, tracks, etc.) were observed on the operation:

Percent Operations (20 or more ewes)

	Frequency						
	Never		Less than monthly		At least monthly		
Animal	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Total
Bighorn sheep	98.6	(0.3)	0.6	(0.1)	0.8	(0.2)	100.0
Deer, elk, moose, antelope	21.8	(1.0)	19.4	(1.0)	58.8	(1.1)	100.0
Wild pigs	92.1	(0.6)	2.7	(0.4)	5.2	(0.5)	100.0
Any of the above	21.4	(1.0)		78.6	(1.0)		100.0

D.3.c. Percentage of operations on which the following wild animals and/or signs of wild animals (scat, tracks, etc.) were observed at least once during 2010, by region:

Percent Operations (20 or more ewes)

	Region							
	West		Central		East		All operations	
Animal	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Bighorn sheep	0.1	(0.1)	2.6	(0.6)	0.2	(0.2)	1.1	(0.2)
Deer, elk, moose, antelope	60.5	(2.9)	80.7	(1.4)	82.2	(1.4)	78.2	(1.0)
Wild pigs	5.5	(1.3)	16.8	(1.4)	1.2	(0.3)	7.9	(0.6)
Any of the above	60.8	(2.9)	81.8	(1.4)	82.2	(1.4)	78.6	(1.0)

Bighorn sheep or their signs were observed on 10.2 percent of herded/open range operations in 2010. Regardless of flock type, the majority of operations observed deer, elk, moose, or antelope (or their signs) during 2010.

D.3.d. Percentage of operations on which the following wild animals or signs of wild animals (scat, tracks, etc.) were observed at least once during 2010, by flock type:

Percent Operations (20 or more ewes)

	Flock Type							
	Herded/ open range		Fenced range		Pasture		Dry lot/feedlot	
Animal	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Bighorn sheep	10.2	(3.6)	2.0	(0.6)	0.9	(0.3)	0.0	(0.0)
Deer, elk, moose, antelope	74.6	(5.5)	85.4	(1.7)	76.7	(1.3)	67.0	(4.1)
Wild pigs	6.2	(2.8)	18.3	(1.8)	4.0	(0.6)	3.4	(2.0)
Any of the above	75.1	(5.5)	85.7	(1.7)	77.3	(1.3)	67.0	(4.1)

E. Health Management Practices

1. External parasite treatment

External parasites live on or within the skin of their hosts, are usually more problematic in the winter due to closer living conditions, and may cause financial loss and welfare concerns. External parasites on sheep include ticks, keds, fly larvae, and mites. Topical treatments are usually more effective and easier to apply on shorn animals and often includes the use of pesticides or anthelmintics.

Overall, 33.8 percent of operations treated their sheep for external parasites during 2010. As operation size increased, the percentage of operations that treated their sheep for external parasite increased. Just over one-fourth of very small operations (25.6 percent) treated their sheep for external parasites compared with 64.9 percent of large operations.

E.1.a. Percentage of operations that treated any sheep for external parasites (keds, ticks, lice, etc.) 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**
25.6	(1.6)	37.2	(1.5)	46.6	(1.6)	64.9	(1.6)	33.8	(1.0)	40.7	(1.1)

A higher percentage of operations (43.3 percent) in the Central region treated their sheep for external parasites compared with operations in the West or East regions (28.9 and 29.1 percent, respectively).

E.1.b. Percentage of operations that treated any sheep for external parasites (keds, ticks, lice, etc.) during 2010, by region:

Percent Operations (1 or more ewes)

Region					
West		Central		East	
Percent	Std. error	Percent	Std. error	Percent	Std. error
28.9	(2.1)	43.3	(1.6)	29.1	(1.5)

E.1.c. Percentage of operations that treated any sheep for external parasites (keds, ticks, lice, etc.) during 2010, by flock type:

Percent Operations (20 or more ewes)

Flock Type							
Herded/ open range		Fenced range		Pasture		Dry lot/feedlot	
Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
69.0	(5.5)	38.3	(2.1)	40.9	(1.5)	39.5	(4.2)

2. Professional consultant visitors

Almost one-fourth of operations (23.9 percent) had a private veterinarian visit for any sheep-related reason during 2010. As expected, a higher percentage of large operations (31.7 percent) than very small operations (18.8 percent) were visited by a private veterinarian. A higher percentage of medium and large operations were visited by a nutritionist compared with operations in other size categories.

E.2.a. Percentage of operations that were visited by the following types of visitors for any sheep-related reason 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**	
Visitor	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Private veterinarian	18.8	(1.4)	27.7	(1.3)	29.0	(1.5)	31.7	(1.7)	23.9	(0.9)	28.2	(1.0)
Federal/State veterinarian	3.0	(0.6)	5.8	(0.7)	5.2	(0.7)	5.3	(0.9)	4.4	(0.4)	5.6	(0.5)
Extension agent	2.7	(0.6)	4.9	(0.7)	7.2	(0.9)	9.1	(1.1)	4.3	(0.4)	5.6	(0.5)
Nutritionist	1.7	(0.5)	4.1	(0.6)	8.1	(0.9)	8.8	(1.1)	3.6	(0.4)	5.2	(0.5)
Any of the above	22.5	(1.5)	33.6	(1.4)	37.3	(1.6)	39.7	(1.8)	29.1	(0.9)	34.8	(1.1)

A higher percentage of operations in the East region (30.4 percent) were visited by a private veterinarian compared with operations in the West and Central regions (16.3 and 18.5 percent, respectively).

E.2.b. Percentage of operations that were visited by the following types of visitors for any sheep-related reason during 2010, by region:

	Percent Operations (1 or more ewes)					
	Region					
	West		**Central**		**East**	
Visitor	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Private veterinarian	16.3	(1.7)	18.5	(1.2)	30.4	(1.4)
Federal/State veterinarian	3.6	(0.9)	5.3	(0.7)	4.2	(0.6)
Extension agent	1.6	(0.5)	6.3	(0.8)	3.8	(0.6)
Nutritionist	1.8	(0.6)	3.1	(0.6)	4.6	(0.5)
Any of the above	19.1	(1.8)	24.8	(1.4)	35.8	(1.5)

A lower percentage of fenced-range operations were visited by a private veterinarian compared with the other flock types.

E.2.c. Percentage of operations that were visited by the following types of visitors for any sheep-related reason during 2010, by flock type:

	Percent Operations (1 or more ewes)							
	Flock Type							
	Herded/ open range		**Fenced range**		**Pasture**		**Dry lot/feedlot**	
Visitor	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Private veterinarian	30.5	(4.6)	17.8	(1.6)	31.8	(1.4)	33.1	(4.1)
Federal/State veterinarian	8.1	(3.1)	3.2	(0.8)	6.4	(0.7)	7.3	(2.1)
Extension agent	10.0	(3.6)	4.8	(1.0)	5.9	(0.7)	5.3	(1.7)
Nutritionist	5.7	(2.6)	3.1	(0.6)	5.5	(0.7)	11.1	(2.5)
Any of the above	38.8	(5.0)	22.8	(1.8)	38.4	(1.5)	44.6	(4.3)

Large operations were visited more often during 2010 by nutritionists than by private veterinarians, Federal/State veterinarians, or extension agents. Collectively, sheep operations were visited an average of 5.7 times by a private veterinarian in 2010.

E.2.d. For operations that were visited by the following types of visitors during 2010, average number of visits in 2010, by flock size:

Average Number of Visits

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**	
Professional	**Avg.**	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**	**Avg.**	**Std. error**
Private veterinarian	4.6	(2.6)	6.6	(2.2)	5.9	(1.4)	3.9	(0.2)	5.7	(1.4)	6.3	(1.6)
Federal/State veterinarian	1.4	(0.2)	1.4	(0.1)	1.9	(0.2)	1.4	(0.2)	1.5	(0.1)	1.5	(0.1)
Extension agent	2.4	(0.4)	2.4	(0.6)	2.8	(0.4)	3.3	(0.5)	2.5	(0.3)	2.6	(0.4)
Nutritionist	3.7	(1.2)	3.5	(0.8)	3.0	(0.3)	8.8	(0.7)	3.8	(0.5)	3.8	(0.5)

Pasture operations were visited more frequently (7.5 times) by a veterinarian during 2010 than herded/fenced range operations (2.2 times).

E.2.e For operations that were visited by the following types of visitors during 2010, average number of visits in 2010, by flock type:

Average Number of Visits (20 or more ewes)

Flock Type

Visitor	Herded/ open range		Fenced range		Pasture		Dry lot/feedlot	
	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error	Avg.	Std. error
Private veterinarian	2.2	(0.2)	3.6	(0.4)	7.5	(2.3)	3.5	(0.5)
Federal/ State veterinarian	2.1	(0.4)	1.7	(0.3)	1.4	(0.1)	1.4	(0.2)
Extension agent	1.9	(0.4)	3.2	(0.7)	2.5	(0.5)	1.3	(0.2)
Nutritionist	2.6	(0.2)	5.6	(0.7)	3.6	(0.7)	2.9	(0.4)

3. Use of private veterinarian

Although only 23.9 percent of operations were visited by a veterinarian during 2010 (table E.2.a.), 42.2 percent consulted with a veterinarian. A lower percentage of very small operations consulted with a veterinarian compared with operations with 20 or more ewes.

E.3.a. [0573] Percentage of operations that consulted with a private veterinarian 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
30.9	(1.7)	50.3	(1.5)	55.7	(1.6)	56.9	(1.8)	42.2	(1.0)	51.8	(1.2)

A higher percentage of operations in the East region (47.8 percent) consulted with a veterinarian with operations in the West and Central regions (34.2 and 38.6 percent, respectively).

E.3.b. Percentage of operations that used a private veterinarian during 2010, by region:

Percent Operations (1 or more ewes)

Region					
West		**Central**		**East**	
Percent	**Std. error**	**Percent**	**Std. error**	**Percent**	**Std. error**
34.2	(2.3)	38.6	(1.5)	47.8	(1.5)

A higher percentage of pasture and dry lot operations (57.1 and 57.8 percent, respectively) used a private veterinarian compared with fenced-range operations (38.4 percent).

E.3.c. Percentage of operations that used a private veterinarian during 2010, by flock type:

Percent Operations (20 or more ewes)

Flock Type							
Herded/ open range		**Fenced range**		**Pasture**		**Dry lot/feedlot**	
Pct.	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
47.2	(5.1)	38.4	(2.1)	57.1	(1.5)	57.8	(4.3)

The two most common reasons for consulting a veterinarian were for disease diagnosis and disease prevention (42.8 and 41.9 percent of operations, respectively). Nearly one-third of operations consulted a private veterinarian for lambing problems and over one-fifth consulted a veterinarian for an interstate health certificate.

E.3.d. For operations that consulted a private veterinarian during 2010, percentage of operations by reason for consultation 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**	
Reason for consultation	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Disease diagnosis	34.7	(3.1)	45.0	(2.1)	51.9	(2.3)	51.2	(2.5)	42.8	(1.5)	46.9	(1.6)
Disease prevention	35.2	(3.2)	44.4	(2.1)	45.8	(2.3)	53.6	(2.5)	41.9	(1.5)	45.3	(1.6)
Interstate health certificate	16.1	(2.4)	24.7	(1.8)	24.3	(1.9)	36.9	(2.2)	22.2	(1.2)	25.3	(1.4)
Nutrition information	9.5	(1.9)	10.3	(1.3)	17.0	(1.8)	17.4	(1.8)	11.3	(0.9)	12.3	(1.0)
Production management practices	8.8	(1.9)	11.8	(1.3)	12.6	(1.5)	19.6	(1.9)	11.2	(0.9)	12.4	(1.0)
Lambing problems	25.9	(2.8)	35.8	(2.0)	34.4	(2.2)	23.2	(2.1)	31.8	(1.4)	34.7	(1.5)
Breeding soundness exam (rams)	4.0	(1.1)	13.2	(1.4)	14.3	(1.5)	28.4	(2.2)	10.9	(0.8)	14.4	(1.1)
Pregnancy check	4.6	(1.5)	5.9	(1.0)	8.1	(1.2)	14.5	(1.8)	6.1	(0.7)	6.9	(0.8)
Lameness	8.7	(1.8)	9.1	(1.2)	9.5	(1.3)	7.4	(1.1)	9.0	(0.9)	9.1	(0.9)
Other	12.7	(2.2)	6.3	(1.1)	4.3	(1.0)	3.3	(0.8)	8.0	(0.9)	5.6	(0.8)

E.3.e. For operations that consulted a private veterinarian during 2010, percentage of operations by reason for consultation and by region:

	Percent Operations (1 or more ewes)					
	Region					
	West		**Central**		**East**	
Reason for consultation	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Disease diagnosis	44.7	(4.1)	46.8	(2.5)	40.1	(2.1)
Disease prevention	40.8	(4.0)	44.5	(2.4)	40.7	(2.2)
Interstate health certificate	21.7	(3.3)	23.6	(1.7)	21.6	(1.8)
Nutrition information	11.6	(2.4)	13.8	(1.7)	9.9	(1.2)
Production management practices	9.4	(2.2)	10.3	(1.4)	12.2	(1.4)
Lambing problems	23.6	(3.5)	28.5	(1.9)	35.7	(2.0)
Breeding soundness exam (rams)	11.8	(2.5)	18.0	(1.6)	6.7	(1.0)
Pregnancy check	4.5	(1.5)	7.4	(1.2)	5.9	(1.0)
Lameness	8.0	(2.2)	10.1	(1.6)	8.4	(1.1)
Other	10.6	(2.6)	9.0	(1.7)	6.8	(1.2)

For the 42.2 percent of operations that consulted a private veterinarian (table E.3.a.), a higher percentage of pasture and dry lot/feedlot operations (37.9 and 40.2 percent, respectively) consulted a veterinarian for lambing problems compared with herded/open-range and fenced-range operations (17.2 and 23.7 percent, respectively). However, a higher percentage of herded/open-range operations (28.5 percent) consulted a veterinarian for rams' breeding soundness exams compared with pasture operations (13.5 percent).

E.3.f. For operations that consulted a private veterinarian during 2010, percentage of operations by reason for consultation and by flock type:

Percent Operations (20 or more ewes)

	Flock Type							
	Herded/ open range		**Fenced range**		**Pasture**		**Dry lot/feedlot**	
Reason for consultation	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Disease diagnosis	42.1	(6.3)	43.5	(3.4)	48.0	(2.0)	49.1	(5.7)
Disease prevention	53.1	(6.4)	43.3	(3.3)	46.3	(2.0)	42.5	(5.6)
Interstate health certificate	36.5	(5.4)	23.9	(2.7)	23.3	(1.7)	40.6	(5.7)
Nutrition information	18.2	(3.5)	11.9	(2.2)	12.4	(1.3)	9.3	(3.2)
Production management practices	20.1	(5.2)	9.9	(1.7)	12.9	(1.3)	10.3	(3.4)
Lambing problems	17.2	(3.4)	23.7	(2.8)	37.9	(1.9)	40.2	(5.5)
Breeding soundness exam (rams)	28.5	(4.4)	15.6	(2.1)	13.5	(1.3)	13.4	(3.7)
Pregnancy check	7.0	(2.0)	10.0	(2.0)	5.8	(0.9)	8.8	(3.1)
Lameness	4.9	(1.4)	8.3	(2.0)	9.7	(1.2)	6.4	(2.5)
Other	3.7	(1.0)	7.1	(2.1)	5.2	(1.0)	5.3	(2.4)

Of operations that did not use a veterinarian in 2010, 68.9 percent had no health-related problems and 11.8 percent thought veterinarians were too expensive. Another 14.2 percent listed “other” as a reason for not using a veterinarian, with the majority of these operations indicating they did not use a veterinarian because they had experience and could do the work themselves.

E.3.g. For operations that **did not** use a private veterinarian during 2010, percentage of operations by reason 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**	
Reason for not consulting a veterinarian	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
No health-related problems	77.7	(1.9)	58.5	(2.2)	57.2	(2.5)	55.4	(2.9)	68.9	(1.3)	58.1	(1.8)
No veterinarian with sheep experience available	2.7	(0.8)	7.5	(1.2)	10.7	(1.5)	7.1	(1.5)	5.1	(0.6)	8.1	(0.9)
Too expensive	6.2	(1.1)	19.6	(1.8)	16.2	(1.8)	16.3	(2.2)	11.8	(0.9)	18.8	(1.4)
Other	13.5	(1.6)	14.4	(1.5)	15.9	(1.9)	21.1	(2.3)	14.2	(1.1)	15.0	(1.2)
Total	100.0		100.0		100.0		100.0		100.0		100.0	

E.3.h. For operations that **did not** use a private veterinarian during 2010, percentage of operations by reason and by region:

	Percent Operations (1 or more ewes)					
	Region					
	West		**Central**		**East**	
Reason for not consulting a veterinarian	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
No health-related problems	77.5	(2.5)	66.0	(2.2)	67.2	(2.2)
No veterinarian with sheep experience available	2.8	(0.9)	5.6	(1.1)	5.9	(0.9)
Too expensive	6.7	(1.4)	14.1	(1.5)	12.3	(1.4)
Other	13.0	(2.1)	14.3	(1.7)	14.6	(1.7)
Total	100.0		100.0		100.0	

E.3.i. For operations that **did not** use a private veterinarian during 2010, percentage of operations by reason and by flock type:

	Percent Operations (20 or more ewes)							
	Flock Type							
	Herded/ open range		**Fenced range**		**Pasture**		**Dry lot/feedlot**	
Reason for not consulting a veterinarian	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
No health-related problems	52.9	(8.2)	60.6	(3.0)	57.3	(2.4)	55.1	(6.8)
No veterinarian with sheep experience available	11.2	(5.5)	5.1	(1.3)	9.5	(1.4)	11.3	(4.1)
Too expensive	15.0	(6.6)	23.1	(2.7)	17.3	(1.9)	11.2	(3.7)
Other	20.9	(6.4)	11.3	(1.8)	15.9	(1.7)	22.4	(5.7)
Total	100.0		100.0		100.0		100.0	

F. Shearing

Until recently, the U.S. sheep population was experiencing a decades-long decline in numbers. These declines were accompanied by reduced wool marketing entities and related infrastructure, which resulted in difficult marketing schemes with fewer domestic wool buyers, distance-to-market challenges, and fewer selling systems. The declining sheep numbers also discouraged individuals in the United States from becoming shearers, and the industry has for years relied on international shearers from New Zealand, Australia, and other countries. A worldwide shortage of shearers has magnified this problem for U.S. sheep producers and limited their abilities to increase their sheep numbers.[3] A combination of low wool prices and the difficulty of finding shearers have sometimes made producing wool a liability. As a result, more producers have focused on raising hair sheep, which do not need to be sheared.

Shearing is typically performed with electric shears or shearing machines, but some producers shear their own sheep and may use manual clippers.

1. Shearing management

Overall, 80.2 percent of operations with 20 or more ewes sheared lambs and sheep during 2010. A lower percentage of small operations (77.3 percent) sheared lambs and sheep during 2010 compared with medium (86.7 percent) or large (93.0 percent) operations.

F.1.a. Percentage of operations that sheared sheep and lambs 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**
		77.3	(1.2)	86.7	(1.2)	93.0	(1.0)			80.2	(0.9)

[3] Committee on the Economic Development and Current Status of the Sheep Industry in the United States and National Research Council. 2008. Changes in the Sheep Industry in the United States: Making the Transition from Tradition.

A lower percentage of operations in the Central region (75.4 percent) sheared lambs and sheep compared with operations in the West and East regions (83.2 and 83.2 percent, respectively).

F.1.b. Percentage of operations that sheared sheep and lambs during 2010, by region:

Percent Operations (20 or more ewes)

Region					
West		**Central**		**East**	
Percent	**Std. error**	**Percent**	**Std. error**	**Percent**	**Std. error**
83.2	(2.5)	75.4	(1.5)	83.2	(1.3)

A lower percentage of fenced-range operations (73.8 percent) sheared lambs and sheep during 2010 compared with herded/open-range (89.8 percent), pasture (82.0 percent), and dry lot/feedlot (85.9 percent) operations.

F.1.c. Percentage of operations that sheared sheep and lambs during 2010, by flock type:

Percent Operations (20 or more ewes)

Flock Type							
Herded/ open range		**Fenced range**		**Pasture**		**Dry lot/feedlot**	
Pct.	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
89.8	(4.4)	73.8	(2.1)	82.0	(1.2)	85.9	(3.4)

Overall, 55.8 percent of sheep and lambs on operations with 20 or more ewes were shorn. A lower percentage of sheep and lambs on small operations (44.0 percent) were sheared compared with sheep and lambs on medium and large operations (54.9 and 61.5 percent, respectively).

F.1.d. Percentage of sheep and lambs shorn during 2010, by flock size:

Percent Lambs and Sheep Shorn

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**
		44.0	(1.5)	54.9	(4.0)	61.5	(1.4)			55.8	(1.3)

A lower percentage of sheep and lambs in the East region (49.8 percent) were shorn in 2010 compared with sheep and lambs in the West region (61.8 percent).

F.1.e. Percentage of sheep and lambs shorn during 2010, by region:

Percent Lambs and Sheep Shorn (20 or more ewes)

Region

West		**Central**		**East**	
Percent	**Std. error**	**Percent**	**Std. error**	**Percent**	**Std. error**
61.8	(2.3)	56.5	(2.0)	49.8	(1.4)

F.1.f. Percentage of sheep and lambs shorn during 2010, by flock type:

Percent Lambs and Sheep Shorn (20 or more ewes)

Flock Type

Herded/ open range		**Fenced range**		**Pasture**		**Dry lot/feedlot**	
Pct.	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
64.3	(4.1)	54.4	(1.7)	51.7	(1.2)	38.8	(14.7)

Many States offer shearing schools, and State fairs offer shearing demonstrations, so some producers choose to shear their own sheep. Overall, 50.9 percent of operations with 20 or more ewes used a hired individual to shear their sheep, while 29.2 percent contracted with a shearing crew, and 26.2 percent used employees or the sheep owner to shear. There were some variations by size of operation, with over half of small operations (56.9 percent) hiring individuals to shear compared with just 13.1 percent of large operations. Nearly 9 of 10 large operations (86.4 percent) used a contracted shearing crew compared with just 18.5 percent of small operations.

F.1.g. For operations that sheared sheep or lambs during 2010, percentage of operations by type of shearer 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**	
Type of shearer	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Employees (including owner)			29.0	(1.6)	21.6	(1.5)	11.6	(1.2)			26.2	(1.2)
Contracted shearing crew			18.5	(1.3)	46.0	(1.6)	86.4	(1.3)			29.2	(1.0)
Hired individual			56.9	(1.7)	43.2	(1.7)	13.1	(1.3)			50.9	(1.3)
Other			2.1	(0.5)	1.0	(0.4)	0.6	(0.2)			1.7	(0.4)

Over half of operations in the Central region (54.4 percent) contracted with shearing crews compared with just 14.8 percent of operations in West region and 14.6 percent in the East region.

F.1.h. For operations that sheared sheep or lambs during 2010, percentage of operations by type of shearer used and by region:

	Percent Operations (20 or more ewes)					
	Region					
	West		**Central**		**East**	
Type of shearer	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Employees (including owner)	38.3	(3.3)	15.9	(1.4)	29.9	(1.9)
Contracted shearing crew	14.8	(1.9)	54.4	(1.7)	14.6	(1.4)
Hired individual	59.5	(3.4)	35.3	(1.7)	60.0	(2.0)
Other	2.0	(1.1)	1.7	(0.6)	1.6	(0.5)

A higher percentage of herded/open-range operations (67.4 percent) contracted shearing crews compared with fenced-range (49.6 percent), pasture (20.8 percent), and dry lot/feedlot (15.0 percent) operations.

F.1.i. For operations that sheared sheep or lambs during 2010, percentage of operations by type of shearer used and by flock type:

	Percent Operations (20 or more ewes)							
	Flock Type							
	Herded/ open range		**Fenced range**		**Pasture**		**Dry lot/feedlot**	
Type of shearer	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Employees (including owner)	15.2	(4.0)	20.0	(2.1)	28.2	(1.5)	34.4	(4.4)
Contracted shearing crew	67.4	(5.5)	49.6	(2.3)	20.8	(1.2)	15.0	(3.1)
Hired individual	18.3	(4.7)	37.2	(2.4)	57.7	(1.7)	54.6	(4.6)
Other	8.6	(4.4)	1.3	(0.5)	1.4	(0.4)	2.5	(1.7)

Disinfecting shears between sheep can reduce the likelihood of transmitting disease from one sheep to another. One disease in particular (caseous lymphadenitis) is likely to be transmitted from sheep to sheep when skin is broken or cut by contaminated shearing equipment. Shears should always be disinfected between flocks and, ideally, should be disinfected between sheep. A higher percentage of small operations (10.0 percent) than medium (4.6 percent) or large (4.6 percent) operations disinfected shears between sheep.

Over half of operations (54.0 percent) never disinfected shears between sheep, while 15.3 percent sometimes disinfected shears between sheep.

F.1.j. For operations that sheared sheep or lambs during 2010, percentage of operations by frequency shears were disinfected between individual 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**	
Frequency	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Always			10.0	(1.1)	4.6	(0.7)	4.6	(0.9)			8.4	(0.8)
Sometimes			15.9	(1.3)	15.1	(1.3)	9.4	(1.2)			15.3	(1.0)
Never			52.6	(1.7)	57.5	(1.8)	58.0	(1.8)			54.0	(1.3)
Do not know			21.5	(1.4)	22.8	(1.5)	27.9	(1.6)			22.2	(1.1)
Total			100.0		100.0		100.0				100.0	

Shearing sheep in order from the youngest to the oldest is one method of reducing the risk of transmitting disease between sheep. A lower percentage of small operations (3.4 percent) sheared sheep from youngest to oldest compared with large operations (7.2 percent). Overall, 91.6 percent of operations with 20 or more ewes sheared sheep in no particular order.

F.1.k. For operations that sheared sheep or lambs during 2010, percentage of operations by shearing practice 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**	
Shearing practice	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
From youngest to oldest			3.4	(0.6)	4.1	(0.7)	7.2	(0.9)			3.8	(0.5)
From oldest to youngest			3.7	(0.7)	5.2	(0.8)	11.1	(1.1)			4.5	(0.5)
In no particular order			92.9	(0.9)	90.6	(1.0)	81.7	(1.4)			91.6	(0.7)
Total			100.0		100.0		100.0				100.0	

2. Wool management and marketing

Wool is easily stored, and some producers bag and store their wool until market conditions improve. Other producers, especially those with smaller operations, have developed niche markets and sell their wool to hand-spinners and weavers.

Over half of operations (61.5 percent) sold wool on a greasy basis. Nearly half of operations (48.8 percent) stored wool in bags. Overall, 11.3 percent of operations that sheared sheep had their wool analyzed by a laboratory; 62.3 of large operations had their wool analyzed. A small percentage of small operations (4.7 percent) had their wool analyzed by a laboratory. Wool can be used in many ways for a variety of things. For example, 3.3 percent of operations used at least some wool for animal bedding; 5.8 percent used at least some wool for mulch; and 3.2 percent used wool for insulation. More than one of five small operations (21.8 percent) threw their wool away.

F.2.a. For operations that sheared lambs or sheep during 2010, percentage of operations by wool management method 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**	
Wool management method	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Analyzed by a laboratory			4.7	(0.7)	17.4	(1.2)	62.3	(1.8)			11.3	(0.6)
Sold on a clean basis			11.2	(1.1)	17.4	(1.3)	42.6	(1.8)			14.6	(0.8)
Sold on a greasy basis			58.7	(1.7)	70.4	(1.6)	59.9	(1.8)			61.5	(1.3)
Given away			16.6	(1.3)	10.4	(1.2)	4.7	(0.8)			14.4	(1.0)
Spun (on this operation or elsewhere)			10.1	(1.0)	6.7	(1.0)	5.2	(0.9)			9.0	(0.8)
Used for animal bedding			3.4	(0.6)	3.3	(0.6)	1.7	(0.5)			3.3	(0.5)
Used for mulch			5.7	(0.8)	6.8	(0.9)	3.0	(0.6)			5.8	(0.6)
Used for insulation			3.1	(0.6)	4.2	(0.8)	1.1	(0.3)			3.2	(0.5)
Stored in bags			47.4	(1.7)	51.0	(1.8)	56.0	(1.8)			48.8	(1.3)
Thrown away			21.8	(1.4)	14.0	(1.2)	5.4	(0.8)			18.9	(1.0)
Other			3.4	(0.6)	3.3	(0.8)	1.7	(0.6)			3.3	(0.5)

A higher percentage of operations in the West region gave or threw away their wool compared with operations in the Central or East regions. A higher percentage of operations in the Central region (24.8 percent) had their wool analyzed by a laboratory compared with operations in the West and East regions (7.6 and 2.2 percent, respectively).

F.2.b. For operations that sheared lambs or sheep during 2010, percentage of operations by wool management method used and by region:

Percent Operations (20 or more ewes)

	Region					
	West		Central		East	
Wool management method	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Analyzed by a laboratory	7.6	(1.5)	24.8	(1.2)	2.2	(0.6)
Sold on a clean basis	8.7	(1.9)	22.6	(1.4)	10.4	(1.2)
Sold on a greasy basis	53.7	(3.5)	60.1	(1.8)	65.2	(1.9)
Given away	25.6	(3.1)	9.8	(1.2)	14.0	(1.4)
Spun (on this operation or elsewhere)	13.3	(2.4)	5.8	(0.8)	10.0	(1.2)
Used for animal bedding	5.7	(1.7)	1.8	(0.5)	3.5	(0.7)
Used for mulch	12.9	(2.3)	2.7	(0.5)	5.7	(0.9)
Used for insulation	5.1	(1.5)	2.1	(0.5)	3.5	(0.7)
Stored in bags	45.3	(3.5)	55.0	(1.8)	45.1	(2.0)
Thrown away	34.1	(3.3)	11.8	(1.2)	19.2	(1.6)
Other	7.9	(2.1)	2.0	(0.6)	2.7	(0.6)

A higher percentage of herded/open-range and fenced-range operations (30.2 and 21.2 percent, respectively) sold their wool on a clean basis compared with pasture (11.5 percent) and dry lot/feedlot (11.3 percent) operations.

F.2.c. For operations that sheared lambs or sheep during 2010, percentage of operations by wool management method used and by flock type:

	Percent Operations (20 or more ewes)							
	Flock Type							
	Herded/ open range		**Fenced range**		**Pasture**		**Dry lot/feedlot**	
Wool management method	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Analyzed by a laboratory	43.1	(4.4)	24.0	(1.6)	5.7	(0.7)	2.1	(1.2)
Sold on a clean basis	30.2	(4.0)	21.2	(1.7)	11.5	(1.0)	11.3	(2.8)
Sold on a greasy basis	63.0	(4.9)	55.4	(2.4)	64.3	(1.6)	57.2	(4.6)
Given away	9.7	(3.2)	13.0	(1.7)	15.7	(1.3)	10.4	(3.0)
Spun (on this operation or elsewhere)	9.5	(3.1)	3.9	(0.8)	10.8	(1.1)	10.5	(3.0)
Used for animal bedding	2.7	(1.3)	2.0	(0.6)	3.6	(0.6)	4.9	(2.2)
Used for mulch	2.5	(1.1)	3.9	(0.9)	6.5	(0.8)	7.5	(2.5)
Used for insulation	1.1	(0.5)	1.7	(0.5)	4.0	(0.7)	3.0	(1.4)
Stored in bags	38.2	(4.4)	46.2	(2.4)	50.9	(1.7)	44.6	(4.6)
Thrown away	6.3	(2.0)	15.2	(1.8)	20.1	(1.4)	26.9	(4.1)
Other	6.9	(4.0)	2.8	(0.9)	3.5	(0.6)	1.9	(1.3)

Wool in the United States is usually marketed by one of four methods: marketing cooperatives, pools, warehouses, and private treaties. For this study, marketing cooperatives and pools were placed in the “cooperative pools” category, since pools are another marketing channel cooperative. Cooperative pools were used by the second highest percentage of operations for marketing wool; direct sales were used by the highest percentage of operations. A higher percentage of small operations (38.7 percent) sold wool using cooperative pools compared with medium and large operations (28.4 and 12.9 percent, respectively). Over half of large operations (53.3 percent) used warehouses to market their wool compared with only 15.5 and 30.3 percent of small and medium operations, respectively.

F.2.d. For operations that sold any wool during 2010, percentage of operations by primary method used to market wool 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 wool marketing method	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Cooperative pools			38.7	(2.0)	28.4	(1.7)	12.9	(1.3)			33.8	(1.4)
Direct sales			41.7	(2.1)	38.8	(1.8)	31.3	(1.7)			40.0	(1.4)
Warehouses			15.5	(1.5)	30.3	(1.6)	53.3	(1.9)			22.7	(1.1)
Other			4.1	(0.8)	2.5	(0.6)	2.5	(0.7)			3.5	(0.6)
Total			100.0		100.0		100.0				100.0	

For operations that sold any wool during 2010, 46.1 percent in the Central region marketed wool to warehouses compared with only 12.5 and 6.0 percent of operations in the West and East regions, respectively.

F.2.e. For operations that sold any wool during 2010, percentage of operations by primary method used to market wool and by region:

Percent Operations (20 or more ewes)

	Region					
	West		Central		East	
Primary wool marketing method	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Cooperative pools	39.3	(4.4)	20.0	(1.5)	43.7	(2.2)
Direct sales	44.4	(4.5)	31.1	(1.8)	46.3	(2.2)
Warehouses	12.5	(2.9)	46.1	(2.0)	6.0	(1.0)
Other	3.9	(1.9)	2.7	(0.8)	4.1	(0.9)
Total	100.0		100.0		100.0	

Section II: Methodology

A. Needs Assessment

NAHMS develops study objectives by exploring existing literature and contacting industry members about their informational needs and priorities during a needs assessment phase. The needs assessment for the NAHMS Sheep 2011 study collected information from U.S. sheep producers and other goat 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, 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.

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 275 stakeholders completed the needs assessment questionnaire. In addition, an advisory group of producers, researchers, extension veterinarians, and clinicians helped develop the study objectives.

Of those, 37 percent were meat producers, 14 percent wool producers, 0.8 percent milk producers, 8.0 participated in 4-H or club lamb participants, 1.9 percent veterinarians, 21.8 percent Federal or State government, 5.3 percent university or extension agents, 0.8 percent were allied industry, and 10.3 percent classified themselves as “other,” which included mostly producers of meat and wool, hair sheep, or seed stock. The number of sheep raised by producers was between 1 and 5,000. Of the respondents, 49.25 percent were from the Eastern time zone, 34.9 percent from the Central time zone, 7.0 percent from the Mountain time zone, and 8.9 percent from the Pacific time zone.

Ewe health/management was the most important management issue, with 40 percent of respondents ranking health/management as their 1st, 2nd, or 3rd most important issue. For those producers who indicated ewe health as a 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 survey respondents. Overall, 65.7 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. The next most important disease issues were scrapie (22.0 percent of operations), abortions (19.8 percent), and lameness (19.8 percent).

Federal and State veterinarians made up nearly 22 percent of respondents. The following describes their responses to the survey: The majority are in the Eastern time zone (61.0 percent) followed by the Central (25.0 percent), Mountain (7.4 percent), and Pacific

(5.6 percent) time zones. The top three management issues were: identification (15.9 percent), infectious disease (15.2 percent), and disease prevalence (13.4 percent). The top three disease-specific issues were: scrapie (18.1 percent), internal parasites (13.6 percent), and Johne's (10.6 percent).

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.

Objectives for NAHMS Sheep 2011 study were

- Describe trends in sheep health and management practices from 1996 to 2011.
- Describe management and biosecurity practices used to control common infectious diseases, including scrapie, ovine progressive pneumonia, Johne's disease, and caseous lymphadenitis.
- Estimate the prevalence of gastrointestinal parasites and anthelmintic resistance.
- Estimate the prevalence of *Mycoplasma ovipneumonie* in domestic sheep flocks. Relate presence of the organism in blood and nasal secretions to clinical signs and demographic and management factors.
- Facilitate the collection of information and samples regarding causes of abortion storms in sheep
- Determine producer awareness of the zoonotic potential of contagious ecthyma (soremouth) and the management practices used to prevent transmission of the disease.
- Provide sera to include in the serological bank for future research.

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 population 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 the farms with ewes. Sampling discussions were held with NASS statisticians and 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 ewe inventory and

70.1 percent of farms with ewes. In addition, the States included 84.6 percent of the January 1, 2010, 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 reports. The sample was selected from those producers who reported one or more ewes on hand January 1, 2010. The sample of sheep producers was selected in each State. Among producers reporting fewer than 20 ewes, 1,401 operations were selected for Phase Ia. For operations reporting 20 or more ewes, a total of 3,542 operations were selected for contact during Phase Ib. Therefore a total of 4,943 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 out of 68,222). In addition, these States accounted for 84.6 percent of the January 1, 2010, ewe inventory in the United States or 2,824,000 head out of 3,340,000 head. (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 telephone interviewers who administered the questionnaire which averaged approximately 30 minutes. NASS enumerators administered the General Sheep Management Questionnaire to producers with 20 or more ewes via an in-person interview which took approximately 1 hour.

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 and edited. For the in-person administered questionnaire, initial data entry and validation for the General Sheep Management Questionnaire 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 upon 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 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 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[4]			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 19 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.

Comparable number of ewes by size (1 or more and 20 or more):

West	405,900	373,863	92.1
Central	1,389,359	1,330,576	95.8
East	619,389	510,188	82.4
Total (22 States)	2,414,648	2,214,627	91.7

(Published totals for ewes on all farms **and** ewes on farms with 20 or more head by State.

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 Percent by Size Group, United States 2008–09

	1–99 head		200–499 head		500–4,999 head		5,000+ head	
	2008	2009	2008	2009	2008	2009	2008	2009
Operations	92.5	93.7	6.2	5.2	1.2	1.0	0.1	0.1
Inventory	32.6	36.2	22.7	20.8	30.2	31.3	14.5	11.7

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

Appendix III: Study Objectives and Related Outputs

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, December 2012
- Part III: Changes in the Sheep Industry, 1996–2011, expected winter 2013
- Part IV: Reference of Sheep Health and Health Management in the United States, 2011, expected spring 2013
- Vaccination Practices on U.S. Sheep Operations, 2011, info sheet, expected spring 2013
- Sheep and Lamb Losses on U.S. Sheep Operations, 2011, info sheet, expected spring 2013
- Lambing Management on U.S. Sheep Operations, 2011, info sheet, expected spring 2013

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 2013
- Parasite Control on U.S. Sheep Operations, 2011, info sheet, expected winter 2013
- Producer Disease Awareness, 2011, info sheet, expected spring 2013
- Antimicrobial Drug Use on U.S. Sheep Operations, 2011, info sheet, expected spring 2013

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

- Gastrointestinal Parasites and Anthelmintic Resistance, 2011, info sheet, expected spring 2013
- Gastrointestinal Parasites and Anthelmintic Resistance on U.S. Sheep Operations, 2011, info sheet, expected spring 2013

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 spring 2013

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 spring 2013
- Q Fever in Sheep in the United States, 2011, info sheet, expected spring 2013
- *Campylobacter* on U.S. Sheep Operations, 2011, info sheet, expected spring 2013
- *Salmonella* on U.S. Sheep Operations, 2011, info sheet, expected spring 2013

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 spring 2013