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Guide to raising dairy sheep

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While the United States has a long history of producing sheep for meat and wool, the dairy sheep industry is relatively new to this country. In Wisconsin, dairy sheep flocks weren't introduced until the late 1980s. This industry remains a small but growing segment of overall domestic sheep production: by 2009, the number of farms in North America reached 150, with the majority located in Wisconsin, the northeastern U.S., and southeastern Canada.

Consumers are showing a growing interest in sheep's milk cheese. In 2007, the U.S. imported over 73 million pounds of sheep milk cheese, such as Roquefort (France), Manchego (Spain), and Pecorino Romano (Italy), which is almost twice the 37 million pounds that was imported in 1985.

There is unmet demand for sheep milk in Wisconsin and throughout the country. Domestically, the market for sheep milk is growing as cheese makers explore the potential of producing unique sheep milk and mixed milk cheeses. In 2009, over 1 million pounds of milk was produced in Wisconsin, an increase of 40% from 2004. Currently the 13 dairy sheep operations in the state both supply local cheese makers and ship frozen milk to other states.

Before beginning a dairy sheep enterprise, producers should review the following fact sheet, designed to answer many of the questions they will have, to determine if raising dairy sheep is an appropriate enterprise for their personal and farm goals.

Dairy sheep breeds

Just as there are cattle breeds that have been selected for high milk production, there are sheep breeds tailored to commercial milk production:

- East Friesian (Germany)
- Lacaune (France)
- Sarda (Italy)
- Chios (Greece)
- British Milkshope (U.K.)
- Awassi and Assaf (Israel)

In the U.S., however, only the East Friesian and Lacaune are currently available.

Some non-dairy domestic breeds such as Dorset and Polypay are reasonable milk producers, but the production of these breeds is far below that of specialized dairy breeds.



East Friesian dairy ewes

Breeding practices

Purebred or high percentage dairy ewes will produce more milk than non-dairy breeds but generally cost more. A less expensive way to build a dairy flock is to mate purebred or crossbred domestic ewes with purebred or high percentage East Friesian or Lacaune rams. Producers can continue to increase the dairy percentage of their flock by continuous mating of their ewes with dairy rams (Figure 1). Compared to purchasing dairy ewes from the start, however, this process requires a longer period of time before a high percentage dairy flock is obtained and may negatively affect the profitability of an operation in the initial years.

Dairy ewe traits

Mature body weight:
150 to 190 pounds

Years to reach mature size:
2 to 3 years

Productive life span:
5 to 7 years

Wool production:
3 to 10 pounds/year

Milk composition:
Fat content = 6–8%
Protein content = 5–7%

Sheep are seasonal breeders and begin mating as the day length shortens in the fall. Under natural light conditions, ewes will mate from August to December.

With a 147-day (approximately 5-month) gestation period, lambs are born from January to May. Since lambs can reach puberty in 7 to 10 months, ewes may have their first set of lambs at either 1 or 2 years of age.

Ewes will give birth to one to three lambs per lambing. Among dairy breeds, Lacaune ewes average 1.8 lambs/lambing and East Friesian ewes average 2.2 lambs/lambing.

Lactation

Dairy ewes will produce milk from lambing until the fall, when the shortening day length decreases milk production. The cessation of milk production, or dry-off, will occur by the end of September or early October. Therefore, breeding ewes to lamb earlier in the calendar year will increase lactation length.

Domestic, non-dairy ewes typically lactate for 90 to 150 days. Dairy breeds will lactate for 120 to 240 days, thereby increasing milk yield per ewe per year. In general, producers can expect to milk 85–90% of ewes they have bred; some ewes will not be able to be milked due to problems with breeding, lambing, or mastitis.

Facilities

Since dairy ewes typically lamb from January to May, producers need a barn or shed to accommodate them. Space requirements are 15 to 20 square feet per ewe to accommodate the ewe and her lambs. The structure should have a porous floor (dirt, gravel, etc.) to allow moisture to move away from the sheep. It should also have adequate ventilation but be free from drafts to prevent chilling of young lambs. The type of buildings available on a farm, then, may dictate the choice of lambing season.

Spring lambing

Lambing during the April to May time period requires less extensive buildings and may even occur on pasture. The cost of feed also may be reduced because the high nutritional requirements of lactating ewes coincide with pasture growth. However, ewes that lamb in the spring will have a shorter lactation period (no more than 150 days) and decreased overall milk production.

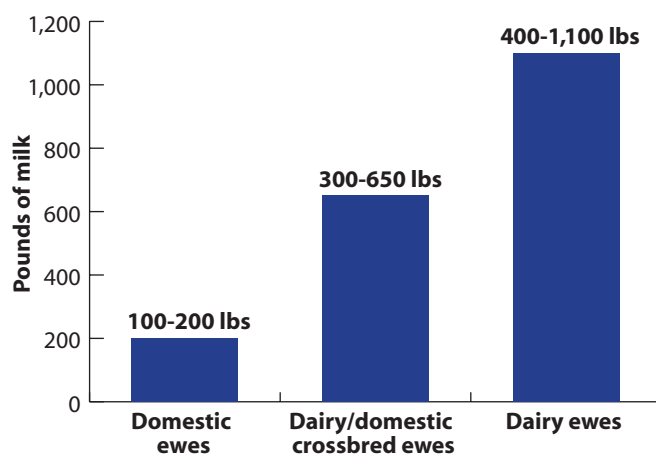
Winter lambing

Lambing in winter (January to February) is very favorable for milk production. Ewes increase their feed intake in cool weather and thus produce more milk. In addition, lactation length increases to 200 to 240 days with winter lambing. However, winter lambing requires an increased amount of stored feed and adequate buildings for lambing and lamb rearing.

Year-round milking

Year-round milking cannot be done with one group of animals, but it can be coordinated with two groups of animals: one group lambing in the winter and the other lambing in the fall. This system more efficiently utilizes high-cost milking equipment and the milking parlor. In addition, less equipment and a smaller parlor may be needed, as fewer animals are milked per day. For example, a parlor designed for 200 ewes may be utilized to milk 400 ewes per year with this system. Hormone or light treatment may be necessary for a successful spring breeding, because sheep do not normally exhibit estrus, or heat, at this time of year.

Figure 1. Annual milk production in dairy sheep



Lamb management

After ewes give birth, lambs are weaned so producers can milk the ewes. There are three management systems for the weaning lambs from ewes.

Day-1 system

In this system, lambs are removed from their mother 24 to 36 hours after lambing. The ewes are milked twice a day and the lambs are raised on milk replacer. All of the milk produced is then sold. This system is the most labor-intensive and the milk replacer costs will be high. A dairy sheep producer may want to transition to this system progressively, beginning with the highest-producing ewes and increasing the number of ewes yearly as knowledge and confidence in lamb rearing grows.

Day-30 system

In this system, ewes nurse their lambs for 30 days, after which the lambs are completely weaned and the ewes are milked twice a day. While this method is the least labor-intensive, the total amount of milk produced per ewe will be less, as lambs will consume nearly 25% of the ewe's total lactation milk production. While nursing, lambs of high-producing ewes may not be able to consume all of the milk produced, so the potential for mastitis is greater.

MIX system

In this system, ewes nurse their lambs for 30 days. One week after lambing, lambs are separated from ewes in the evening, the ewes are milked in the morning, and then the ewes are returned to their lambs for the day. Lambs adapt quickly to this system, and lamb growth is reduced only slightly. However, the fat content of the milk collected during the nursing period is lower, which decreases its value for cheese production.

Nutrition

Proper nutrition is very important for high milk production. Dairy ewes can consume 3–4% of their body weight in dry matter per day. Ewes can be fed a variety of feedstuffs, including pasture, hay, silage, and concentrates (corn, oats, barley, soybean meal). A ewe's requirements are the greatest during the last month of gestation and during lactation. Table 1 presents the basic rations for a ewe throughout the year.

As an example, a ewe milking for 180 days would require approximately 1,600 pounds of alfalfa hay and 325 pounds of corn per year, provided there is no access to pasture.

Note: Some feeds (e.g., fish meal) can impart undesirable flavors to the milk and should not be fed in large quantities during lactation.

Pasture

Sheep are very effective grazers and may obtain all or a majority of their forage requirements from pasture when available. Mixed grass–legume pastures are preferable as lactating ewes require diets with 16–18% crude protein and 25–35% neutral detergent fiber. Dairy ewes grazing mixed grass–legume pastures should be supplemented with grain (0.5 to 2.0 pounds corn/day) to maximize milk production.

One acre of improved and fertilized pasture will normally support five ewes for the grazing season. Pastures can be fenced with traditional woven wire or with 3 to 5 strands of high-tensile electric fencing. Pastures will be more productive if large pastures are divided into smaller paddocks with portable electric fencing. In areas where predatory animals are a concern, guard dogs, donkeys, and llamas that have been bonded to sheep often are commingled with the flock as a deterrent.

Adequate clean water is essential, as milk is 88% water. Lactating ewes have the highest requirement for water of any class of sheep: approximately 3 gallons per ewe per day. A mineral mix with salt formulated specifically for sheep must be offered free choice at all times. It should have no added copper (toxic to sheep) and added selenium (deficient in the Great Lakes region).



A lamb nursing on milk replacer

Table 1. Alfalfa hay and corn rations of 155-pound ewe

Stage of production	months	Feed (lbs) per ewe per day	
		alfalfa hay	corn
Early lactation	2	5	1.75
Mid-lactation	2	5	1.5
Late lactation/Flushing	3	4	1.0
Early pregnancy (dry)	4	4	—
Late pregnancy (dry)	1	4	1.0

Lamb rearing

While lambs are nursing or consuming milk replacer, they must also be offered a high-energy (more than 75% total digestible nutrients) and high-protein (20–21% crude protein) feed known as creep feed. This feed will improve their daily weight gain and adapt them to the complete dry feed diet that they will consume once weaned. Some alfalfa hay can be fed with the creep feed. After they are weaned from milk or milk replacer, lambs should continue on the creep diet.

Once they reach approximately 75 pounds, lambs can be fed a lower-protein (14%) diet until they reach market weight. Each lamb will require 350 to 400 pounds of feed from birth to their market weight of 120 pounds. Lambs may be raised on pasture, which will reduce feed costs. However, pasture raised lambs will have lower daily gains than lambs fed in drylot. Lambs on pasture will also need to be treated for internal parasites.

Lamb growth

Birth weight: 7 to 12 pounds

Lamb survival to weaning:
85–95%

Weaning age (onto dry feed): 30 days

Weaning weight: 20 to 35 pounds

Post-weaning daily gain:
0.6 to 0.9 pounds

Lamb market weight:
115 to 140 pounds at
5 to 8 months of age

Milking parlors

Producers milking fewer than 150 ewes should consider constructing an elevated milking platform for the ewes to stand on while being milked. This platform must be made from a non-porous material such as metal. The platform will have a ramp at both ends for the ewes to enter and exit and a manger for feeding grain. The ewes are positioned side-by-side and milked from the rear. Ewes can be secured using a commercially manufactured stanchion or a “crowd” system, where they do not have individual head gates. Installing two platforms in the parlor will increase the number of ewes milked per hour.

Producers milking 150 or more ewes should consider constructing a “pit” parlor, where the ewes enter at ground level and the milker stands in a pit. Sheep tend to move into the parlor faster in a pit system than in a platform system. With a pit system, there are various head gate systems, including the crowd, stationary stanchion, movable stanchion, and rapid-exit systems.

At a minimum, the milking equipment in the parlor will include a vacuum pump and vacuum line, milking claws, and a milking bucket. Milking time is reduced with more milking claws and buckets. Buckets are used to carry milk from the parlor to the milk room. Installing a milk pipeline, which transports milk from the parlor to the bulk tank, reduces labor but increases capital and maintenance costs. In the milk room, the milk is deposited into a bulk tank for cooling. After the milk is cooled, it can be transported to the processing plant or frozen on site.



An elevated milking platform



A pit parlor with movable stanchions

Milking regulations

Milk quality

For milk that is shipped across state lines or consumed fresh, a Grade A milk permit and a milk producer license are required. Grade B milk may be produced under a milk producer license. The legal limit for somatic cell count (SCC) in fresh milk is 750,000 somatic cells/milliliter (ml). The legal limit for bacteria count is 300,000 cells/ml for Grade B milk and 100,000 cells/ml for Grade A milk. However, some cheese makers may require even lower levels.

Milking equipment

Milking facilities and equipment are one of the largest expenses of a dairy sheep operation, which requires both a milking parlor and a milk room. Before building facilities or purchasing equipment, a producer should visit as many dairy sheep farms and dairy sheep equipment dealers as possible to determine what will work best on their farm. Contact the local milk inspector from the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) to discuss requirements and regulations for such facilities.

Water quality

In order to sell Grade A milk, water quality must be certified as safe drinking water by an approved lab. After that time, on-farm water tests must be performed every two years. The County Extension Office can instruct producers in proper water sampling and testing procedures.

Milk handling

Sheep milk may be shipped fluid in a bulk milk truck or frozen in plastic bags on the farm and transported in a climate-controlled truck. The ability to freeze milk on the farm and deliver large quantities to a processing plant has allowed dairy sheep farms to be located great distances from the processing plant. In order to freeze milk, the farm must have a freezer that can freeze large quantities of milk quickly. Traditional home freezers have no air flow and cannot freeze milk fast enough. Recommended walk-in freezers require compressor sizes of 3 to 5.5 horsepower to freeze up to 1,800 pounds of milk rapidly. As an example, a farm milking 200 ewes may need to freeze 1,600 pounds of milk per day during peak lactation.

Health care

Health considerations for dairy sheep are similar to sheep raised for meat and wool. Lambs should be vaccinated with a combination vaccine that gives protection against overeating disease and tetanus. Ewes should be given the same vaccine prior to lambing to provide passive immunity to the newborn lambs for these two diseases. Ewes may be vaccinated against abortion diseases and monitored for CL (caseous lymphadenitis, which causes abscessed lymph nodes), a disease detrimental to milk production. Lambs and ewes should be routinely treated for internal parasites, especially while on pasture.

Lactating ewes should be monitored for mastitis. Routine use of the California Mastitis Test (CMT) or a somatic cell count from a commercial laboratory will identify any subclinical mastitis in the flock. Compounds administered to ewes with clinical or subclinical mastitis must be approved for lactating animals and withdrawal periods must be adhered to before the milk from treated ewes can be mixed with milk from the rest of the flock and sold.

Lactating ewes must not be treated with any drugs or compounds that may taint the milk. Consult a veterinarian to establish a treatment plan.

Waste

A ewe and her lambs will produce approximately seven pounds of manure per day. Combined with bedding material, this will result in production of 10 to 12 pounds of waste material per ewe per day while ewes are housed indoors. In addition to managing manure, provisions must be made for proper disposal of dead sheep, as many rendering companies will no longer pick up sheep carcasses. Other disposal options include burial, landfills, and composting. Contact your County Extension Office for more information.

Economics

In a dairy sheep operation, milk is the major source of revenue accounting for 50–70% of total farm income, and should receive the producer's greatest attention. In 2009, producers received \$75 to \$80/hundredweight (cwt) of sheep milk, depending on milk fat, protein, and somatic cell count. Lamb production, while still a significant source of revenue, will provide less than 50% of the total income. Income from wool, in turn, will be a small percentage of the total. And shearing twice a year, which may be preferred in some management systems, will reduce the value of the wool.

For those interested in learning more, an interactive economic evaluation spreadsheet is available on the Wisconsin Sheep Dairy Cooperative website: www.sheepmilk.biz.



Sheep milk in frozen bags

Summary

Cheese makers across the country are utilizing sheep milk to create unique cheeses, resulting in a demand for sheep milk that producers currently do not meet. For those considering a dairy sheep enterprise, keep the following in mind:

- Raising dairy sheep requires many animal husbandry skills, including monitoring ewe nutrition, managing ewes during lambing, maintaining udder health, and rearing lambs.
- Because sheep milk can be shipped as fluid milk or frozen in a commercial freezer, dairy sheep farms do not need to be located near processing plants or cheese manufacturers.
- The resources in this publication will help you to determine if this operation is an appropriate enterprise for your personal and farm goals.



Resources

Online resources

- Proceedings of the Annual Great Lakes Dairy Sheep Symposia: www.uwex.edu/ces/animalscience/sheep
- Proceedings of the Biennial Spooner Dairy Sheep Days: www.uwex.edu/ces/animalscience/sheep
- National Sustainable Agriculture Information Service: attra.ncat.org/attra-pub/PDF/dairysheep.pdf
- Dairy Sheep Association of North America www.dsana.org
- Dairy Business Innovation Center www.dbicusa.org

Books and DVDs

- Principles of Sheep Dairying in North America* (A3767): learningstore.uwex.edu
- Practical Sheep Dairying* (out of print)
Author: Olivia Mills; ISBN: 0722507313
- System Solutions for Dairy Sheep*
Published by DeLaval:
www.delaval.com
- Sheep Housing and Equipment Handbook*
Midwest Plan Service: www.mwps.org

Sources of milking equipment

- DeLaval, Inc.: www.delaval.com
- Westfalia Surge: www.westfalia.com/hq/en/
- The Schlueter Company:
www.schlueterco.com
- The Coburn Company: www.coburn.com

Wisconsin sheep milk cheese processors

- Butler Farms
- Carr Valley Cheese:
www.carrvalleycheese.com
- Cedar Grove Cheese:
cedargrovecheese.com
- Hidden Springs Creamery:
www.hiddenspringscreamery.com
- Lovetree Farmstead: www.lovetreefarmstead.com/home.htm
- Wisconsin Sheep Dairy Cooperative:
www.sheepmilk.biz

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