EQUIPMENT FOR SHEEP PRODUCTION

Hirning, H. J.
Professor Emeritus, North Dakota State University, Fargo, ND, USA

Keywords: Sheep, equipment, corrals, fences, feeders, waterers, milking parlors, buildings

Contents

1. Sheep production options
2. Equipment for pasture systems
2.1. Pasture Fences
2.2. Electrified Fences
2.3. Corral Fences
2.4. Windbreak Fences
3. Watering troughs
4. Feeding equipment
4.1. Creep Feeders
4.2. Bunk Feeders
4.3. Hay Feeders
5. Lambing equipment
5.1. Artificial Rearing
5.2. Supplemental Heat
6. Confinement production
7. Handling facilities
7.1. Associated Handling Equipment
7.2. Computer Identification
7.3. Milking Facilities
8. Buildings for sheep production
8.1. Lighting
Glossary
Bibliography
Biographical Sketch

Summary

Sheep are produced in a wide variety of climates and production systems around the world. Climate and local experiences have dictated the types of facilities. Typically, sheep have been raised in open pastures with a shepherd. Dogs are frequently used to assist in keeping the flock together, especially during periods when the flock must be moved from one pasture to another or to move them into handling facilities.

Harsh climates or severe losses due to predation may force producers to confine the sheep during certain periods of the year. This has resulted in the development of specialized feeding facilities and production buildings.

Pasture systems require good fencing systems to contain the sheep and to resist predators. Confinement facilities require good feeding facilities and handling facilities. Special facilities for lambing and handling of orphan lambs are discussed along with treatment facilities.

Adequate water can be supplied with many types of commercially available watering devices as well as homemade equipment. Modified watering equipment can also be used to provide milk to orphan lambs.

1. Sheep Production Options

Sheep are raised in three fundamental systems. The oldest and most widely used system in the world is the pasture system. This may include full time pasture systems in moderate climates and partial pasture systems where supplemental feed is used during seasons when pasture is unavailable due to climatic conditions.

The second system involves a combination of pasture and confined feeding areas. Ewes, rams and lambs are raised in a pasture system. When lambs reach weaning age, they are removed from the pasture and placed in a confined feeding area until they are ready for market.

The third system is a total confinement system where all sheep are raised in a feedlot or building. All breeding, lambing and finishing is done in the confined area. Density is such that little or no vegetation grows in the production area. All feedstuffs are grown on adjacent lands and fed to the sheep with specialized feeding equipment.

2. Equipment for Pasture Systems

In areas where sheep are placed on pasture throughout the year, there is very little equipment that is needed. This is especially true if the shepherd is with the sheep at all times on an open range. Mechanical watering devices may be placed in strategic locations throughout the range, while the shepherd is responsible for the safety of the sheep and controls their movement. Where rangeland is limited, fences are used to control the movement of sheep and to deter predators. Electrified fences may be used to subdivide pastures for more efficient utilization of the pasture grasses.

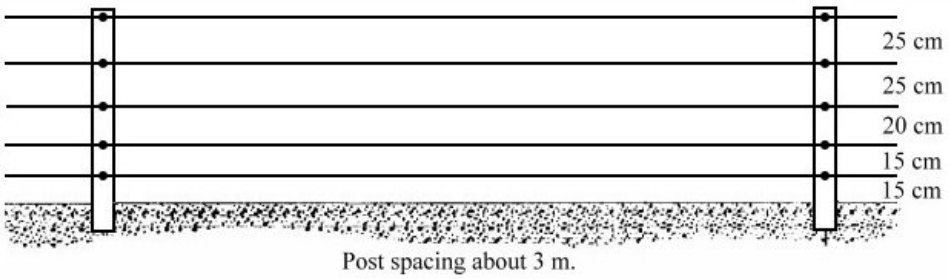

Figure 1: A five wire electrified fence for sheep pastures. The top, bottom and middle wires are energized. The intermediate wires are grounded.

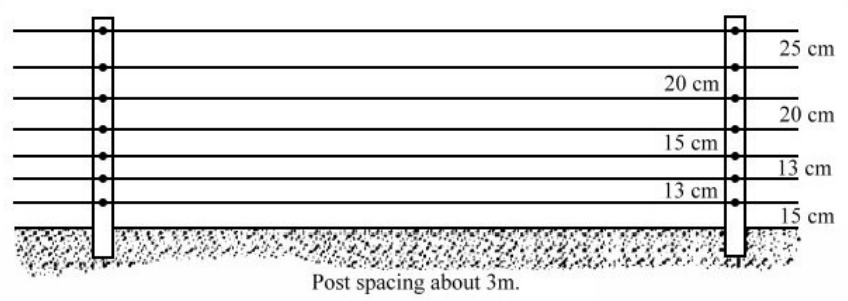

Figure 2. A seven wire electrified fence will aid in controlling predators. Alternate energized and grounded wires.

2.1. Pasture Fences

A pasture fence may be built of any available materials, such as stone, wood, metal, woven wire (net-wire) or electrified wires. The fence must be of sufficient height to prevent the adult sheep from jumping or climbing over the top (usually 1.5 to 1.7 m). Any openings in the fence must be small enough to prevent lambs from escaping (usually less than 15 cm).

If the fence is to serve as a tool in reducing predation from dogs, coyotes and foxes, it must be high enough to prevent the predators from jumping over the fence and also to prevent them from climbing the fence or digging under the fence. A barbed wire at ground level will discourage digging under the fence. A charged wire at the top of the fence will usually prevent climbing over the fence. Occasionally, a wire overhang must be used for full protection.

2.2. Electrified Fences

Electric fences have been used to control of all types of livestock. However, the high resistance of wool to the flow of electric current has limited the effectiveness of single strand electric fence. A sheep requires a current flow of greater than 5 milli-amperes to elicit an aversion response.

Permanent fencing with 5 to 8 strands of properly spaced high tensile wire is excellent for a sheep pasture. An overall height of 1.3 m works well to keep sheep in and many predators out. The bottom wire should be charged and placed about 15 cm above the ground. The next two wires should be spaced about 13 cm and alternate charged and ground wires. The next two wires can be spaced about 15 cm with the top wire at a height of 1.2 m.

Wire sizes can be either 12 ½ gauge (AWG) or 14 gauge. The heavier wire will conduct the voltage better and will also be stronger. The principle idea is that the electric shock prevents the animals from putting pressure on the fence. It is necessary that sheep become accustomed to the electric fence. Freshly shorn sheep will have less wool for insulation and are therefore more likely to experience the shock effect when exposed to the fence. It helps if the sheep are allowed to discover the electric fence on their own, such as in a large enclosed area rather than being crowded against the fence. A multi-

wire fence will teach the sheep to respect the fence more quickly than a single or two wire fence. Most animals will be fully trained in 48 hours.

After the sheep have learned to respect an electric fence, they can be controlled in temporary enclosures that have only two or three wires. A two-wire system requires that the lower wire be about 25 cm above the ground and the upper wire 50 cm above the ground. Other materials that can be used for temporary fencing include smooth wire, polywire, polytape or flexible netting. The polywire and polytape are best utilized in rotational or controlled grazing environments where the fence is frequently moved.

2.3. Corral Fences

Corral fences will be exposed to considerable pressure from the confined sheep. Post spacing is usually less then 3 m. The actual fencing material may be wood, prefabricated metal panels or woven wire. The lower portion of the fence can have no openings larger than 15 cm, or lambs will be able to escape. Space in a corral needs to be around 2 m^2 per adult ewe with a lamb. Wooden fences are typically made from 4 cm by 14 cm boards, or a similar size depending upon the standard sizes locally available. Spacing between boards is 10 cm between the earth and the lowest board, then a 15 cm opening. Other boards may be placed at increased spacing, but the upper board should be no more than 25 cm above the board below it.

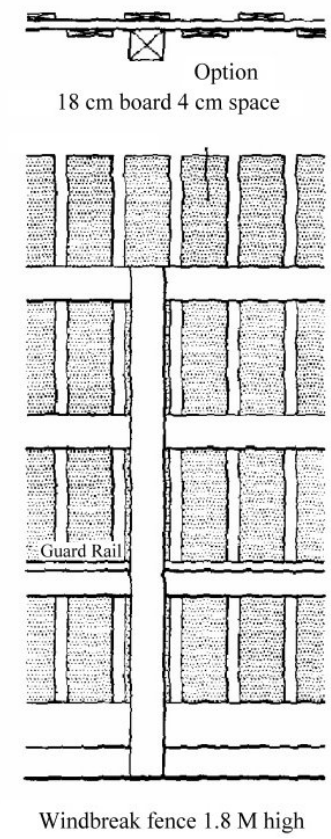

Figure 3: A windbreak fence requires approximately 20 percent open space. Each meter of vertical height will provide some decrease in wind velocity for a distance of 10 meters downwind.

2.4. Windbreak Fences

A windbreak fence can change the wind direction and provide an area with reduced wind velocity. Windbreak fences may be constructed of wood or metal. A typical windbreak fence is 1.8 m high with 20 percent openings. A board 18 cm wide with 5 cm between the boards provides about 20 percent opening. Such a fence will provide an area of reduced wind velocity for a distance 10 times the height of the fence downwind. A 1.8 m high fence will protect an area 18 m downwind.

Windbreak fences should be placed in a manner to prevent snow deposits on the walls or roof of buildings. Allow at least 1 m of space between the fence and any buildings for each meter of fence height.

3. Watering Troughs

Sheep require moderate amounts of water for good production. Many types of containers can be used to supply water for the sheep. A simple trough is adequate in moderate and warm climates. However, in areas that frequently have temperatures colder than 0 C, some type of heated waterer is needed. Many commercial units are available in areas where heated waterers are needed.

Figure 4. Many models of commercial waterers are available for sheep. Units with electric heaters will require special grounding to insure that the sheep do not receive electrical shocks if a malfunction should occur. Be sure to follow the manufacturers instruction during installation.

A concrete apron around the waterer will help prevent the development of a mud-hole around the waterer. Sloping the concrete 1 cm per 10 cm of width will help prevent the build-up of manure and ice on the concrete apron.

Total water needs depend upon the size of the animal and the level of activity, diet, lactation status and climate. Typical water requirements in a temperate climate will vary from 0.4 liters per animal per day to 11 liters per animal per day.

Animal	Liters per day
Ram	7.5
Dry ewes	7.5
Ewes with lambs	11
2 kg to 9 kg lambs	0.4 to 1.2
Feeder lambs	6

Table 1. Typical daily water requirements for sheep in liters per animal per day.

If an adequate water supply is not available, there is a need to develop a water storage system. This can be accomplished with ground level tanks, elevated tanks or earthen storage basins (dugouts). High quality water is particularly important to young lambs, however all sheep will respond positively to high quality water. Brackish or water that is too hot or cold will cause sheep to reduce their daily water intake. A reduction in water consumption will reduce growth rates.

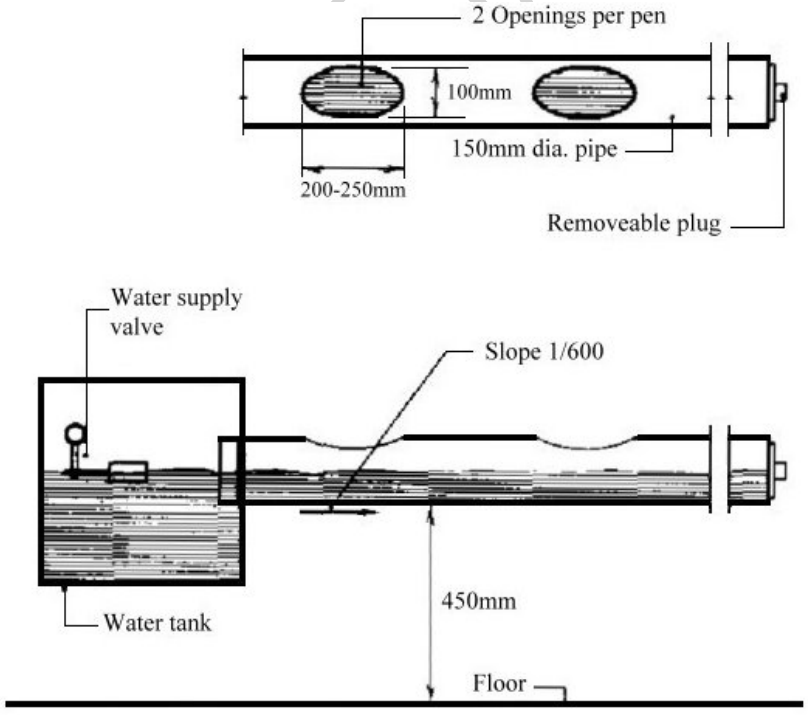

Figure 5. A pipe waterer. A minimum of two openings should be installed in each pen. Each meter of pipe length will hold water weighing about 15 kg and so supports will be needed every 2 meters. Regular cleaning is essential to insure that the sheep will always have an adequate supply of clean water.

Several waterers are more desirable than one large waterer. The waterers should be located so that they are convenient to the sheep and have good wind protection. If the waterer is located inside a building, it will have good wind protection, but will have increased manure and mud problems.

A pipe watering trough can be used to water several pens or large groups of sheep at one time. A 15 cm plastic pipe with an opening cut into the top has worked well. Each opening is from 10 to 12 cm wide and about 20 to 25 cm long. A slight slope to the pipe (about 1 cm in 6 meters) will allow the operator to drain the pipe as needed, while keeping water available along the full length of the pipe.

Nipple waterers have also been used successfully with sheep. Best results occur with one nipple at ewe height and another at lamb height. Mount the waterers at 45 to 50 cm above the floor for lambs and 55 to 60 cm above the floor for ewes. Nipple waterers work well on slotted floors where water spillage goes directly into the manure storage area. In conventional bedded areas, placing the waterer over a large tile filled with crushed stone will help to keep the bedding dry.

4. Feeding Equipment

Many types of feeding equipment are available for feeding sheep. Pails and buckets are frequently used for small numbers of sheep. For large numbers, some type of automation can greatly reduce the hand labor required. Feed mixing wagons and feed delivery wagons make fence-line feed-bunks an attractive option. Self-feeders can be used to make feed available at all times and thereby reduce the amount of feeding space needed.

4.1. Creep Feeders

A creep feeder will allow lambs to access high energy, highly palatable feed without allowing the ewe to access this special feed. Grains are usually fed in a self-feeder that is placed inside a special enclosure.

Openings into the enclosure are large enough to allow the lamb to enter, but will prevent the adult sheep from entering. Openings into the creep area will be from 15 to 25 cm wide and 35 to 50 cm high.

Allow 5 cm of feed trough space per lamb (weighing less than 30 kg) in the creep feeder. If feed is continuously available, this may be reduced to 3 cm per lamb.

The bottom of the feed trough can be at ground level, however the edge of the trough should not be more than 15 cm above the ground to allow the lambs to easily reach over the edge of the trough.

Some provision will need to be made to keep the lambs from climbing into the feed trough. This can be accomplished by placing a board over a portion of the feeder or trough making it difficult for the lambs to stand up while in the trough.

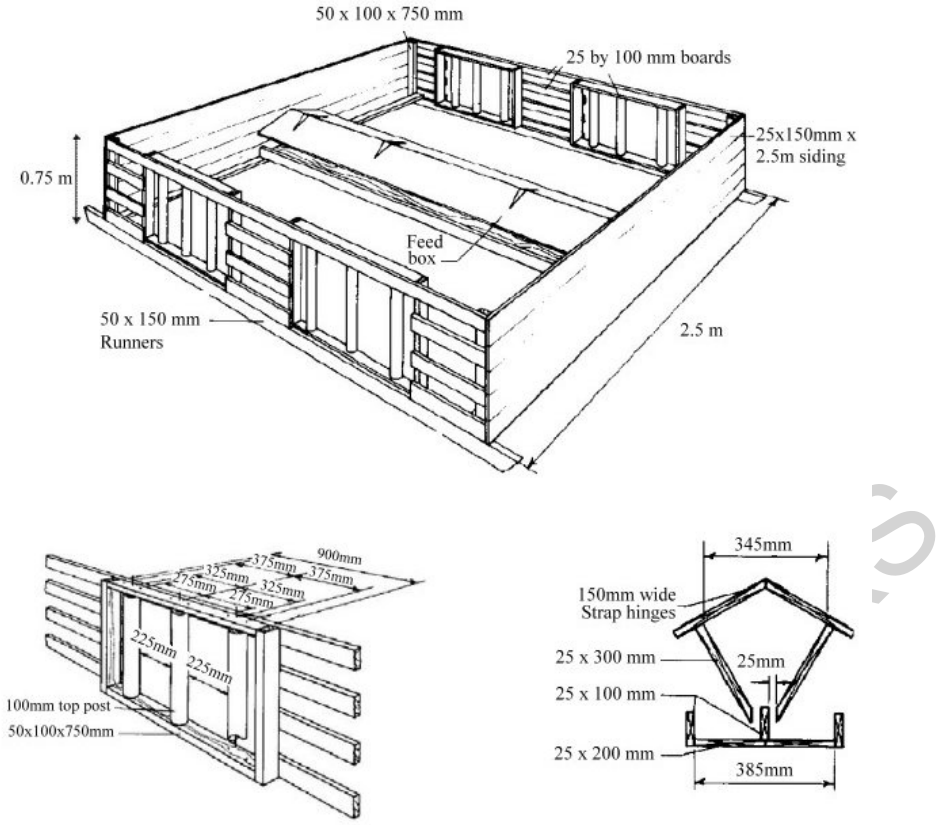

Figure 6. A moveable lamb creep feeding area. The width of the openings into the creep area may need to be adjusted to allow larger lambs to enter without allowing the ewes to enter the creep.

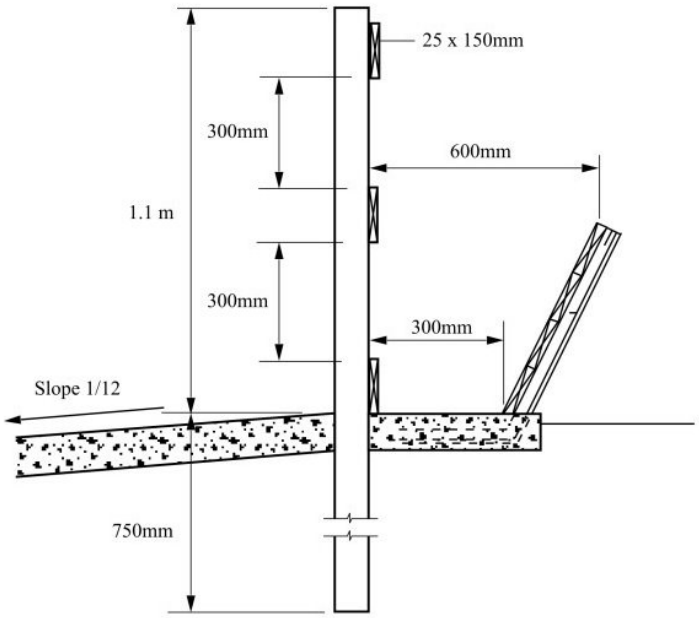

Figure 7. A fenceline bunk feeder with wooden boards to keep the sheep out of the bunk. Lambs may be able to enter the bunk area and escape from the pen.

-
-
-

Bibliography

American Sheep Industry Association Inc. (1997). *Sheep Production Handbook*, 210-211, 717-719. [A comprehensive handbook on all the facets of sheep production.]

Caja G. (1996). Electronic identification of sheep, goats and cattle using ruminal bolus. *Proceedings of the 30th Biennial Session of ICAR*, 355-358, Veldhoven, The Netherlands. [This research reports on the use of electronic identification systems for ruminants.]

Eitam M., and Leibovich H. (1993). Rotary milking parlour performance in small ruminants. *Sheep-Dairy-News* **10** (**2**), 27-28. [Two types of rotary milking parlour for ewes were examined.]

Gordon G.D.H., Cockram M.S. (1995). A comparison of wooden slats and straw bedding on the behaviour of sheep. *Animal-Welfare* **4** (**2**), 131-134. [Discusses the behavior of two groups of sheep observed when placed on wood slats or straw bedding.]

Hargreaves A L, Hutson G.D. (1997). Handling systems for sheep. *Livestock-Production-Science* **49** (**2**), 121-138. [A review of the performance of handling systems for sheep.]

Hirning H.J., Faller, T.C., Hoppe, K.J., Nudell, D.J. and Ricketts, G.E. (1994). *Sheep Housing and Equipment Handbook*, 90 pp. Published by Midwest Plan Service, Ames, Iowa, USA. [A comprehensive discussion of the buildings and equipment used in sheep production.]

Kencove Farm Fences. Electric fencing manual. Kencove.com/stafix/construct.htm. [An internet website that discusses electric fences for sheep.]

McGregor B.A. (1990). Observations on the effectiveness of prefabricated wire fences for fibre goats and sheep. *Proceedings of the Australian Society of Animal Production* **18**, 292-295. [A discussion of nine prefabricated wire fence designs used to restrain goats and sheep.]

Mowlem A., Eitam M. (1989). A moving abreast parlour for milking sheep and goats. *Proceedings International Symposium on Machine Milking of Small Ruminants*, 173-180. Available from the Ministry of Agriculture, Tel-Aviv, Israel. [A description of a "a moving abreast parlour" which speeds up milking.]

Mugnozza G.S. Fiume, G., Russo, G. (1996). Artificial lighting criteria in intensive lamb breeding barns. *Rivista-di-Ingegneria-Agraria* **27** (**3**), 155-161. [Results of experimental tests on lambs raised in barns with different lighting equipment.]

Biographical Sketch

Harvey J. Hirning has a BS and an MS in Agricultural Engineering from North Dakota State University, USA, and gained a PhD from Iowa State University, Ames, Iowa, USA in 1970. He presently holds the rank of Professor Emeritus.

Dr. Hirning has served as an extension rural civil defence engineer and instructor at Iowa State University. He served as assistant professor and extension agricultural engineer at the University of Illinois, Urbana, Illinois, USA. He also served as an instructor, associate professor and Professor at North Dakota State University, Fargo, North Dakota, USA.

In addition to his teaching and extension duties, Dr. Hirning served as program coordinator for the Energy Extension Service in North Dakota and co-leader of the Energy Integrated Farm Demonstration Project.

Dr. Hirning is a member of Phi Kappa Phi, Epsilon Sigma Phi, Alpha Epsilon, Gamma Sigma Delta and Sigma Xi honor societies. He is an Honorary North Dakota FFA State Farmer. The North Dakota Power Use Council has twice recognized him for outstanding service, and he is the only person so recognized in the history of the council. The North Dakota Office of Intergovernmental Assistance and United States Department of Energy has also recognized him for outstanding service. He has received the Distinguished Service Award from the National Food and Energy Council. In 1992, he received the first place award in the Red River Valley Section ASAE innovations contest for his mobile, water heated small animal warmer. Dr. Hirning has also received 17 Blue Ribbons for his technical publications.