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Small-scale U.S. Goat Operations



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ITEMS OF NOTE

For this report, small-scale goat operations were defined as operations with fewer than 500 goats. Within U.S. livestock agriculture, farms with fewer than 500 goats are strong contributors to total goat production. In 2007, 99.7 percent of all goat farms had fewer than 500 goats, and farms with fewer than 500 goats accounted for 82.6 percent of all U.S. goats (NASS 2007 Census of Agriculture).

Goats are important producers of meat, milk, fiber, and other products. However, goats are also raised or kept for a wider range of uses, such as brush control, livestock shows, packing, and as lively companions. About 4 of 10 small-scale goat operations (42.4 percent) focused primarily on meat production. One of 10 operations (10.0 percent) focused primarily on dairy production. Only 1.5 percent of operations focused primarily on fiber production, and 46.1 percent indicated that their primary production focus was “other,” i.e. goats used for brush control, pets, livestock shows, pack animals, or other uses. Of operations with fewer than 10 goats, 72.4 percent indicated their primary production focus was “other”. The percentage of operations with “other” as a primary production focus decreased as herd size increased.

Many goat producers are relatively new to the business, particularly goat meat producers and producers with operations that have a

production focus other than meat, fiber, or dairy. Operators on almost two-thirds of small-scale meat goat operations (66.0 percent) had managed goats for 10 years or less, while operators on almost two-thirds of fiber goat operations (62.0 percent) had managed goats for more than 10 years. Operators on about three of four “other” operations (74.3 percent) had been in business 10 years or less.

Although 13.5 percent of all small-scale goat operations (meat, dairy, fiber, and “other”) had milked does during the previous 12 months, only 2.8 percent had sold or traded any goat milk or other goat milk products. The majority of operations that milked does used at least some of the milk to feed goat kids and/or for home consumption. Of operations that milked does, 53.8 percent had family members or employees who consumed raw goat milk or raw goat milk products during the previous 12 months. Almost one of four operations that sold or traded milk or milk products (24.5 percent) had marketed raw goat milk or raw goat milk products intended for human consumption during the previous 12 months.

Increased awareness of disease, disease management practices, and biosecurity practices could help goat producers improve biosecurity and derive economic benefits. The Goat 2009 study revealed that many producers on small-scale operations could benefit from education regarding zoonotic diseases that affect goats.

Producers on less than one-third of operations knew that brucellosis, Q fever, toxoplasmosis and sore mouth are infectious to humans. Veterinarians can serve as a valuable resource for information on animal health. Overall, 34.8 percent of operations had consulted a veterinarian for any reason related to goat health, productivity, or management during the previous 12 months. While it is unclear why so few operations used a veterinarian, one reason could be the difficulty in finding a veterinarian experienced in working with goats. Goat associations and clubs can also be good sources of information on biosecurity, animal health, production practices, and marketing. A relatively small percentage of operations belonged to a national or State/local goat association or club (16.9 and 12.9 percent, respectively).

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INTRODUCTION

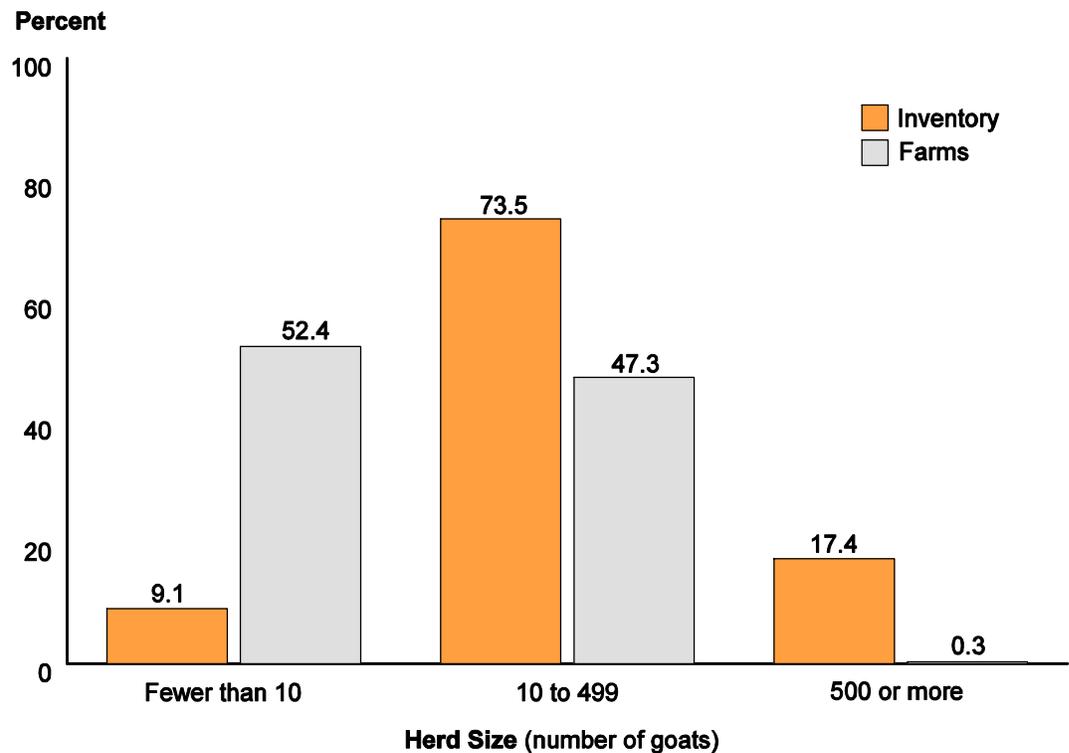
This is the third report in a series of reports resulting from the Small-scale Operations Initiative implemented by the National Animal Health Monitoring System (NAHMS) at the request of the administrator of the U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service. The primary objective of the Small-scale Operations Initiative is to investigate factors that set small-scale operations apart from larger operations.

1. Defining farm size for goat operations

The USDA defines a small farm as a sole proprietorship, partnership, or family corporation with annual gross sales of less than \$250,000 for all agricultural products sold from the farm. Ninety-one percent of all U.S. farms meet USDA's definition of a small farm. These

farms supply 15 percent of all U.S. crop and animal production and account for more than one-half of the land in U.S. farms (NASS 2007 Census of Agriculture).

For this report, small-scale goat operations are defined as operations with fewer than 500 goats. Within U.S. livestock agriculture, farms with fewer than 500 goats are strong contributors to total goat production. In 2007, 99.7 percent of all goat farms had fewer than 500 goats, and 52.4 percent had fewer than 10 goats. Farms with fewer than 500 goats accounted for 82.6 percent of all U.S. goats, and farms with fewer than 10 goats accounted for 9.1 percent of all U.S. goats (NASS 2007 Census of Agriculture) [figure 1].

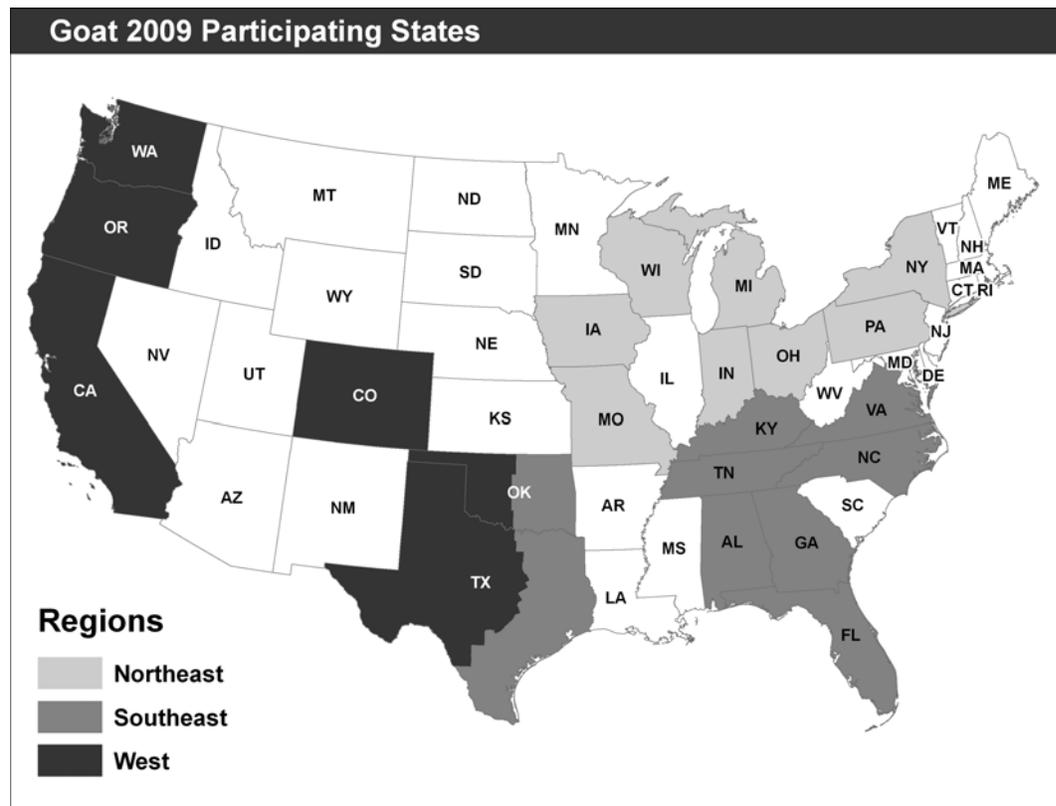
Figure 1. Percentage of U.S. Goat Inventory and Goat Farms, by Herd Size

Source: 2007 U.S. Census of Agriculture.

2. Data Sources

Unless otherwise noted, data for this report were taken from the NAHMS Goat 2009 study. Goat 2009 was NAHMS' first study of the U.S. goat industry and was conducted in 21 of the Nation's major goat-producing States (see map, next page). As of December 31, 2007, these States accounted for 82.2 percent of all goats and 75.5 percent of all operations with goats in the United States (NASS 2007 Census of Agriculture).

A total of 2,484 goat operations participated in the NAHMS Goat 2009 study. The study design was a stratified random sample with unequal selection probabilities. All respondent data were statistically weighted to reflect the population from which they were selected. Operations with fewer than 10 goats (649) completed an abbreviated version of the questionnaire by phone or by self-administered mail-in survey. Those with 10 or more goats (1,835) were interviewed by NASS enumerators to complete the full version of the questionnaire. Additional details of sample weighting and study design are available (USDA, 2010).

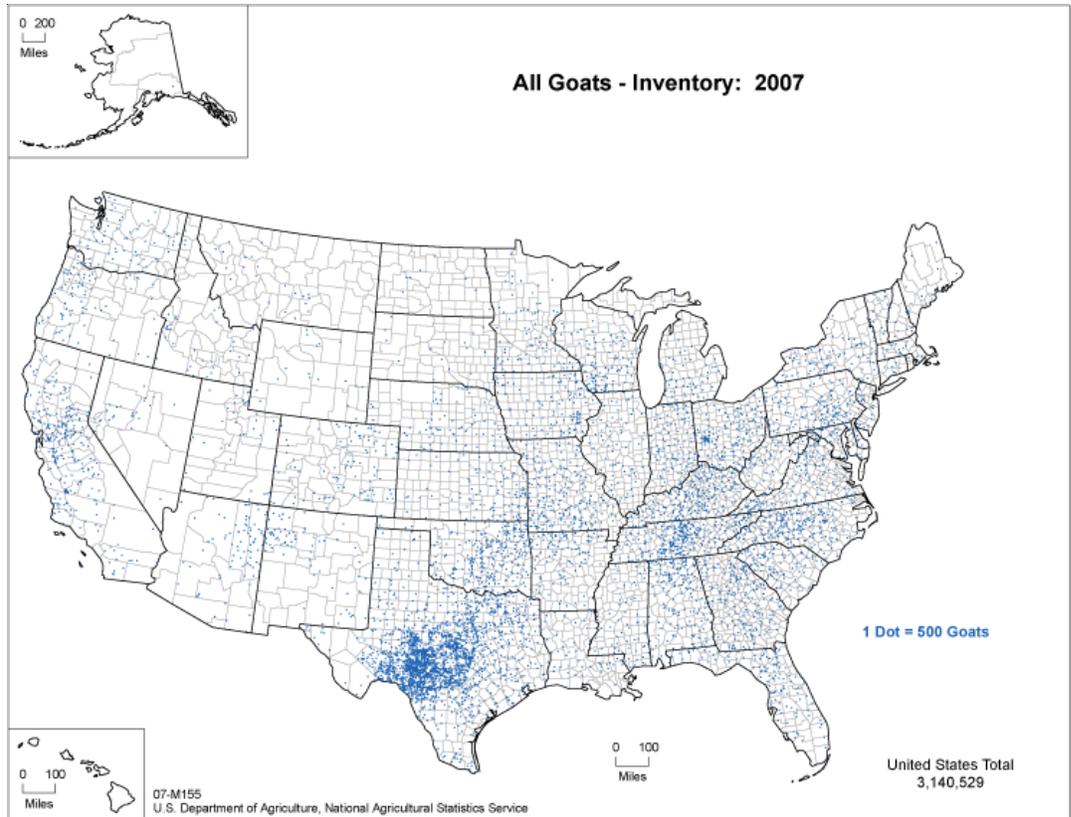


Note: Texas and Oklahoma were divided on a line corresponding to north-south Interstate 35. The western halves of the States were included in the West region, and the eastern halves were included in the Southeast region.

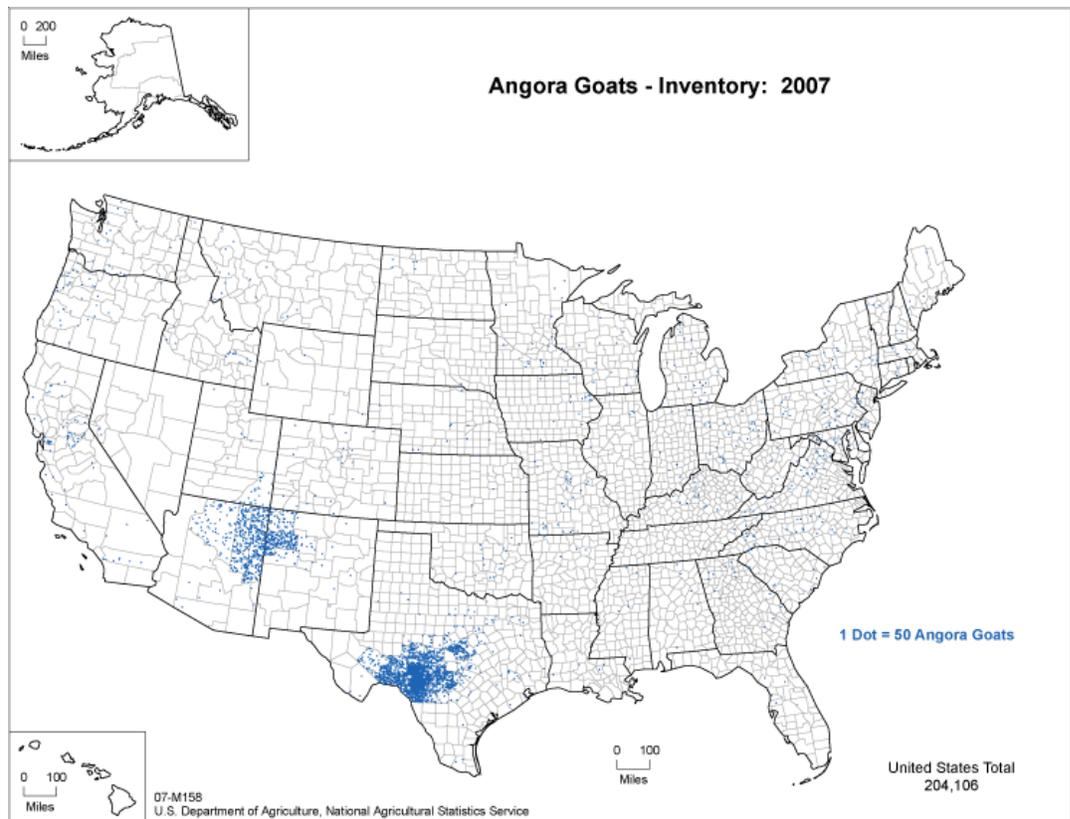
3. Distribution of Goats in the United States

The following maps show the distribution of goat inventory in the United States for all goats and for individual goat types. Goats are more heavily concentrated in the eastern United

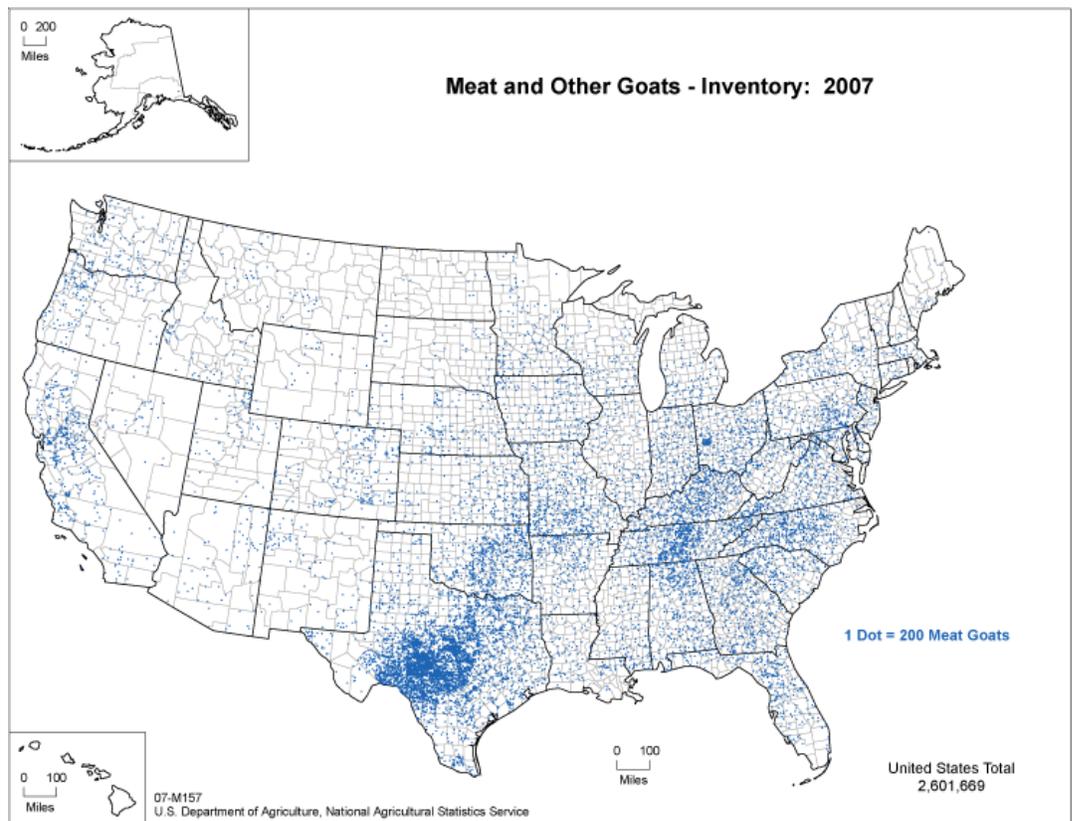
States. Texas has about one-third of the goats in the United States (36.3 percent), which might be because the Texas environment and climate are suitable for goat production.



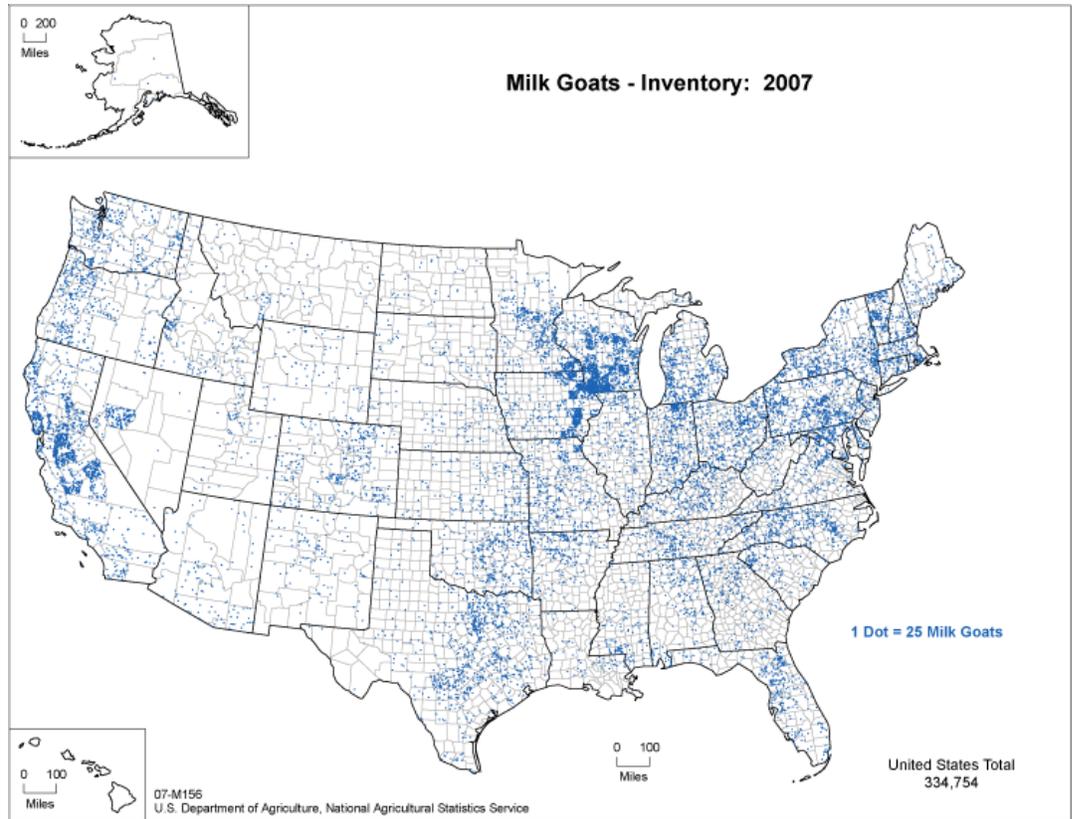
Angora goat production is very localized. Southwest Texas, northeast Arizona, and northwest New Mexico have more Angora goats than anywhere else in the United States, primarily because these areas' climatic conditions and terrain are well suited for Angora goat production.



Meat goat distribution closely mirrors the distribution of all goats, with the heaviest concentrations in the eastern States and Texas. The distribution of meat goats might be partially related to the demand for goat meat by local populations in these areas.



California and Wisconsin account for nearly one-fourth of all U.S. milk goats (22.6 percent).



TERMS USED IN THIS REPORT

Abortion storm: A cluster of abortions occurring at about the same time or in rapid sequence within a group of pregnant females.

Carding: Mechanical process that breaks up locks and unorganized clumps of fiber to align individual fibers so that they are parallel with each other.

De-hairing: Process of separating the fine, soft undercoat or underdown of Cashmere goats from the straighter and much coarser outer coat of guard hairs. For the fine underdown to be processed further, it must first be de-haired. After de-hairing, the resulting cashmere fiber is ready to be dyed and converted into yarn, fabrics and garments.

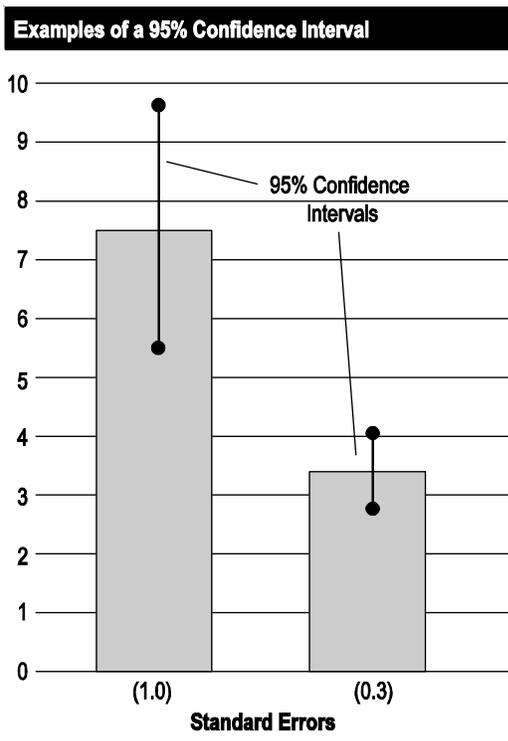
Guard hairs: The longest, coarsest hairs in a mammal's coat. They form the topcoat or outer coat and protect the undercoat from the elements.

Greasy wool: Or "wool in the grease" is wool straight off a sheep or goat. It contains valuable lanolin as well as dirt, dead skin, sweat residue, pesticide, and vegetable matter. Before the wool can be used for commercial purposes, it must be scoured, a process of cleaning the greasy wool.

Micron: Measurement used to express the average diameter of wool fibers in a fleece. A micron is one-millionth of a meter. Finer fibers have a smaller diameter and a smaller micron. Human hair has a micron of about 75, while Cashmere fibers have a micron of 14 to 17, and merino wool fibers have a micron of 18 to 25. Fine fibers may be used in the production of garments such as men's suits, while coarser fibers may be used for the production of products such as carpets.

Population estimates: The estimates in this report make inference to all operations in the target population. Data from the operations responding to the survey are weighted to reflect their probability of selection during sampling and to account for any survey nonresponse.

Precision of population estimates: Estimates in this report are provided with a measure of precision called the standard error. A 95-percent confidence interval can be created with bounds equal to the estimate plus or minus two standard errors. If the only error is sampling error, the confidence intervals created in this manner will contain the true population mean 95 out of 100 times. In the example on the next page, an estimate of 7.5 with a standard error of 1.0 results in limits of 5.5 to 9.5 (2 times the standard error above and below the estimate). The second estimate of 3.4 shows a standard error of 0.3 and results in limits of 2.8 and 4.0. Alternatively, the 90-percent confidence interval would be created by multiplying the standard error by 1.65 instead of 2. Most estimates in this report are rounded to the nearest tenth. If rounded to 0, the standard error was reported (0.0). If there were no reports of the event, no standard error was reported (-).



Staple length: Length of a wool staple. Staples are naturally formed clusters or locks of fibers in a fleece, such as the locks in an Angora goat fleece. Staple length is closely correlated with mean fiber length and determines whether the yarn spun from the wool will be used to produce woven or knitted garments.

Woolen (yarn): Yarn made from carded wool. Woolen yarn is soft, light, stretchy, full of air and is used in the production of both knitted and woven garments.

Worsted (yarn): Yarn in which the fibers are combed to lie parallel rather than carded, producing a hard, strong yarn usually used to produce woven garments.

Wool crimp: The number of bends per unit length (inch or centimeter) along the wool fiber. Crimp indicates the spinning capacity of the wool. Fibers with a fine crimp have many bends and usually have a small diameter. Such fiber can be spun into fine yarns with a greater market value than coarser fibers with less crimp.

SECTION I: POPULATION ESTIMATES

A. BUSINESS CHARACTERISTICS

1. Production focus

Goats are important producers of meat, milk, fiber, and other products. As part of the NAHMS Goat 2009 study, producers were asked to identify the primary production focus of their operations, i.e., meat, dairy, fiber, or other.

Of operations with fewer than 10 goats, 72.4 percent indicated their primary production focus was “other,” i.e. goats used for brush control, pets, livestock shows, and pack animals. The percentage of operations with “other” as a primary production focus decreased as herd size increased. For example, only 4.9 percent of operations with 100 to 499 goats indicated a primary production focus of “other.”

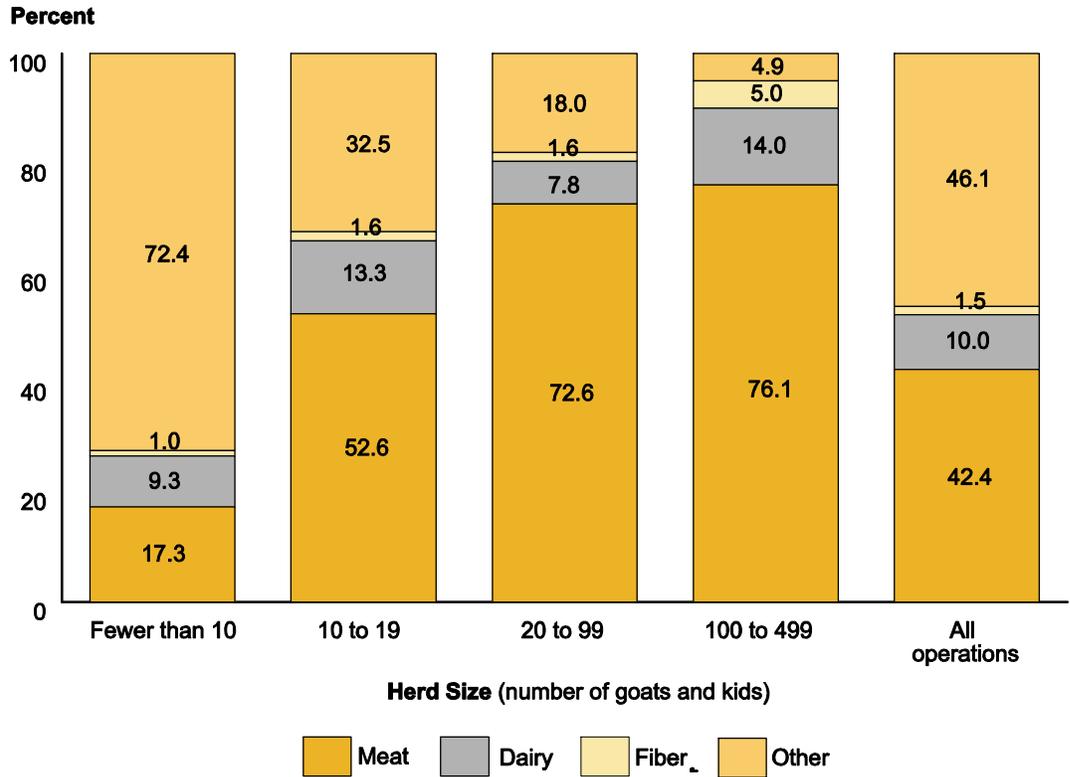
Overall, about 4 of 10 small-scale goat operations (42.4 percent) focused primarily on meat production, ranging from 17.3 percent of operations with fewer than 10 goats to 76.1 percent of operations with 100 to 499 goats (figure 2). Until recently, Texas and Tennessee produced the majority of goat meat; however,

goat meat is now produced throughout most of the United States (Spencer, 2008). The primary consumers of goat meat in the United States are foreign-born U.S. citizens, primarily from the Middle East, Southeast Asia, Africa, Mexico, Western Europe and the Caribbean, and their descendants (Spencer, 2008).

One of 10 small-scale goat operations (10.0 percent) focused primarily on dairy production (figure 2). Dairy production was the primary focus on 14.0 percent of operations with 100 to 499 goats.

Fiber production from goats in the United States is primarily mohair from Angora goats and cashmere from other goat breeds. About 90 percent of U.S. mohair is produced in the Edwards Plateau in southwest Texas. Only 1.5 percent of small-scale goat operations focused primarily on fiber production.

Figure 2. Percentage of Operations by Primary Production Focus and by Herd Size



2. Number of years in goat business

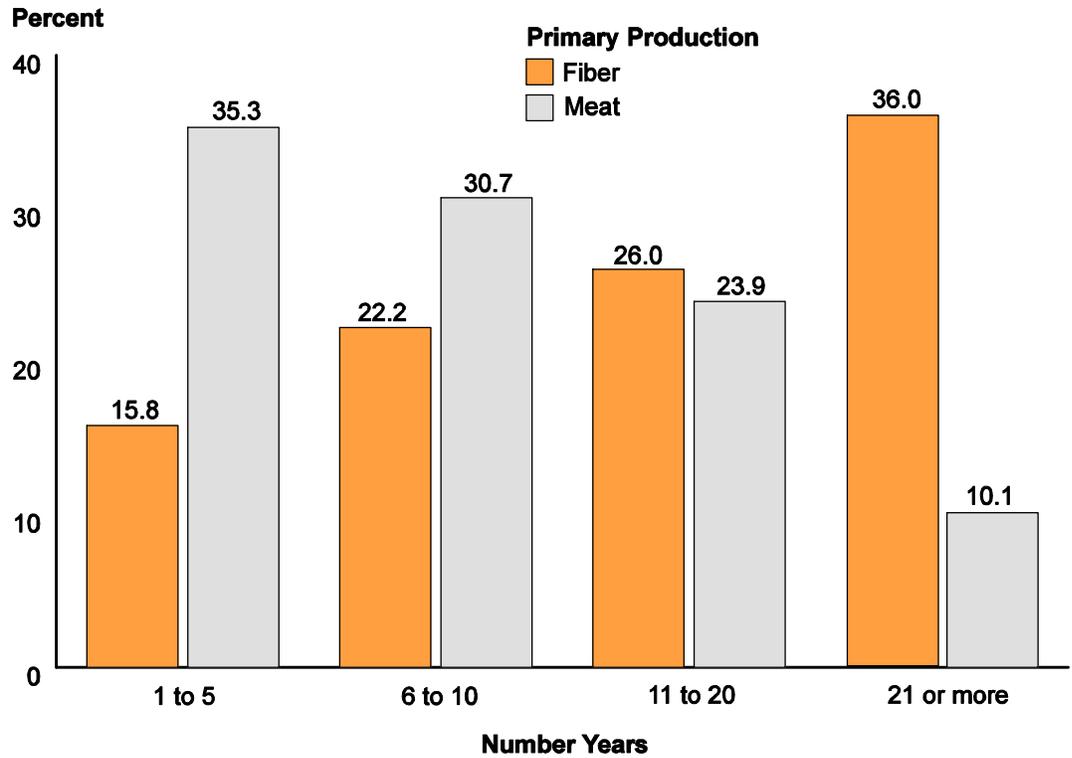
Operators on almost two-thirds of meat goat operations (66.0 percent) had managed goats for 10 years or less, while operators on almost two-thirds of fiber goat operations (62.0 percent) had managed goats for more than 10 years (table 1, figure 3). Operators on a higher percentage of meat goat operations had managed goats for 5 years or less

compared with operators on dairy and fiber goat operations. Operators on about three of four “other” operations (74.3 percent) had been in business 10 years or less. “Other” operations kept goats for pets/companions, brush control/ forage management, showing at livestock shows, competition, 4-H or other club, or other reasons.

Table 1: Percentage of operations by number of years operator had owned or managed any goats, and by primary production

| Number Years | Percent Operations | | | | | | | | | |
|--------------|--------------------|------------|-------|------------|-------|------------|-------|------------|----------------|------------|
| | Primary Production | | | | | | | | | |
| | Meat | | Dairy | | Fiber | | Other | | All Operations | |
| | Pct. | Std. Error | Pct. | Std. Error | Pct. | Std. Error | Pct. | Std. Error | Pct. | Std. Error |
| 1 to 5 | 35.3 | (1.7) | 22.8 | (2.8) | 15.8 | (4.3) | 39.8 | (2.1) | 35.8 | (1.2) |
| 6 to 10 | 30.7 | (1.6) | 28.5 | (3.0) | 22.2 | (5.1) | 34.5 | (2.0) | 32.1 | (1.2) |
| 11 to 20 | 23.9 | (1.5) | 28.5 | (3.1) | 26.0 | (5.5) | 16.8 | (1.6) | 21.1 | (1.0) |
| 21 or more | 10.1 | (1.0) | 20.2 | (2.6) | 36.0 | (7.0) | 8.9 | (1.2) | 11.0 | (0.7) |
| Total | 100.0 | | 100.0 | | 100.0 | | 100.0 | | 100.0 | |

Figure 3. Percentage of Operations by Number of Years Operator had Owned or Managed any Goats, and by Primary Production

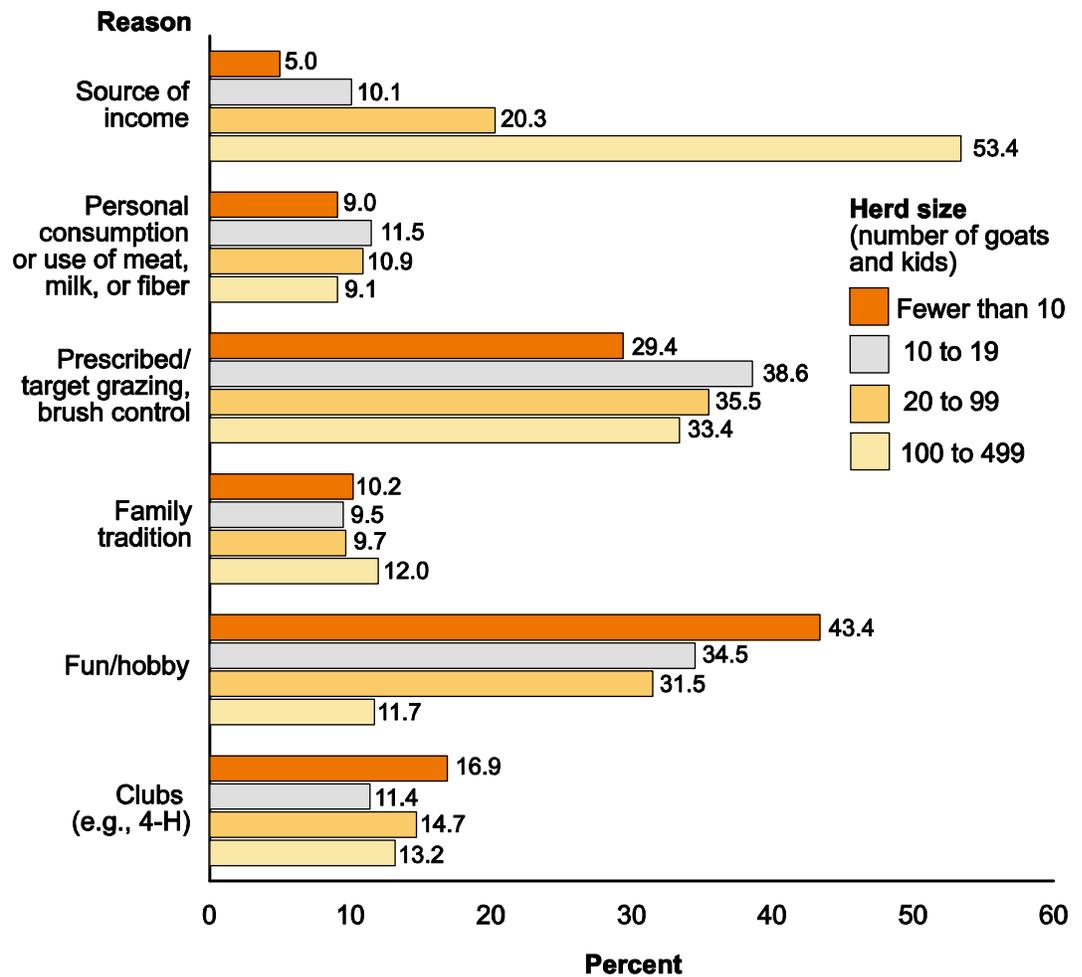


3. Reasons for raising goats

The percentage of operations that reported income as a very important reason for raising goats increased with herd size, ranging from 5.0 percent of operations with 1 to 9 goats, 10.1 percent of operations with 10 to 19 goats, 20.3 percent of operations with 20 to 99 goats, and 53.4 percent of operations with 100 to 499 goats (figure 4).

About 4 of 10 operations with fewer than 10 goats (43.4 percent) reported fun/hobby as a very important reason for raising goats (figure 4). Operations with 100 to 499 goats were less likely to consider fun/hobby a very important reason for raising goats compared with operations with fewer than 100 goats. It is not surprising that larger operations, which are more income-driven, do not consider fun/hobby as important a reason for raising goats.

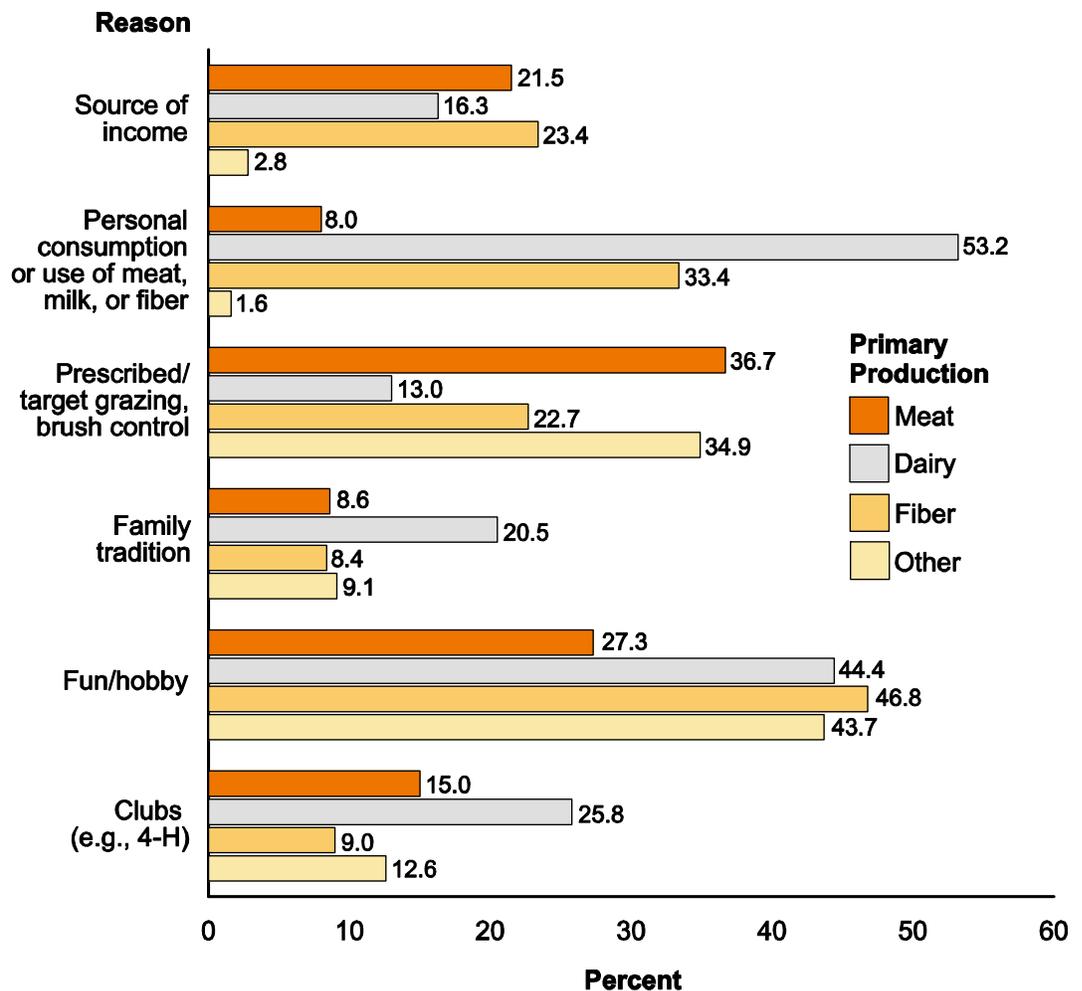
Figure 4. Percentage of Operations that Rated the Following Reasons for Raising Goats Very Important, by Herd Size



About one-half of dairy goat operations (53.2 percent) considered personal consumption or use of meat, milk, or fiber to be a very important reason for raising goats. In comparison, less than 10 percent of operations with either a primary production focus of meat or “other” (8.0 and 1.6 percent, respectively) considered consumption or use of meat, milk, or fiber to be a very important reason for raising goats (figure 5).

Similarly, during the NAHMS Small-Enterprise Swine 2007 study, swine producers were asked to rank their reasons for raising pigs by level of importance: not important, slight, some, high, or extreme. Overall, 60.5 percent of small-enterprise swine operations considered meat for personal consumption a highly or extremely important reason for raising pigs.

Figure 5. Percentage of Operations that Rated the Following Reasons for Raising Goats Very Important, by Primary Production



Goat Fiber Collection and Processing

Sheep are most often associated with wool fiber production; however, goats produce some of the most luxurious and highly prized wool fibers, including mohair from Angora goats and cashmere from multiple breeds of goats. Most of the goat fiber produced in the United States is mohair, and the United States is one of the world's largest producers of mohair. Angora goats are typically shorn twice a year. Mohair fleece has a 4- to 6-inch staple length with a micron count of 24–39. Kids produce the finest fiber because as the goats age their fiber gets coarser. Wethers (castrated males) are excellent fiber-producing animals. They typically produce softer fiber and more fleece than bucks and does because they do not have the stress that comes with rutting, kidding, and lactation; therefore, more of their resources go to fiber production. Raw mohair fiber from goats contains lanolin, just like sheep wool. The first step in processing mohair is to scour it to remove dirt and excess lanolin. The fiber is then carded (shorter fibers) or combed and drawn (longer fiber), depending on the intended yarn type (woolen or worsted, respectively).

Very soft and without crimp, cashmere is the downy undercoat found in cashmere-producing goats. The outer coat consists of guard hairs, which are much coarser than the undercoat and are removed during processing. Staple length in cashmere ranges from 1 to 3 inches with a micron count of about 11 to 18. Cashmere-producing goats are either sheared or combed by hand during the spring molting season. The resulting fiber is sorted and scoured to remove dirt and grease before the guard hair and cashmere are separated by de-hairing. Guard hairs are often used for brushes and other nonapparel uses, while cashmere fibers are used for cloth and apparel.

Pygora goats are a cross between Angora and Pygmy goats and are also used for fiber production. Pygora goats produce fiber that combines the long, silky ringlets of Mohair goats with the fine down produced by Pygmy goats.

Cashgora goats are a cross between Angora and cashmere-producing goats. Cashgora fiber is sometimes compared to Pygora fiber. Cashgora is also used to describe fiber that does not meet the criteria for cashmere (Franck, 2001; Cashmere and Camel Hair Manufacturer's Institute, 2010; Pygora Breeders Association, 2010; Pygora Breeders Association Goat Registry, 2010; The Mohair Council of America, 2010).

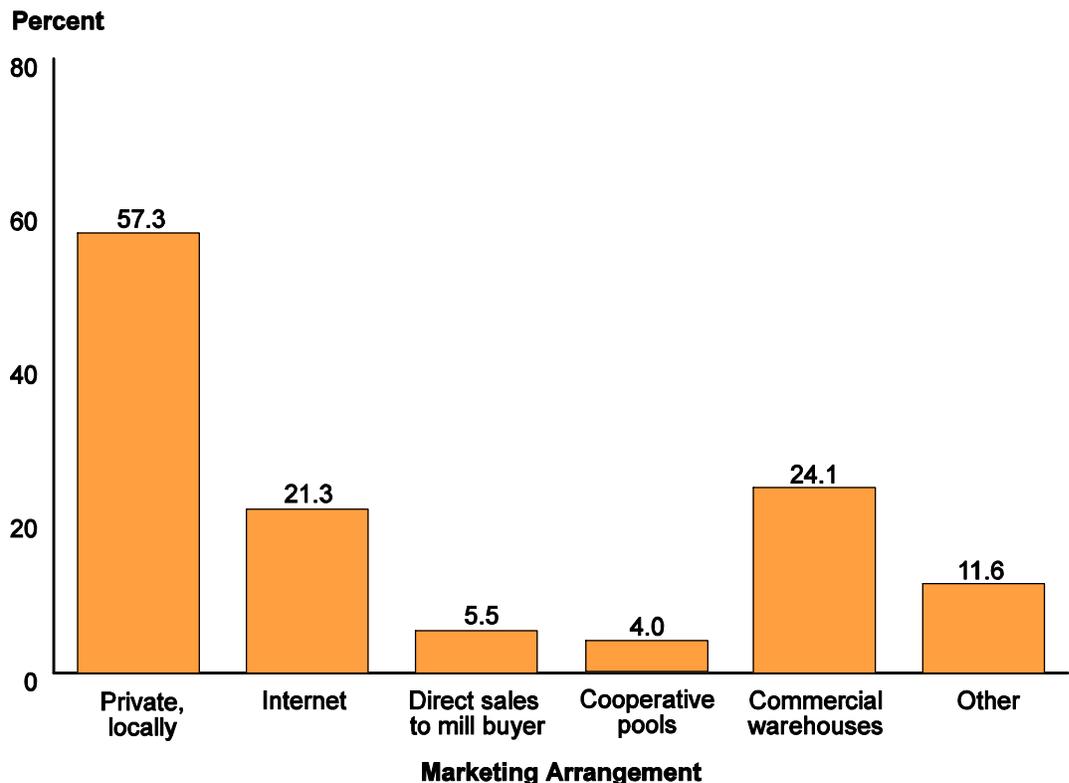
4. Fiber marketing

Only 1.5 percent of operations had a primary production focus of fiber. However, a few meat, dairy, and “other” operations also produced fiber, so that 3.0 percent of all operations had some goats shorn, clipped, or combed for fiber during the previous 12 months.

Of operations that sold or traded fiber in the previous 12 months, 57.3 percent marketed the fiber to private, local individuals; 24.1 percent marketed to commercial warehouses; and 21.3 percent marketed through the Internet (figure 6).

Fiber production from goats in the United States is primarily mohair from Angora goats and cashmere from other goat breeds. Of operations that sheared, clipped, or combed goats during the previous 12 months, 64.7 percent produced some mohair fiber, and 85.8 percent of goats shorn on these operations produced mohair fiber.

Figure 6. For Operations that Sold or Traded Fiber During the Previous 12 Months, Percentage of Operations by Marketing Arrangement

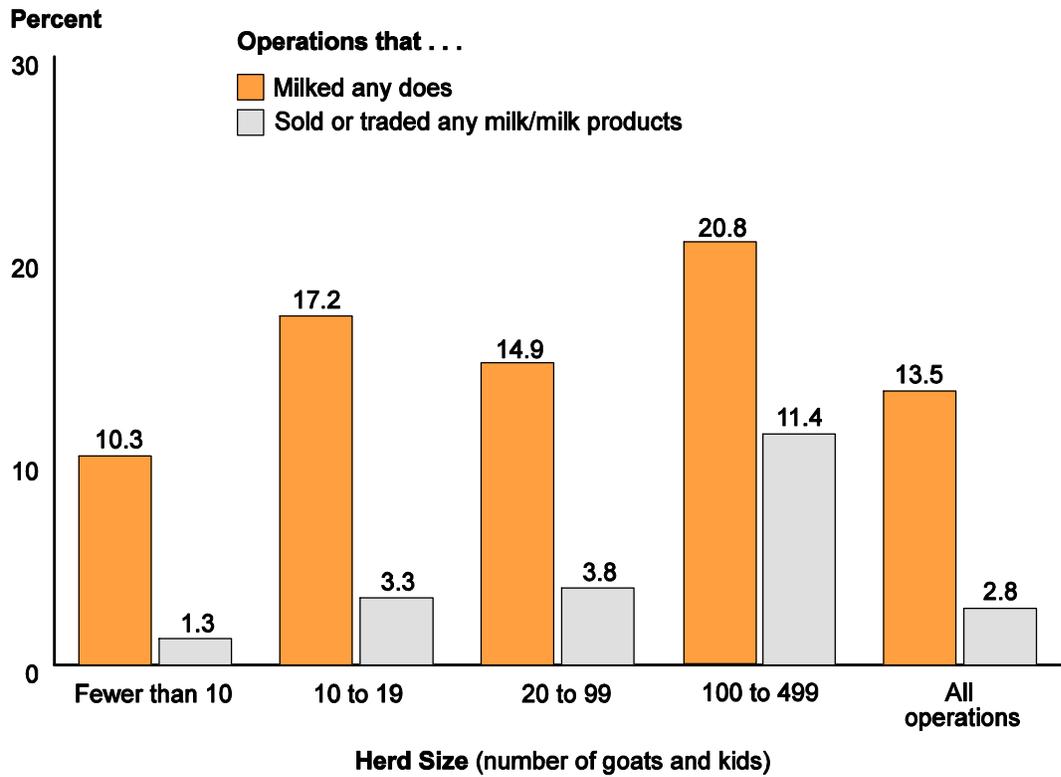


5. Milk marketing

Although 13.5 percent of all operations (meat, dairy, fiber, and “other”) had milked any does during the previous 12 months, only 2.8 percent had sold or traded any goat milk or other goat milk products (figure 7). The majority of

operations that milked does used at least some of the milk to feed goat kids and/or for home consumption. Of dairy goat operations, 83.0 percent had milked does during the previous 12 months, and 22.7 percent had sold or traded any goat milk or goat milk products.

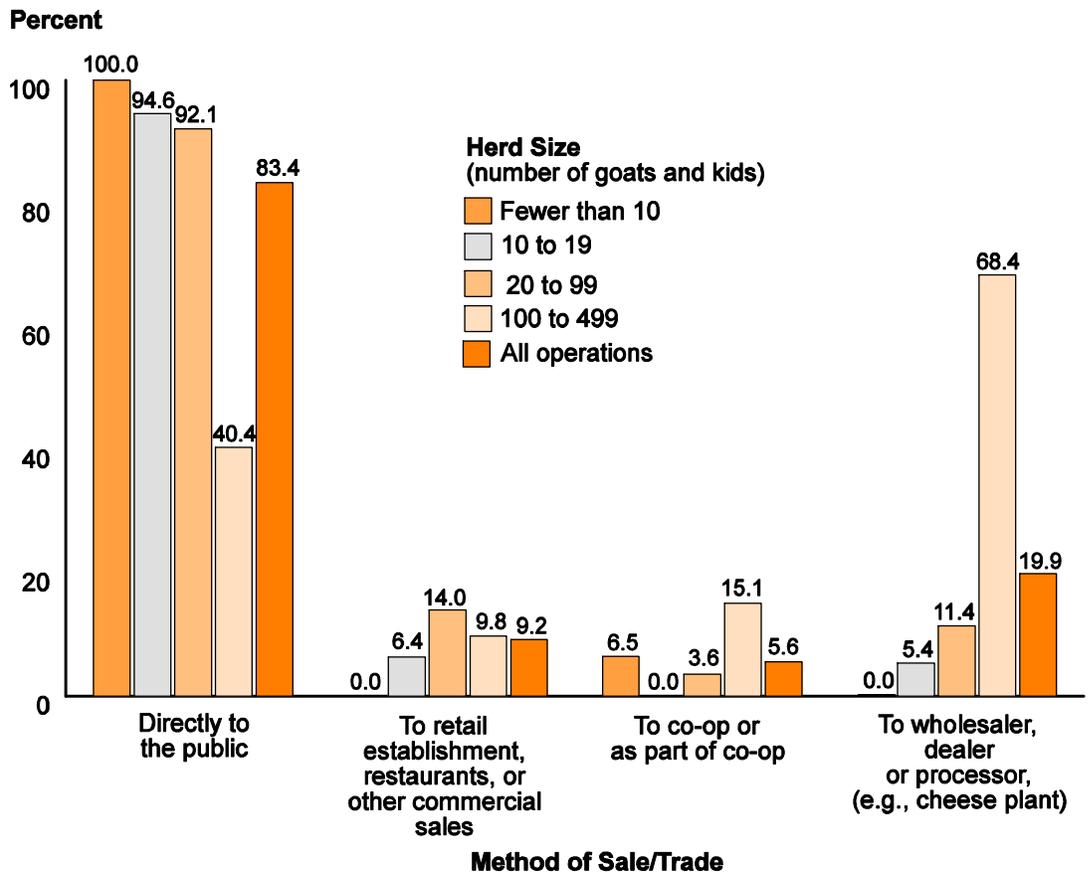
Figure 7. Percentage of all Operations that Milked any Does During the Previous 12 Months, and Percentage of Operations that Sold or Traded any Milk or Milk Products, by Herd Size



Of operations that sold or traded any goat milk or milk products, 83.4 percent sold or traded the products directly to the public. A lower percentage of operations with 100 to 499 goats (40.4 percent) sold products directly to the public compared with operations with fewer than 100 goats. Operations with 100 to

499 goats were, on the other hand, more likely to sell to a wholesaler than smaller operations (figure 8). Selling to a wholesaler might require the operation to provide a consistent and relatively large supply of milk, which is more difficult for smaller operations.

Figure 8. For Operations that Sold or Traded any Milk or Milk Products, Percentage of Operations by Method of Sale/Trade and by Herd Size



Almost one of four operations that sold or traded milk or milk products (24.5 percent) had marketed raw goat milk or raw goat milk products intended for human consumption during the previous 12 months. Of operations that milked any does during the previous

12 months, 53.8 percent had family members or employees who consumed raw goat milk or goat milk products. Public health and agricultural communities are concerned that increasing consumption of raw (unpasteurized) milk may lead to an increase in foodborne disease outbreaks (Akkina, 2010).

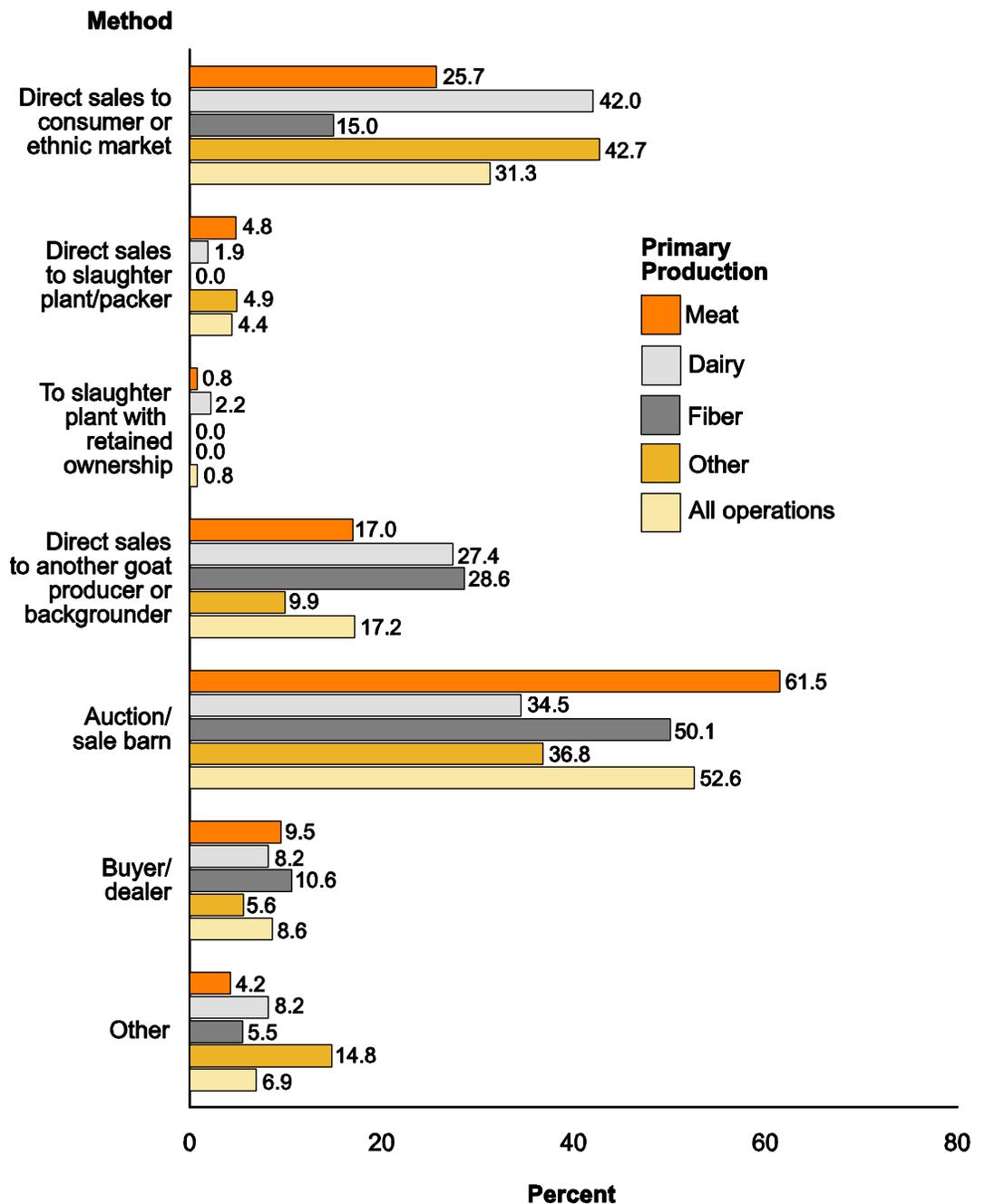
6. Kid Marketing

Marketing refers to animals removed from the operation alive and marketed through various channels. Marketing animals at an auction or sale barn requires little effort in finding a buyer, although sale barns might not be available in all areas. However, direct sales to consumers can be more profitable since there are limited transportation costs, no middlemen, and no sales commissions.

Marketing of live kids is not limited to operations with a focus on meat production. Dairy, fiber, and “other” operations may also market live kids intended for meat, breeding stock, showing at livestock shows, or other purposes. Overall, 41.6 percent of all operations had permanently removed live kids from the operation during the previous 12 months.

Of operations that permanently removed live kids, the highest percentages permanently removed kids through an auction/sale barn or by direct sales to consumer or ethnic markets (52.6 and 31.3 percent, respectively). Marketing channels for live kids differed between operations with different production focuses. A higher percentage of meat goat operations (61.5 percent) permanently removed kids by auction/sale barn compared with dairy goat operations (34.5 percent) [figure 9]. Conversely, a higher percentage of dairy goat operations than meat goat operations permanently removed kids through direct sales to consumer or ethnic markets (42.0 and 25.7 percent, respectively).

Figure 9. For Operations that Permanently Removed Kids During the Previous 12 Months, Percentage of Operations by Method of Removal and by Primary Production

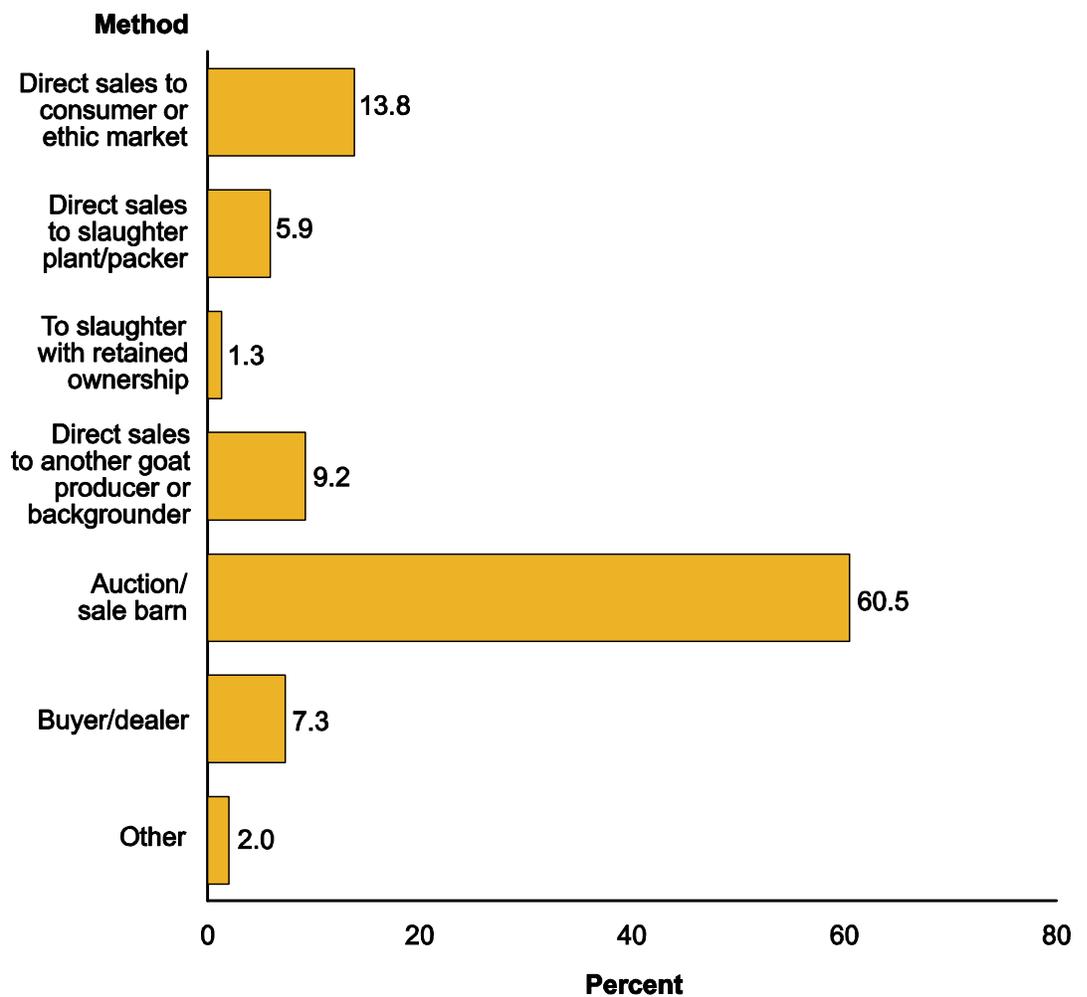


7. Kid marketing by meat goat operations

Nearly one-half of operations (42.4 percent) reported meat production as their primary production focus. Of these operations, 62.8 percent had permanently removed live kids from the operation during the previous 12 months. The majority of live kids that were permanently removed from meat goat operations (60.5 percent) were marketed through auctions

or sale barns (figure 10). Overall, 13.8 percent of kids on meat goat operations were marketed through direct sales to a consumer or ethnic market, most likely for consumption; 9.2 percent were marketed directly to other goat producers, most likely as breeding replacement stock.

Figure 10. For Meat Goat Operations that had Permanently Removed Kids During the Previous 12 Months, Percentage of Kids Removed, by Method of Removal

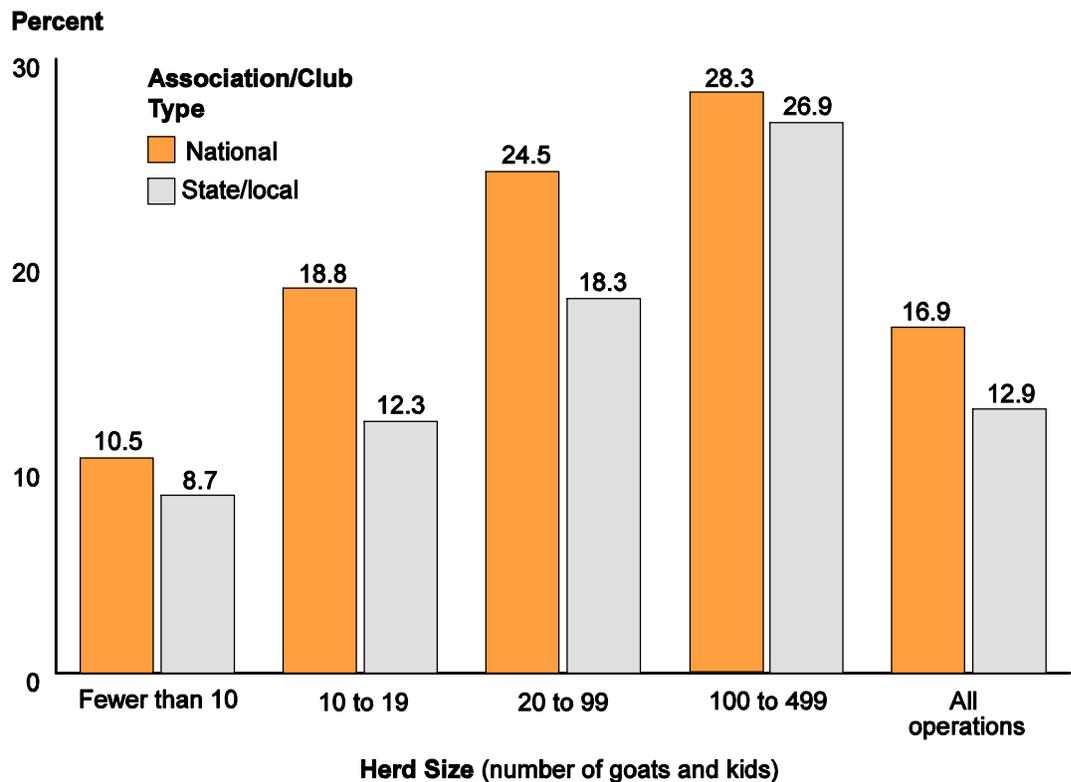


8. Goat associations and club membership

Involvement with industry organizations can be beneficial for goat operations, regardless of herd size. Goat associations and clubs can be good sources of information on biosecurity, animal health, production practices, research, and marketing. Industry organizations can also play an important role in policy-making efforts that affect the industry as a whole. Current industry organizations include local, State, and national organizations or clubs, typically with either a production focus or a breed focus. Dairy and fiber goat organizations are typically well established, while most meat goat organizations are relatively new and growing.

A relatively small percentage of operations belonged to a national or State/local goat association or club (16.9 and 12.9 percent, respectively). A higher percentage of operations with 100 to 499 goats belonged to either a national or State/local association (28.3 and 26.9 percent, respectively) compared with operations with fewer than 10 goats (10.5 and 8.7 percent, respectively) [figure 11], which may be related to larger operations being more income-driven than smaller operations.

Figure 11. Percentage of Operations that Belonged to a Goat Association or Club, by Association/Club Type and by Herd Size



About one-half of dairy goat operations (43.6 percent) belonged to a national goat association or club. A higher percentage of dairy goat operations belonged to a State/local goat association or club (26.4 percent) compared with “other” operations (7.7 percent).

Examples of local, State, and national goat associations

National goat associations

American Goat Federation (AGF): www.americangoatfederation.org.

The AGF is a new national organization designed to represent, unify, improve, and advance the U.S. goat industry. AGF seeks to actively represent the interests of more than 100 organizations and thousands of producers in the production and marketing of milk, meat, fiber, and grazing services.

The National Livestock Producers’ Association (NLPA) Sheep and Goat Fund: <http://www.sheepandgoatfund.com/about.html>. The NLPA Sheep and Goat Fund is the result of a joint effort of the National Sheep Industry Improvement Center (NSIIC) (now the American Sheep and Goat Center) and the NLPA. It is a revolving fund established within NLPA to assist the U.S. sheep and goat industries by strengthening and enhancing the production and marketing of sheep, goats, and their products in the United States.

Dairy goat associations

American Dairy Goat Association: www.adga.org

National Pygmy Goat Association: www.npga-pygmy.com

American Goat Society: www.americangoatsociety.com. Serves dairy goat enthusiasts.

Meat goat associations

The American Boer Goat Association: www.abga.org. The primary U.S. meat goat association and the largest boer goat association in the world.

Members receive “The Boer Goat Magazine” bimonthly.

Fiber goat associations

American Angora Goat Breeder’s Association: www.aagba.org

Colored Angora Goat Breeder’s Association: www.cagba.org

Cashmere goat associations: regional associations

B. ANIMAL HEALTH AND MANAGEMENT PRACTICES

1. Goat health information sources

Operations ranked the importance of several sources of goat health information by level: not important, somewhat important, and very important. Overall, 33.2 percent of operations rated other goat producers as very important sources of information; 29.7 percent rated veterinarian, nutritionist, or other paid consultant very important; and 26.9 percent rated the Internet very important (table 2).

Interestingly, 74.7 percent of operations ranked industry/association meetings not important as a source of goat health information, and 59.5 percent ranked university or extension agents not important. The reason for these findings might be the lack of availability of these information sources in some areas, although the number of extension specialists in goat production is increasing in response to growth in the industry.

Table 2 provides a comparison of the percentage of small-scale goat operations that considered specific sources of information very important with the percentage of small-scale beef, swine, and chicken operations that also considered the sources very important. A lower percentage of goat operations considered a veterinarian to be a very important source of information (29.7 percent) compared with cow-calf and swine operations (53.0 and 39.8 percent, respectively). The Internet was considered a very important source of information by a higher percentage of goat operations than by beef, swine, and chicken operations; however, the goat study was conducted 1 to 2 years after the other studies and Internet access—and the amount of applicable information on the Internet—may have improved during that time.

Table 2. Percentage of small-scale goat, beef, swine, and chicken operations that rated the following sources of information very important

| Information Source | Percent Operations NAHMS Study | | | | | | | |
|--------------------------------|-------------------------------------|------------|---|------------|---|------------|--|------------|
| | Goat 2009 (1–499 goats and kids) | | Beef 2007–08 ¹ (1–99 beef cows) | | Small-Enterprise Swine 2007 ² (1–99 pigs) | | Small-Enterprise Chicken 2007 (1,000–19,999 chickens) | |
| | Pct. | Std. Error | Pct. | Std. Error | Pct. | Std. Error | Pct. | Std. Error |
| Veterinarian ³ | 29.7 | (1.2) | 53.0 | (1.6) | 39.8 | (1.4) | 20.3 | (1.2) |
| Other producers | 33.2 | (1.2) | 24.9 | (1.4) | 27.2 | (1.3) | 16.6 | (1.1) |
| Internet | 26.9 | (1.1) | 7.4 | (0.9) | 14.1 | (1.0) | 8.1 | (0.8) |
| Extension service ⁴ | 16.3 | (0.9) | 22.1 | (1.3) | 20.1 | (1.2) | 29.2 | (1.3) |

¹Question variation: Cow-calf producers were asked about the importance of sources for general or breeding and genetics information (not health information).

²Question variation: For Small-Enterprise Swine 2007, producers were given four categories for level of importance: Not, Slight, Moderate, and Very Important. All other studies gave producers three categories: Not, Somewhat, and Very Important.

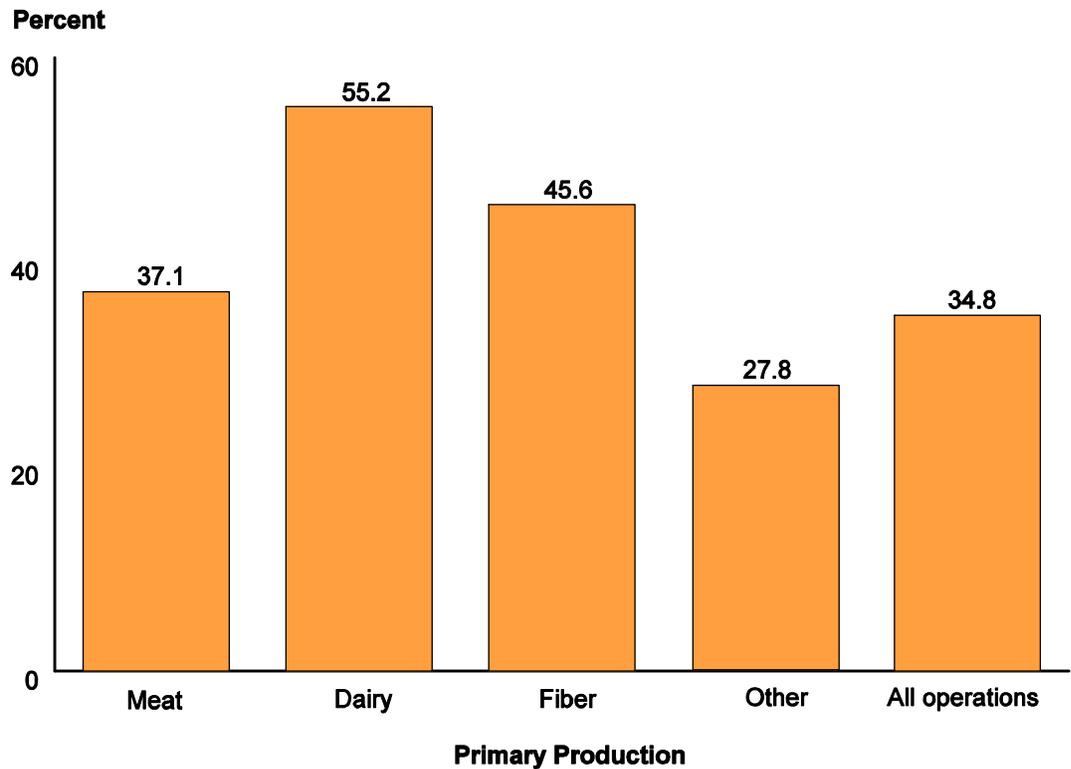
³Question variation: “Veterinarian, nutritionist, or other paid consultant” for Goat 2009, “Local veterinarian” for Small-Enterprise Swine 2007, and “Veterinarian (private practitioner)” for Small-Enterprise Chicken 2007.

⁴Question variation: “University/Extension agent” for Goat 2009, “Extension Service, University, or VoAg Instructors” for Beef 2007–08.

2. Veterinarian Use

Producers were asked if they had consulted a veterinarian for any reason related to goat health, productivity, or management during the previous 12 months. Overall, 34.8 percent of operations had consulted a veterinarian. Use of a veterinarian ranged from 27.8 percent of “other” operations to 55.2 percent of dairy operations (figure 12).

Figure 12. Percentage of Operations that Consulted a Veterinarian for any Reason During the Previous 12 Months, by Primary Production



Zoonotic Diseases Affecting Goats

Q-fever is a zoonotic disease (affects both animals and humans). The disease is caused by the bacterium *Coxiella burnetii* and has been linked to abortion storms in sheep and goats, although many infected animals never show symptoms of disease. *C. burnetii* is excreted in the milk, feces, placenta, amniotic fluid, and other body fluids of its primary reservoirs—cattle, sheep, and goats. The bacteria are hardy organisms that can survive in the environment for long periods. Humans are usually infected by inhaling barnyard dust contaminated by an infected herd of animals. *C. burnetii* infection in humans primarily affects the lungs, heart, or liver. In the United States, Q fever became a notifiable disease in humans in 1999. An important part of preventing disease spread is to understand how widespread infection is in domestic farm animals and to encourage producers to implement management practices to prevent further spread (CDC, 2010).

Toxoplasmosis is caused by the parasite *Toxoplasma gondii*. Infection has been associated with abortion storms in small ruminants, although many animals never show symptoms of infection. Cats are the only definitive hosts known to shed the parasite into the environment. In humans, *T. gondii* infection has been associated with miscarriage. Infection can cause serious illness in individuals with a compromised immune system. The CDC considers toxoplasmosis an important cause of death attributed to foodborne illness in the United States.

Sore mouth (orf or contagious ecthyma) is a common skin disease affecting sheep and goats. It is highly contagious and is caused by a virus in the pox family. It is rarely fatal; however, it can cause significant production losses. Sore mouth is a zoonotic disease, and the virus can survive for months, even years, in the environment. Understanding the distribution of sore mouth in the United States can help target vaccination and other efforts, including management practices designed to help prevent further spread of the disease to uninfected herds.

Brucellosis is caused by different species of the bacterium *Brucella*, including *B. suis* (primarily in pigs), *B. abortus* (primarily in cattle and bison), *B. ovis* (primarily in sheep), *B. canis* (primarily in dogs), and *B. melitensis* (primarily in goats). *B. melitensis*, *B. suis*, and *B. abortus* are zoonotic. *B. melitensis* is considered a serious public health problem, especially in countries that do not have well developed public and animal health control programs. The United States is considered free of *B. melitensis*. Symptoms of brucellosis in goats are similar to symptoms in cattle and include abortion at about the fourth month of pregnancy, mastitis, arthritis, and sometimes orchitis (inflammation of the testes). The organism spreads among animals primarily through contact with an infected placenta, fetus, fetal fluids, and other body fluids. The organism can also spread via equipment, clothing, etc. An infected goat can shed *Brucella* in its milk throughout its life. *Brucella* can spread to humans through consumption of unpasteurized goat milk and goat milk products from infected animals, by inhaling of the organism, or through lesions or open wounds.

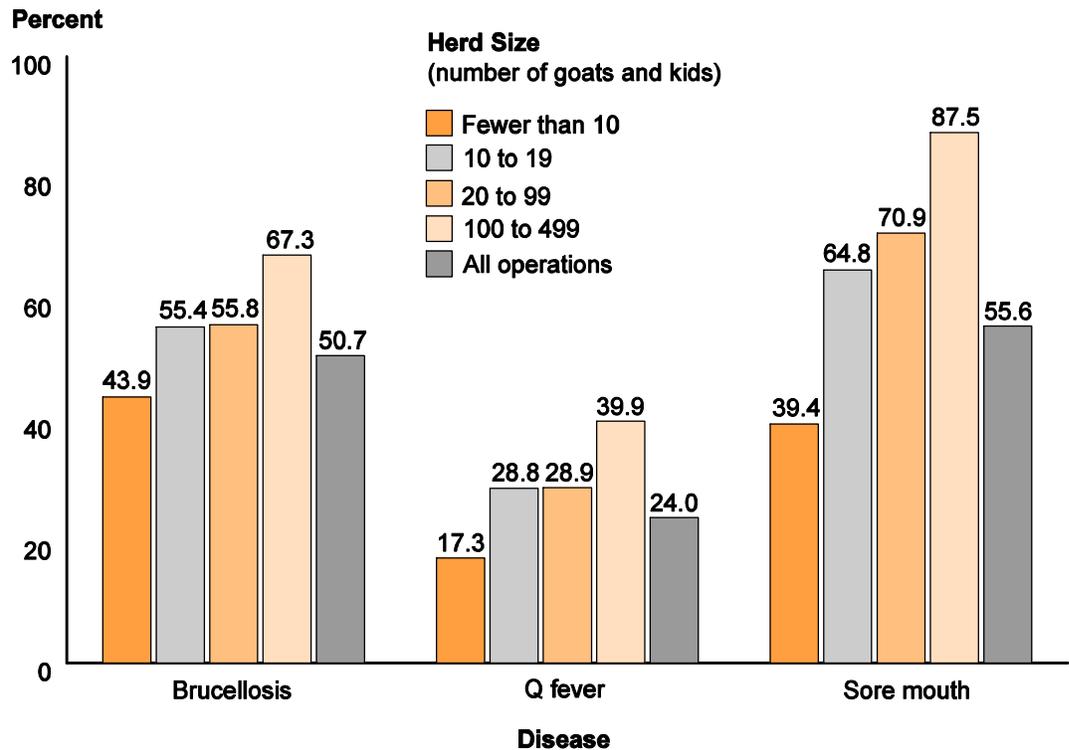
Pinkeye (keratoconjunctivitis) is the term commonly used to describe a number of diseases causing inflammation of the inside of the eyelids of humans and animals. In U.S. goats, the two most common causes of pinkeye are *Mycoplasma* and *Chlamydophila* (formerly *Chlamydia*). Both are highly contagious and infection spreads easily between eyes, from animal to animal, and to humans that come in contact with infected animals. To prevent spread, it is important that infected animals are isolated from the rest of the herd. Common symptoms include squinting, tearing, cloudiness of the cornea, and red and swollen eyes. The disease is rarely fatal; however, the economic impact associated with production losses and treatment costs can be important.

3. Zoonotic disease awareness

Familiarity with zoonotic diseases that affect goats is important for developing animal health management and biosecurity practices, and for protecting human health. More than 50 percent of all operations were familiar or somewhat familiar with brucellosis and sore mouth. About

one of four operations (24.0 percent) was somewhat or very familiar with Q fever. A higher percentage of operations with 100 to 499 goats were somewhat or very familiar with the listed diseases compared with operations with fewer than 100 goats (figure 13).

Figure 13. Percentage of Operations that Were Somewhat Familiar or Very Familiar with the Following Diseases in Goats, by Herd Size



All the diseases listed in table 3 are infectious to humans. Although producers on more than one-half of operations were somewhat or very familiar with brucellosis and sore mouth (figure 13), producers on less than one-third of operations knew that these diseases are infectious to humans. Producers on about two-thirds of operations (63.1 percent) knew that pinkeye was infectious to humans, possibly

because pinkeye is the common name used for many forms of human conjunctivitis, although the majority of human pinkeye cases are not caused by *Chlamydia*. The percentages of operations in which producers were aware that the listed diseases are infectious to humans were lower on operations with fewer than 10 goats than on operations with 100 to 499 goats.

Table 3. Percentage of operations in which the producer believed that the following diseases in goats are infectious to humans, by herd size

| Disease | Percent Operations | | | | | | | | | |
|------------------------------|--------------------------------------|------------|-------|------------|-------|------------|---------|------------|----------------|------------|
| | Herd Size (number of goats and kids) | | | | | | | | | |
| | Fewer than 10 | | 10–19 | | 20–99 | | 100–499 | | All Operations | |
| | Pct. | Std. Error | Pct. | Std. Error | Pct. | Std. Error | Pct. | Std. Error | Pct. | Std. Error |
| Brucellosis | 24.4 | (1.9) | 26.5 | (2.0) | 33.2 | (1.8) | 43.0 | (2.7) | 28.1 | (1.1) |
| Pinkeye (<i>Chlamydia</i>) | 64.3 | (2.1) | 56.6 | (2.3) | 64.4 | (1.9) | 74.9 | (2.1) | 63.1 | (1.2) |
| Q fever | 7.8 | (1.2) | 11.2 | (1.5) | 15.4 | (1.4) | 19.1 | (2.3) | 11.1 | (0.8) |
| Sore mouth | 20.5 | (1.7) | 31.5 | (2.1) | 41.4 | (1.9) | 61.7 | (2.5) | 30.4 | (1.1) |
| Toxoplasmosis | 13.6 | (1.4) | 17.6 | (1.7) | 20.2 | (1.5) | 23.2 | (2.6) | 16.7 | (0.9) |

4. FAMACHA[®] card use

Gastrointestinal parasites are an important environmentally related health concern for goat producers. Unfortunately, many of the parasites have become resistant to commonly used dewormers, rendering dewormers ineffective; therefore other control mechanisms must also be used.

FAMACHA provides a tool to identify anemic animals and was originally developed in South Africa to reduce the burden and cost of deworming goats infected with *Haemonchus contortus* (Barber's pole worm). The FAMACHA system is based on a card that provides pictures of a spectrum of colors viewed inside the eyelids of sheep and goats. The paler the color, the greater the chance a goat is infected with *H. contortus*. Careful use of

dewormers to treat only those animals that need it helps reduce the risk that parasites on the farm develop resistance to dewormers. FAMACHA offers a means of controlling *Haemonchus* worms by helping producers select (through culling) for goats that are inherently more resistant to the worms.

Three-fourths of small-scale goat producers (75.0 percent) had not heard of FAMACHA. The percentage decreased with herd size from 86.9 percent of operations with fewer than 10 goats to 49.1 percent of operations with 100 to 499 goats. Regular use of the FAMACHA card increased with herd size and ranged from 1.1 percent of operations with fewer than 10 goats to 11.2 percent of operations with 100 to 499 goats (table 4).

Table 4. Percentage of operations by level of use of the FAMACHA card, and by herd size

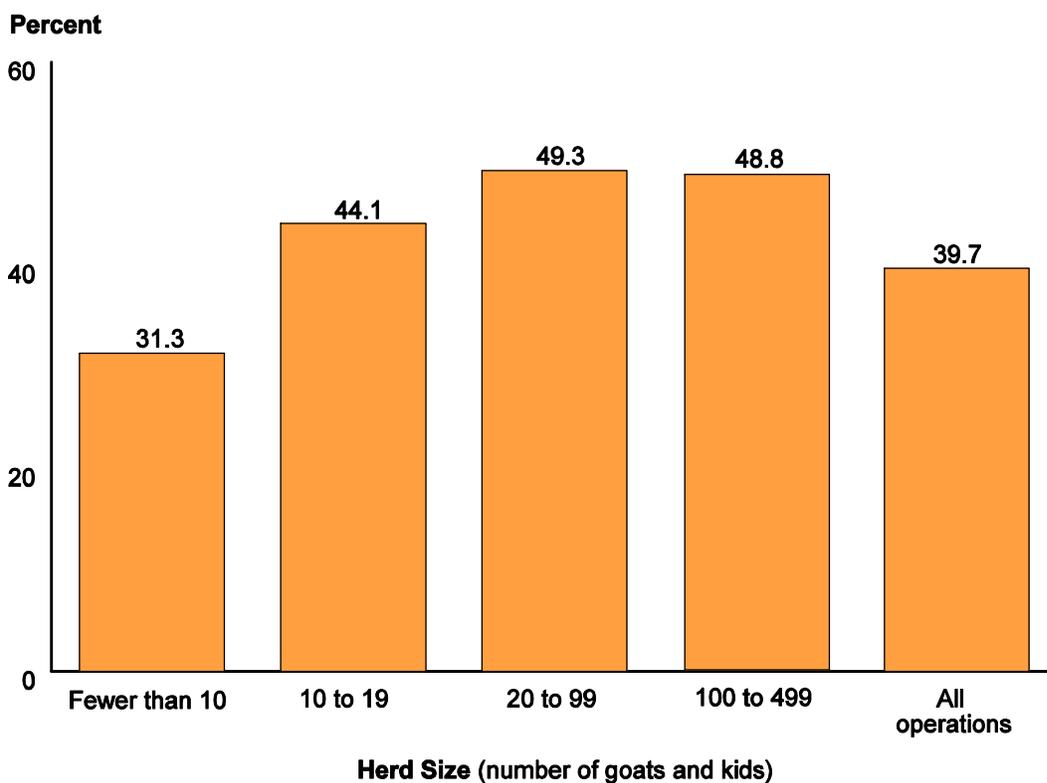
| Level of Use | Percent Operations | | | | | | | | | |
|---|--------------------------------------|-------|-----------|-------|-----------|-------|-----------|-------|----------------|-------|
| | Herd Size (number of goats and kids) | | | | | | | | | |
| | Fewer than 10 | | 10–19 | | 20–99 | | 100–499 | | All Operations | |
| | Std. Pct. | Error | Std. Pct. | Error | Std. Pct. | Error | Std. Pct. | Error | Std. Pct. | Error |
| Regularly used FAMACHA card as a management tool | 1.1 | (0.5) | 3.4 | (0.7) | 7.3 | (0.9) | 11.2 | (1.6) | 3.8 | (0.4) |
| Had used the FAMACHA card some | 2.8 | (0.8) | 4.5 | (1.0) | 5.2 | (0.8) | 9.1 | (1.4) | 4.1 | (0.5) |
| Had seen or heard about the FAMACHA card, but do not use it | 9.2 | (1.2) | 19.6 | (1.8) | 26.0 | (1.7) | 30.6 | (2.7) | 17.1 | (0.8) |
| Had not heard of FAMACHA | 86.9 | (1.5) | 72.5 | (2.0) | 61.5 | (1.8) | 49.1 | (2.7) | 75.0 | (1.0) |
| Total | 100.0 | | 100.0 | | 100.0 | | 100.0 | | 100.0 | |

5. Biosecurity

An excellent way to manage or prevent disease on goat operations is to implement a biosecurity plan, which should be developed in concert with a veterinarian experienced in goat production. Good biosecurity reduces the likelihood of disease introduction into a herd and also manages disease spread among animals within the herd.

Visitors are an important consideration when implementing a biosecurity plan, since they can carry disease agents from one operation to another. Overall, 39.7 percent of operations had visitors enter the goat production area during the previous 12 months. A lower percentage of operations with fewer than 10 goats had visitors enter the goat production area compared with operations with 10 or more goats.

Figure 14. Percentage of Operations that had Visitors Enter the Goat Production Area (Barns, Sheds, Pastures, etc.) During the Previous 12 Months, by Herd Size



About 4 of 10 operations (40.9 percent) always required one or more specific biosecurity measure for visitors entering the goat production area (table 5). The most common biosecurity measure always required was parking away from the goat area (35.2 percent of operations). Washing hands before handling goats was also a common measure always required (14.5 percent

of operations), which might be partially related to ethnic practices for selling meat goats. Less than 6 percent of operations always required each of the other biosecurity measures. By production focus, dairy goat operations were more likely to use at least one of the biosecurity measures compared with meat goat operations.

Table 5. For small-scale operations on which any visitors entered the goat production area during the previous 12 months, percentage of operations that always required the following biosecurity measures, by herd size

| Biosecurity Measure | Percent Operations | | | | | | | | | |
|--|--------------------------------------|------------|-------|------------|-------|------------|---------|------------|----------------|------------|
| | Herd Size (number of goats and kids) | | | | | | | | | |
| | Fewer than 10 | | 10–19 | | 20–99 | | 100–499 | | All Operations | |
| | Pct. | Std. Error | Pct. | Std. Error | Pct. | Std. Error | Pct. | Std. Error | Pct. | Std. Error |
| Change into clean clothes or coveralls | 2.1 | (1.0) | 1.5 | (0.7) | 1.9 | (0.6) | 1.7 | (1.0) | 1.9 | (0.5) |
| Use a footbath before entry | 1.7 | (0.9) | 1.1 | (0.6) | 2.5 | (0.7) | 1.7 | (0.6) | 1.8 | (0.5) |
| Change into clean boots or use shoe covers | 4.8 | (1.7) | 5.4 | (1.5) | 6.0 | (1.2) | 8.7 | (2.0) | 5.6 | (0.8) |
| Scrub shoes before or immediately after entry | 1.1 | (0.6) | 3.0 | (1.2) | 5.0 | (1.1) | 3.9 | (1.2) | 3.0 | (0.5) |
| Wash hands before handling goats | 13.6 | (2.5) | 15.8 | (2.4) | 15.5 | (1.9) | 9.2 | (1.6) | 14.5 | (1.3) |
| No contact with other livestock for at least 24 h before visiting your goats | 3.2 | (1.5) | 2.3 | (1.0) | 1.9 | (0.6) | 3.6 | (1.0) | 2.6 | (0.6) |
| Park away from goat area | 40.7 | (3.8) | 33.5 | (3.1) | 32.1 | (2.5) | 24.4 | (2.9) | 35.2 | (1.8) |
| Any | 45.3 | (3.9) | 39.8 | (3.3) | 38.4 | (2.6) | 31.6 | (3.1) | 40.9 | (1.9) |

SECTION II: CONCLUSIONS

1. General conclusions

Many goat producers are relatively new to the business, particularly goat meat producers and producers with operations that have a production focus other than meat, fiber, or dairy. The increase in the goat population might be related to growth of communities that consume goat meat, and/or the growth of sustainable agriculture in which goats are used for weed

control. The Goat 2009 study revealed that many producers on small-scale operations could benefit from education regarding zoonotic diseases that affect goats. Producers may also benefit from greater involvement with industry organizations, which can provide information and education regarding economically beneficial marketing and production practices.

2. Milk and Meat Marketing

An increasing interest in goat milk and goat milk products, as well as an increased interest in goat meat outside ethnic communities that traditionally consume goat milk, goat milk products, and goat meat, is encouraging for the goat industry. In addition, goat milk producers may find increased benefits by niche marketing specialized products such as low-bacterial-count milk, out-of-season milk, high protein milk and milk products, and by promoting the unique qualities of goat's milk compared with cow's milk.

The U.S. meat goat industry is growing rapidly, with inventories increasing from approximately 600,000 goats in 1992 to approximately 2.5 million goats in 2010 (NASS Census of Agriculture). In the same period, meat goat imports increased from nearly 1,400 metric tonnes in 1990 to over 13,000 metric tonnes in 2010 (U.S. Department of Commerce). The three main niche markets for goat meat in the United States are ethnic communities, health-conscious consumers, and gourmet restaurants (Sande et al., 2005). In addition, more consumers are interested in supporting small

operations and sustainable agricultural practices. Goats can be raised on smaller acreages and are easier to handle than most other livestock, making them attractive to small-scale producers (Sande et al., 2005).

3. Disease Awareness and FAMACHA Card Use

Increased awareness of disease, disease management practices, biosecurity practices, and the targeted use of FAMACHA will help all goat producers improve biosecurity and derive economic benefits.

Overall, education and improved access to information on disease management and other management practices that can improve the economic benefits of goat production are the most important areas of opportunities for small-scale goat producers. Many goat farmers rely on other producers for information on goat health; however, relatively few producers belong to a State or national goat association. Many goat producers also rely on veterinarians and the Internet for information on goat health. Making information available on goat disease management practices through both private veterinarians and the Internet may provide useful educational resources for small-scale goat producers. Additionally, goat association memberships may be more attractive to small-scale producers if the organizations provided more and easy-to-access information on goat health and disease management practices.

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