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Minimum Facilities for Beef Cattle Production

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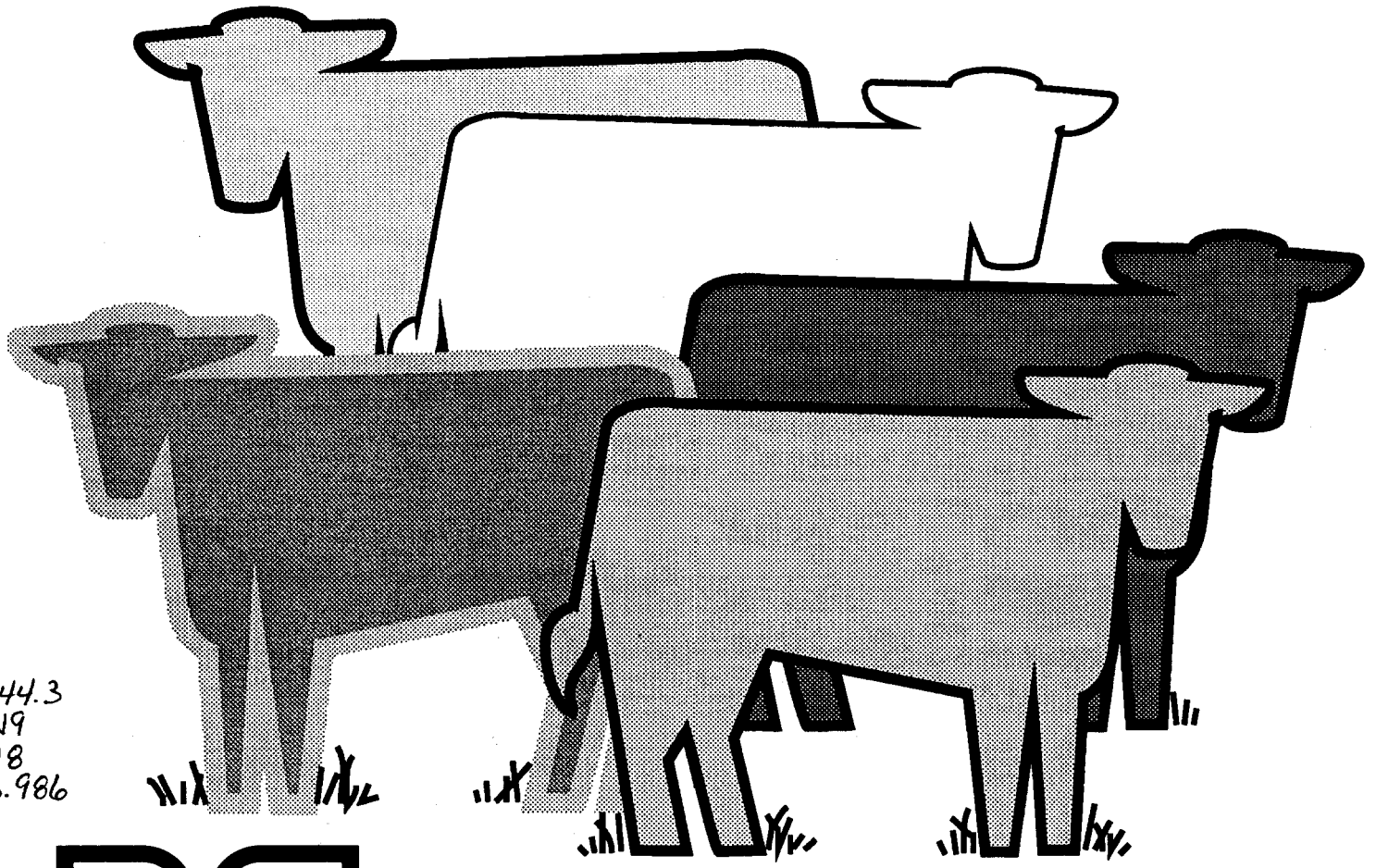

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Interpreting the concept of minimum facilities for beef production can produce a lot of variation. One person's idea of minimum could be considered quite a luxury by someone else. In the context of this publication, minimum will mean some protection from the weather, a corral setup that will facilitate vaccination and dehorning, an ice-free water supply and feeding equipment.

Weather Protection

A mature cow or bull can usually survive the cold temperatures experienced in North Dakota if they have some protection from the wind and snow. For many years cattle have been wintered on the open range. However, during the winter of 1888-1889 some herds had 60 percent or higher losses even if they had access to some protection such as trees and coulees. What percentage of the death loss was caused by the weather and what portion was caused by the inability of the animals to get to feed is not reported.

More recent winters have also resulted in deaths of animals wintered in the open. Some of those deaths were caused by snow-encrusted noses with death by asphyxiation. A good windbreak could have helped to reduce that death loss.

While healthy cows with good hair coats and nutrition can survive temperatures colder than -30 degrees Fahrenheit, any wind and snow can create problems. Bulls may require protection to avoid frozen testicles. Some type of housing is better than deep straw. Calving under these severe conditions makes survival of the calf highly unlikely. Table I shows the wind chill and its potential effects.

Wind chills colder than -30 can result in frozen teats and scrotums and cause increased stress on animals that may result in the appearance of latent diseases. Wind chills colder than -75 are hazardous to all animals with great danger of death in young animals.

Winds greater than 40 miles per hour do not greatly increase the wind chill over that given for 40 miles per hour and in North Dakota rarely occur when temperatures are below zero. The highest velocity winds tend to occur while the temperature is rising or falling.

A windbreak fence can be used to provide some protection for animals which must remain outside.

A solid fence provides better wind protection for short distances, but snow accumulates near the fence. Wind passing over a vertical barrier usually drops or swirls downward on the downwind side, losing energy and dropping snow. An 80 percent solid fence reduces wind speeds for a greater distance and spreads the snow out for faster melting (Figures 1-3).

Provide about 20 percent open space in a windbreak fence for effective wind and snow control (Table 2). Rough cut or dressed lumber 6-10 inches wide works best for slotted windbreak fences. Plywood or metal roofing sheets are not as effective. Slot openings greater than about 2 inches allow too much wind through at one location. Several narrow slots (less than 2 inches) allowing the same total amount of wind through provide better wind and snow protection. A minimum height of 8 feet for solid fences and 10 feet for slotted fences is recommended for better wind control.

Horizontal or vertical slots in a slotted fence perform about the same. Leave a 4-6 inch opening

Table 1. Animal Wind Chill Chart.

Wind Speed MPH	Actual Thermometer Reading F								
	40	30	20	10	0	-10	-20	-30	-40
Calm	40	30	20	10	0	-10	-20	-30	-40
5	37	27	16	7	-6	-15	-26	-35	-47
10	28	16	2	-9	-22	-31	-45	-56	-70
15	22	11	-6	-18	-33	-45	-60	-70	-85
20	18	3	-9	-24	-40	-52	-68	-81	-96
25	16	0	-15	-29	-45	-58	-75	-89	-104
30	13	-2	-18	-33	-49	-63	-78	-94	-109
35	11	-4	-20	-35	-52	-67	-83	-98	-113
40	10	-4	-22	-36	-54	-69	-87	-101	-116
	Little danger			Increasing danger			Great danger Death in youth animals		

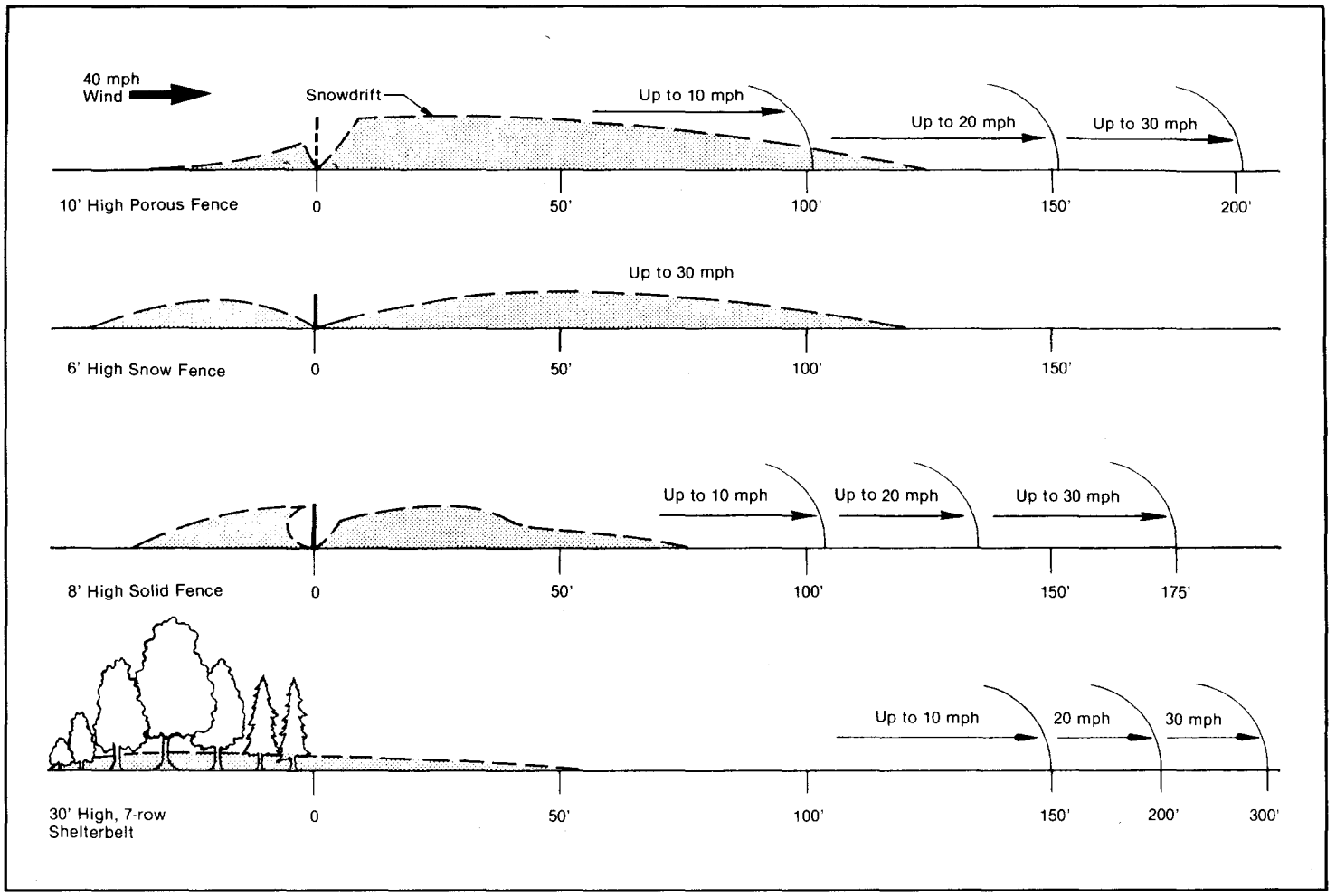


Figure 1. Typical snow and wind patterns. With a 40 mph wind from the left, velocities are reduced to about those shown. For other wind speeds, reductions are proportional. Locate buildings away from the snow drift but within good wind protection.

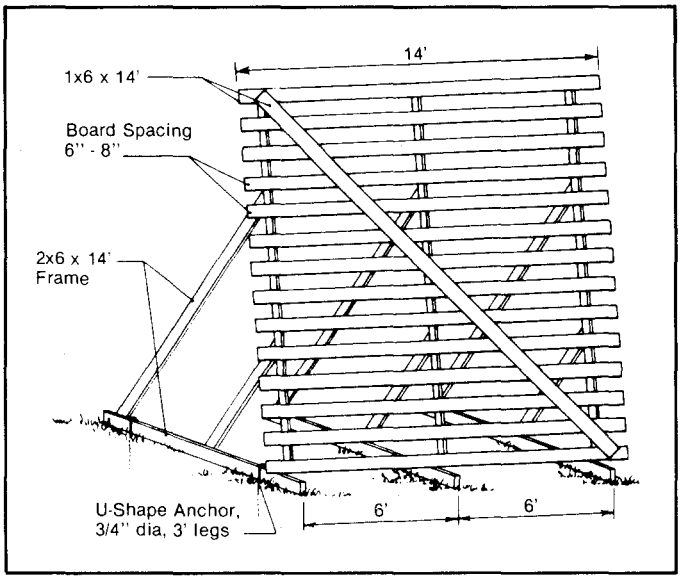


Figure 2. Moveable windbreak fence for pastures. Several moveable fences end-to-end give local snow and wind protection.

Table 2. Windbreak fence board spacing. Recommended spacing between planks is 20 to 25 percent of plank width. Plank width greater than 10" is less effective. Openings over 2" wide are not recommended as too much wind can pass through in one place.

Board size	Slot width	
	Rough cut lumber	Dressed lumber
	in.	
1x4	7/8	3/4
1x6	1-3/8	1-1/8
1x8	1-3/4	1-5/8
1x10	2	2
1x12	2	2

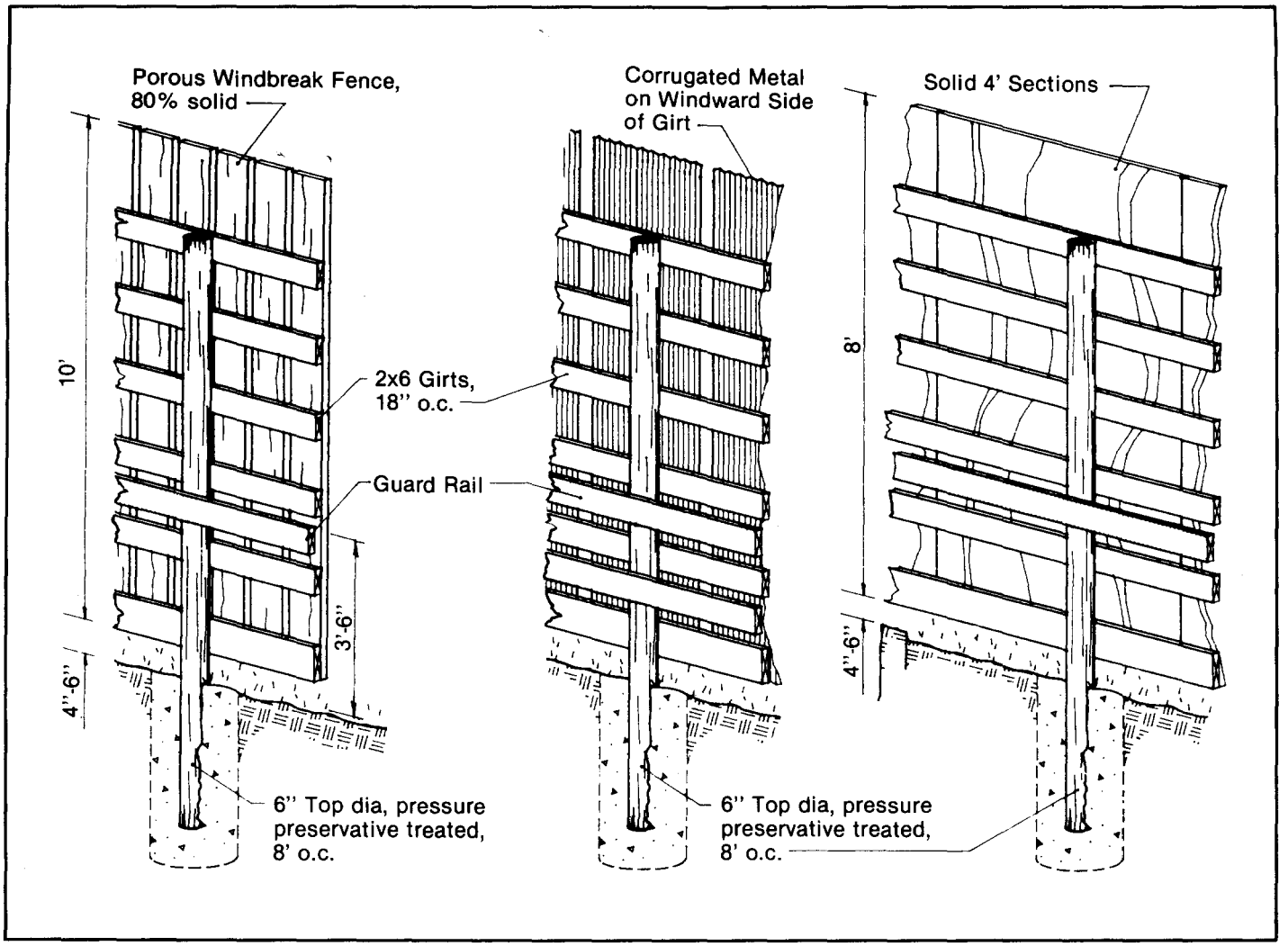


Figure 3. Windbreak fences. Attach boards on the cattle side. If cattle have access to both sides, add guard rails. Splice framing planks on alternate posts.

under the fence for better drainage, drying, and summer air movement. Close the opening below the fence with straw or snow in the winter to reduce drafts.

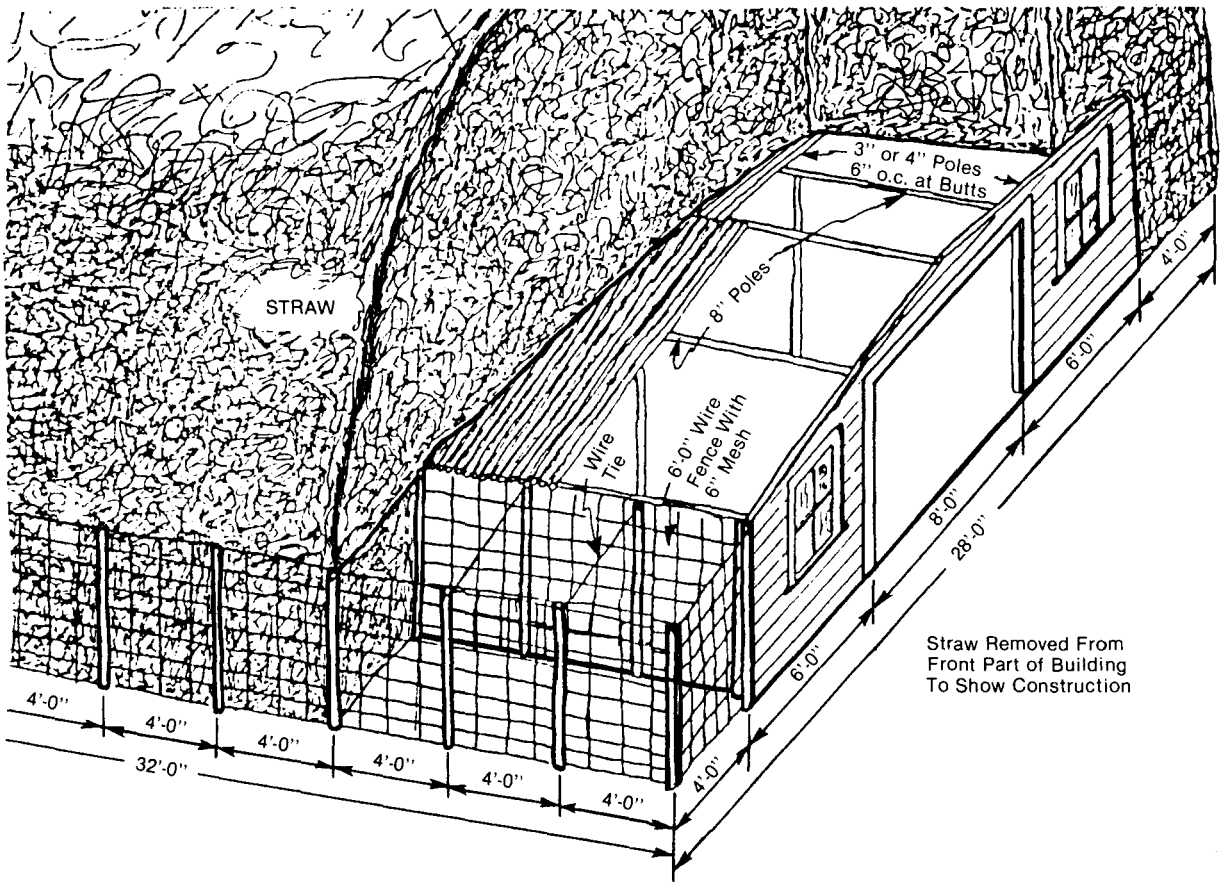
Attach boards on the cattle side of the fence. Install a horizontal rub rail if cattle have access to both sides. Use galvanized nails.

Snow fencing can provide localized wind and snow control. It is too porous to provide the best wind protection and is not durable enough for permanent use around cattle.

The early settlers used many combinations of wood and straw to create shelter for their animals. The very simplest shelters involved a wood and wire framework covered with straw (Figure 4 and 5). Each year some of the straw would have to be replaced. If wood was available, the walls of the barn were made of wood and the roof was made of straw. As soon as they could afford it, most people replaced the straw structure with wood.

The idea of a straw barn was revived during the early part of the 1980s. Large round (6 foot dia by 6 foot long) and square bales of straw were piled up to build a side wall (Figure 6). The roof was made of straw placed on woven wire. After several years the sidewalls settled and a opening began to appear at the top of the wall.

Provisions need to be made to keep the animals from eating the straw or the animals will eventually eat the entire structure. Some producers have placed an electric fence around the inside of the barn to keep the animals from being able to reach the straw. Others have built a short wall or fence to protect the straw.



Roof Covered Not Over 8' Deep with Straw or Fodder

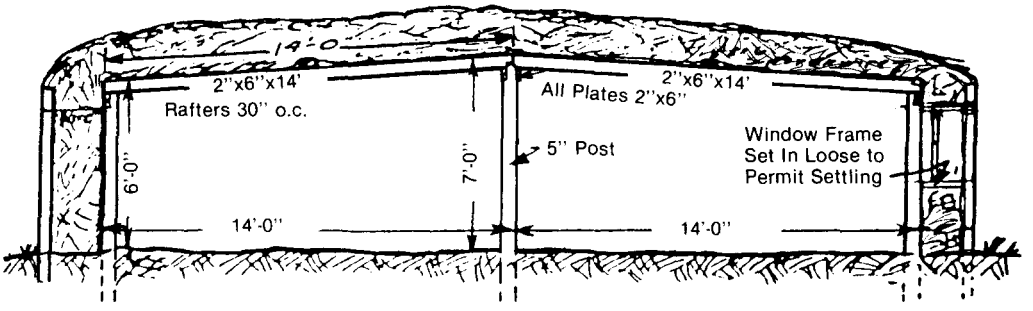


Figure 4. Straw buildings have a long history of use. The drawing above is from a 1943 Plan – ND 727-13-1 for a threshed strawpile barn.

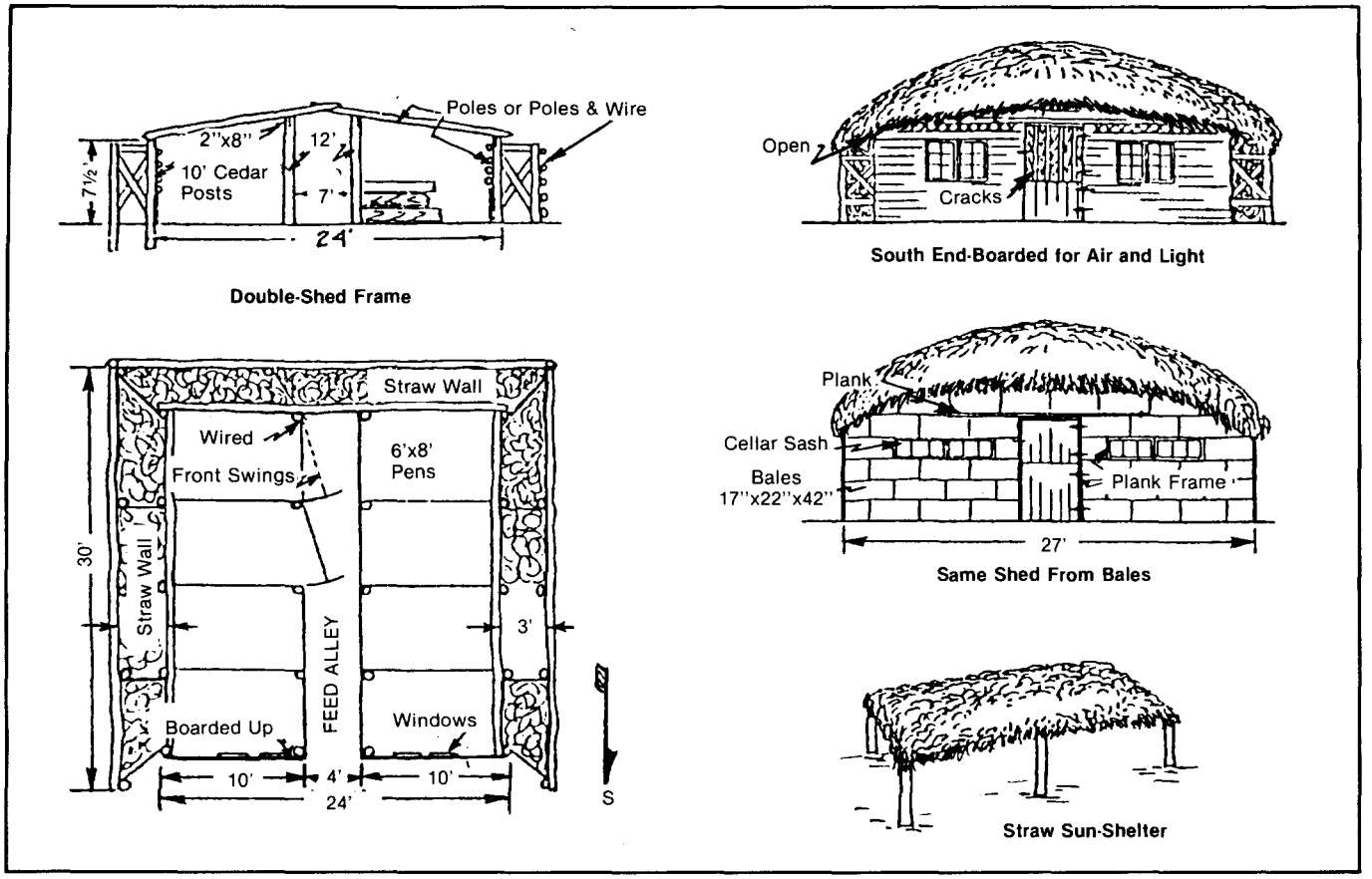


Figure 5. A 24 by 24 foot double straw shed with double walls. This shed will be dark in the back pens but the door and windows in the south end will help to light it. Note the open strip above the door for ventilation when the door is entirely closed.

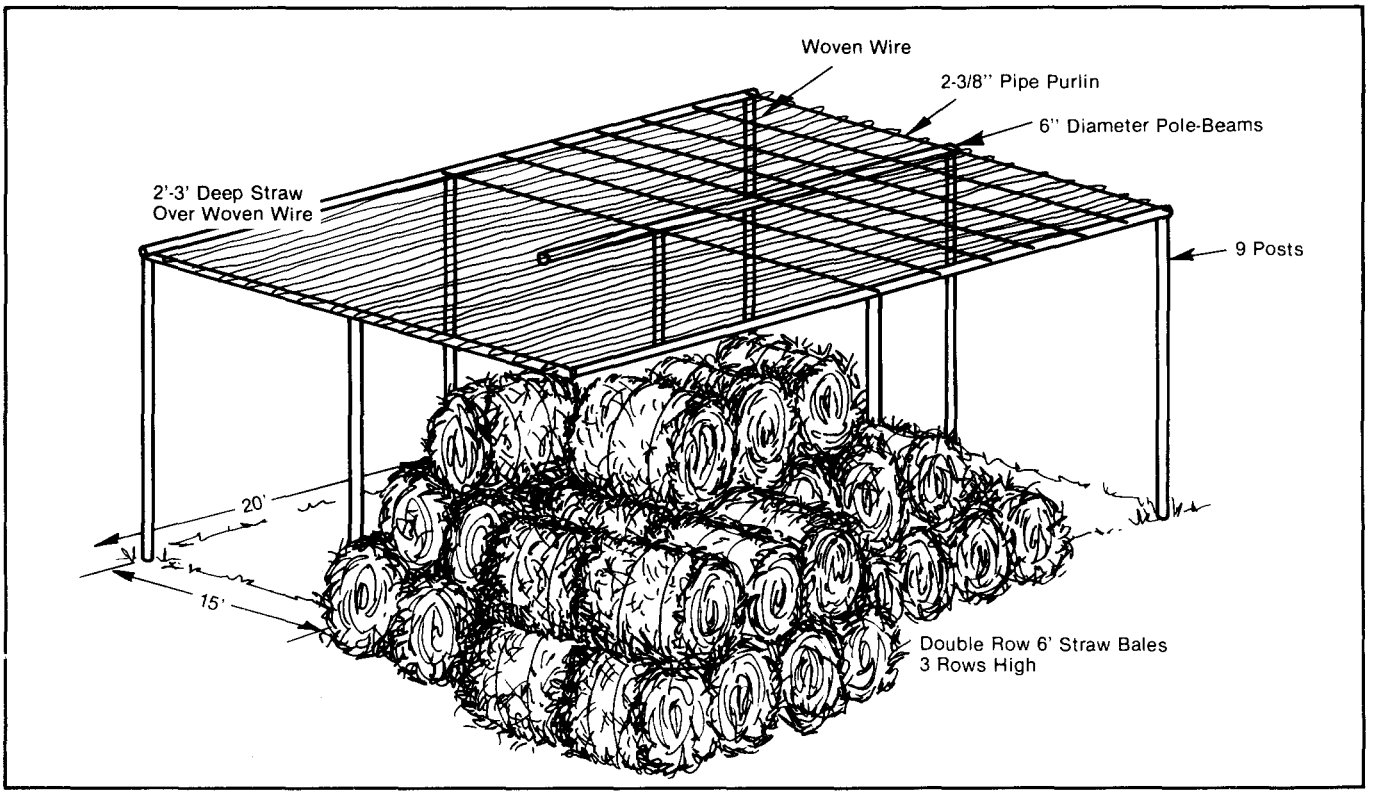


Figure 6. A straw barn can be built with large bales.

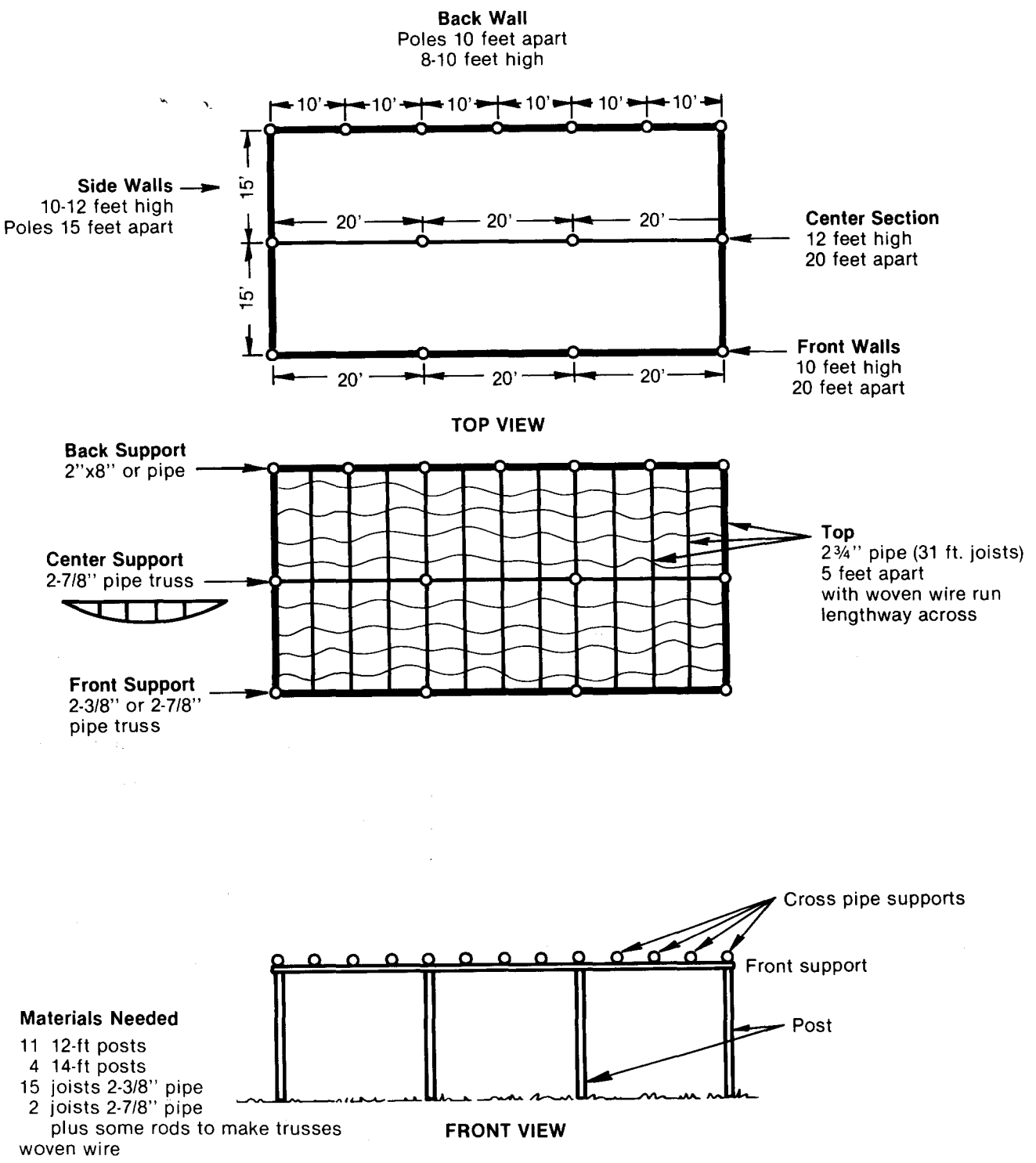


Figure 6 continued.

A simple metal-clad open front shed provides a good protective structure. If the building is used for calving during the coldest part of the winter, a portion of the building can be enclosed and some heat added.

Ventilation can be provided by leaving the ridge on gable roofed structures open. If the side walls are closed, a ventilation space can be provided at the top of the wall to allow air to enter the building (Figure 7). Enclosing of an open front building should start at the bottom of the wall and progress upward as the weather gets colder. The lower 4 feet are the most critical. However, some producers will close up to 90 percent of the wall. This minimizes drafts at the floor while allowing air circulation above the animals.

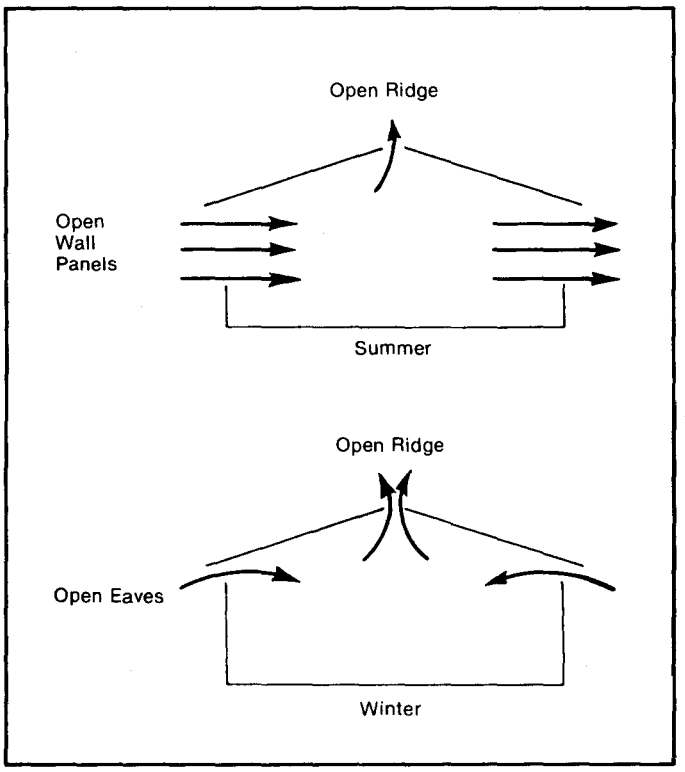


Figure 7. Naturally ventilated barn features.

Corrals and Associated Equipment

A good corral can be the most important facility in a beef production operation. While roping can be used to capture a single animal on the open range, it soon becomes less practical as the number of animals to be treated increases. The time savings and reduced stress on the animals will quickly pay for a simple corral.

The complexity of a corral will vary with the number of animals to be handled and the frequency with which they will be handled. A pen in the corner of the pasture with a crowd gate, working chute and loading chute may be adequate for some operations. A curved working chute with crowd gate, headgate and squeeze along with sorting pens and alleys can be justified for feedlot operations and larger cow-calf operations.

Figure 8 shows a very simple corral arrangement that could be used in a pasture. The working chute can have vertical sides for ease of construction.

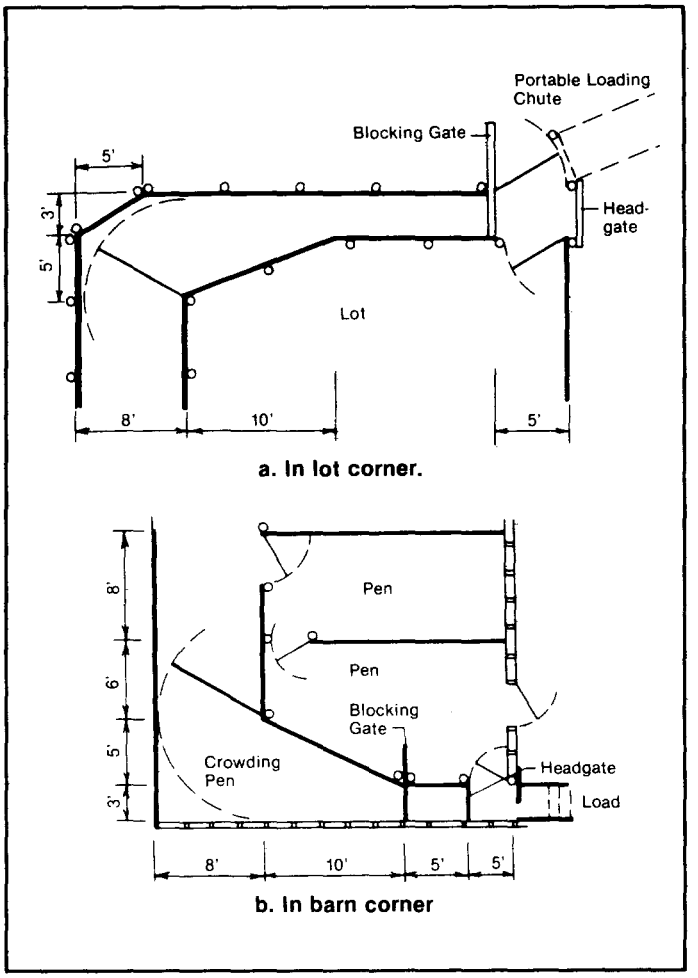


Figure 8. Simple layouts. Corrals for small herds need not be complex. These two are for tame animals in herds up to about 75 head.

The bottom 30 inches of the sides should be solid to reduce the probability of leg injuries. The upper portion can have openings to permit the operator to see the animals in the chute. The use of 2X6 lumber spaced about 6 to 10 inches between boards has worked quite well (Figure 9).

The width of the working chute will vary somewhat with the size of the animals to be handled. For most beef breeds a chute 24 inches wide will permit easy passage for the mature animals with only the small calves able to turn around in the chute. For the larger breeds, the chute will have to be wider with the increased problem of calves turning around. When the cows are over 1200 pounds, the working chute should be about 26 to 28 inches wide (Table 3).

Some producers have elected to go to working chutes with sloping sides to permit working with cattle of different sizes without the problem of calves turning around in the chute. Typically they will use a bottom width of 13 to 16 inches and a width at 4 feet above the bottom of 24 to 28 inches (Table 3).

The floor of the working chute can be earth. However, mud is often a problem, so many producers have elected to place small crushed rock or

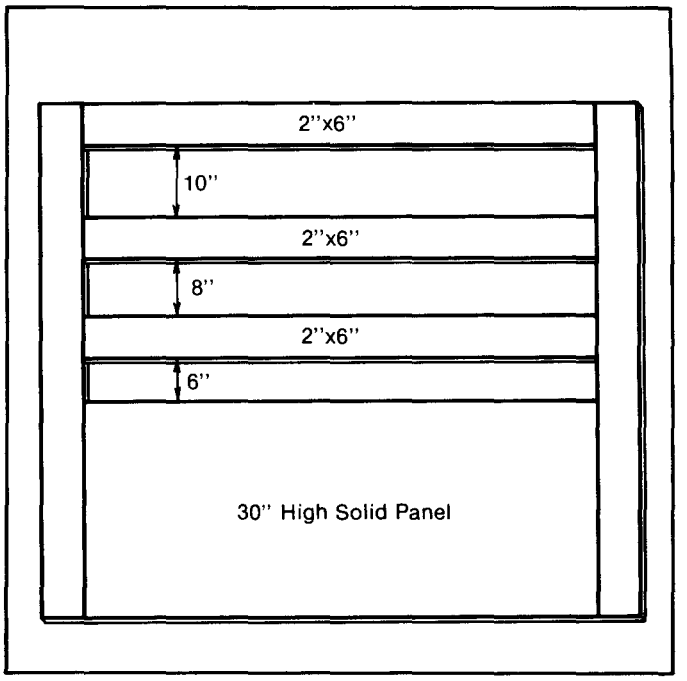


Figure 9. Keep the lower portion of the working chute solid to minimize possible leg injuries.

Table 3. Corral dimensions. Use dimensions for over 1,200 lb. for cow-calf operations.

	To 600 lb	600-1200 lb	Over 1200 lb
Holding area sq ft/head	14	17	20
Crowding pen sq ft/head	6	10	12
Working chute with vertical sides			
Width	18"	26"	28"
Desirable length (min.)	20'	20'	20'
Working chute with sloping sides			
Width at bottom inside clear	13"	13"	16"
Width inside clear (4' height)	20"	26"	28"
Length (min.)	18'	18'	18'
Working chute fence			
Height — solid wall	45"	50"	50"
Depth of posts in ground (minimum)	36"	36"	36"
Overall height (7' clear min. below cross ties to walk under)			
Top rail, farm cattle	55"	60"	60"
Top rail, range cattle	68"	72"	72"
Corral fence			
Recommended height	60"	60"	60"
Depth of posts in ground (minimum)	30"	30"	30"
Loading chute			
Width	26"	26"	26"-30"
Length	12'	12'	12'
Rise in/ft	3½	3½	3½
Ramp height for:			
Gooseneck trailer	15"		
Pickup truck	28"		
Van type truck	40"		
Tractor-trailer	48"		
Double deck	100"		

a concrete floor in the working chute. A 3- to 4-inch thick concrete floor is adequate. The surface should be kept quite rough to minimize animals slipping and injuring themselves. A stiff broom finish is the smoothest surface that should be used. Some producers will form a groove into the concrete similar to the track formed by a tractor tire in an effort to provide better traction for the animals.

A springloaded blocking gate at the back of the working chute will allow animals to enter but not back out. An overhead or side sliding blocking gate will also prevent other animals from entering the working chute and interfering with the treatment of the animal being restrained. A solid wooden gate suspended from a 2-inch pipe (Figure 10) has worked well. A little grease on the pipe and the gate slides easily.

Getting cattle into the working chute is less problem if there is a crowding gate (Figure 11). The person moving the gate should be able to move the gate without being among the cattle.

There are a wide variety of headgates and squeeze chutes that can be used for restraining cattle. Three factors that need to be considered in selecting a headgate include (1) the ability to free an animal that may collapse, (2) the probability that the animal will be able to get through the headgate without being captured and (3) the amount of help that is available. Self catch headgates should have back stops that will prevent the headgate from opening wide, allowing an animal to escape if it backs out without being caught. Figure 12 shows a simple design that has worked well for many producers.

Figures 13 through 16 show some corral plans that might be appropriate for various sized herds.

Since cattle vaccination, dehorning and castration jobs tend to be put off until the weather interferes with field work, some producers have decided to move their handling facilities inside a building. The same principles apply to the inside facilities as to those for outside, but space can be a problem. It is better to place the holding pens outside and allow plenty of space around the headgate for treating the cattle than it is to limit the space around the headgate.

An electrical supply is desirable for lights, clipping and branding. For remote locations, electricity can be supplied by a small portable electric generator. Make sure that the generator has enough capacity to handle the equipment you plan to use. Add up the wattage for all of the equipment that you plan to have operating at one time. This will be the smallest generator that would be acceptable.

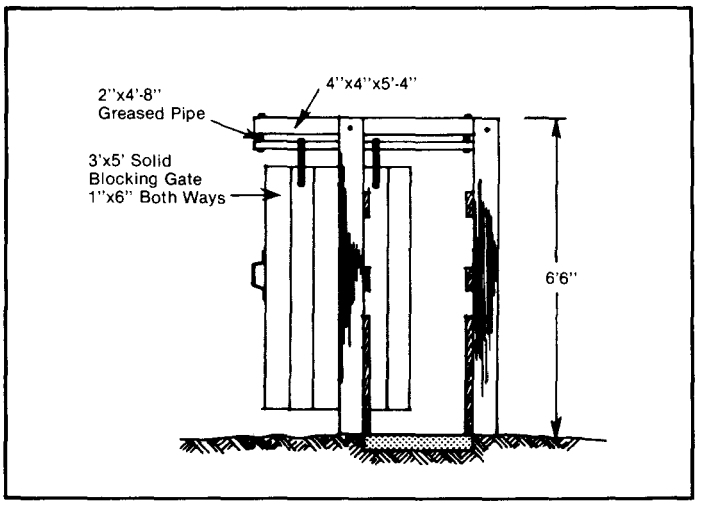


Figure 10. Cross-section of sliding blocking gate.

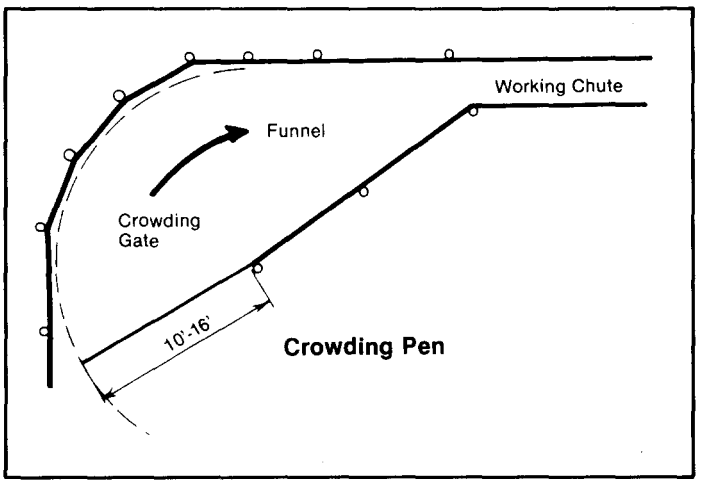


Figure 11. Crowding gate.

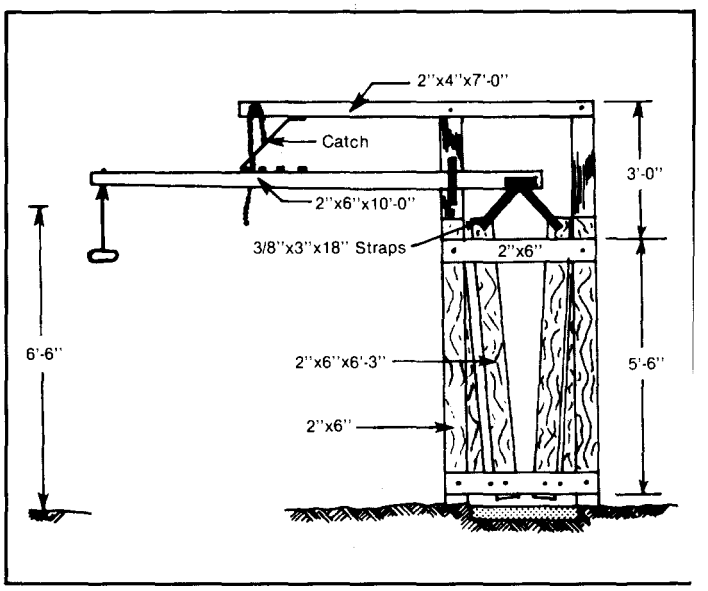


Figure 12. Wooden headgate.

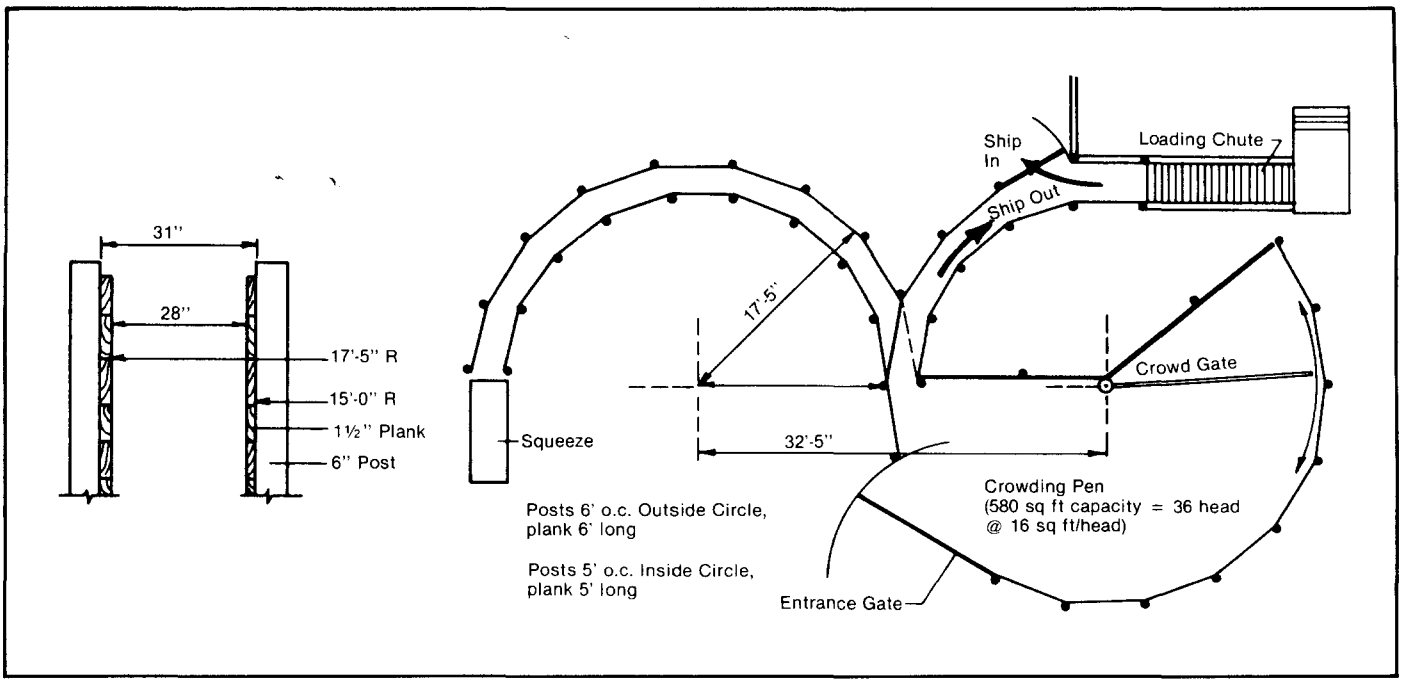


Figure 13. Double-circle layout. Crowding pen, loading chute, working chute, and squeeze are combined into an excellent unit.

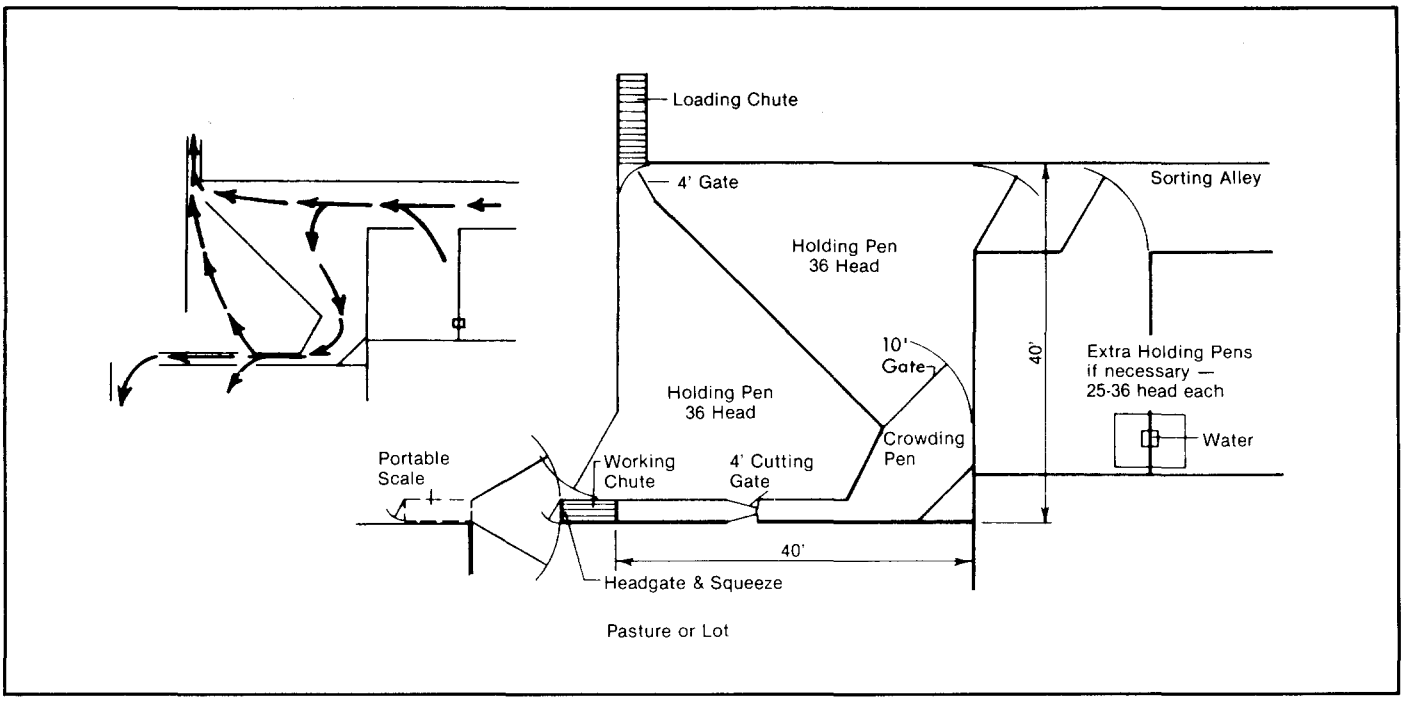
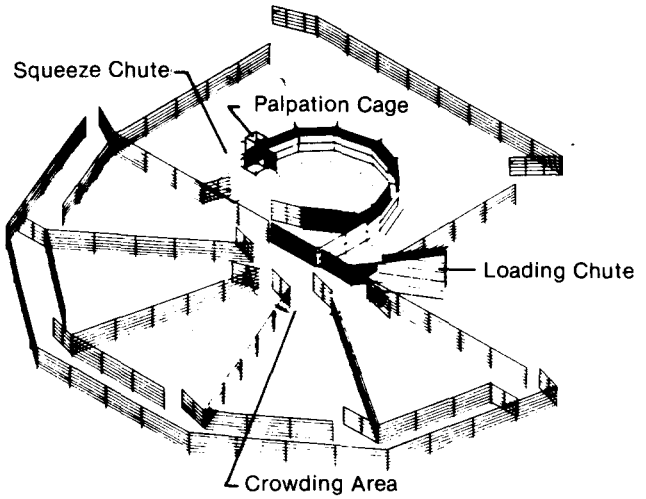
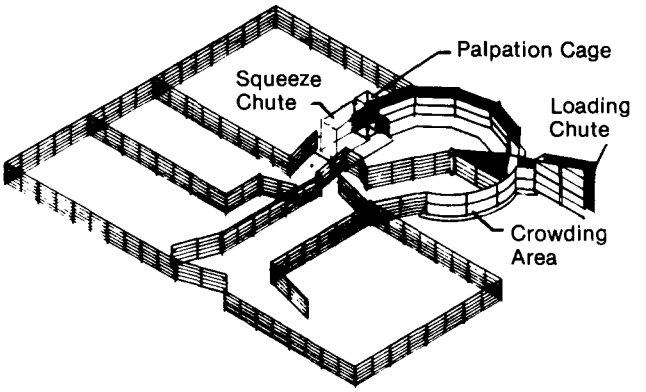


Figure 14. Small square corral. This layout is suitable for small feedlots or cow-calf operations.

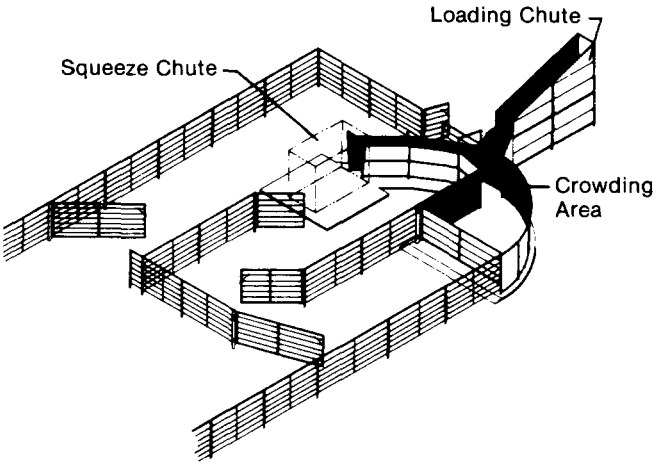


70-400 head or more.
Circular crowding pen and curved working chute. Expand from 1 to 4 pie-shaped holding pens, which require more fence than rectangular ones. Careful construction is needed.

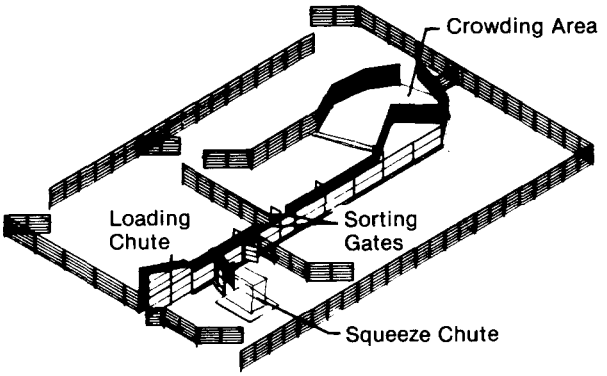


70-400 head or more.
Circular crowding pen and working chute. Good sorting and loading management. This layout can be a hospital area, receiving lot, or combination. Consider roofing over the working area.

USDA 6229. Expansible corral.



25-75 head.
Circular crowding pen and working chute. Good layout for loading and sorting. The plan is adapted to only limited expansion and has no ideal scale location.



Up to 200 head.
Circular crowding pen. Straight working chute to loading chute or squeeze. Holding pens next to the crowding area. There is poor crowding for loading and restricted expansion.

USDA 6230. Corrals with working facilities.

Figure 16. USDA corral plans 6229 and 6230.

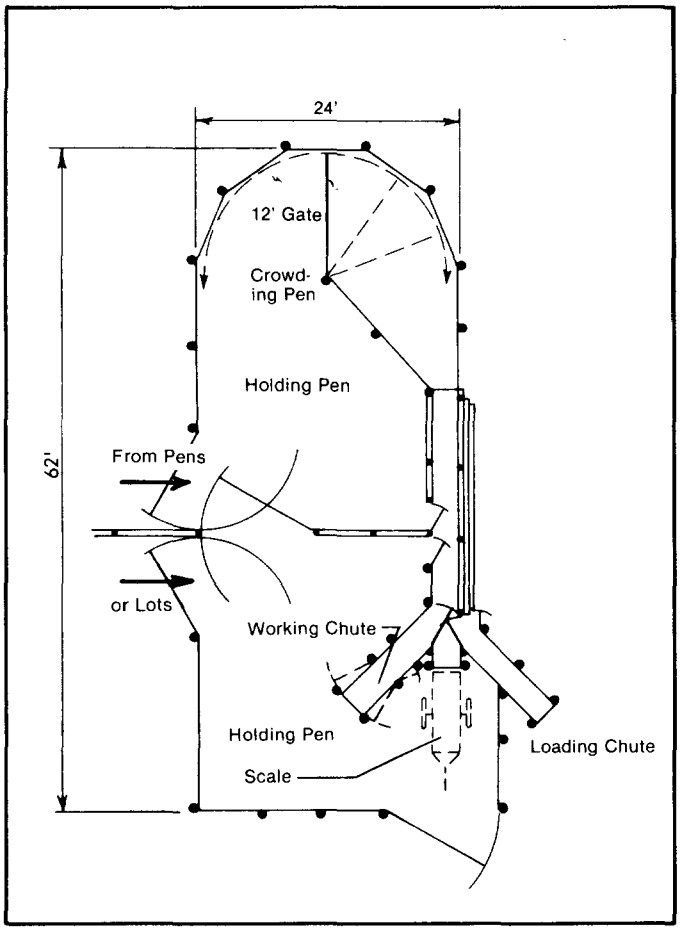


Figure 15. Corral for 300 to 1000 head.

Watering Equipment

An adequate supply of ice-free water is essential for livestock production. Limitations on water intake will reduce performance more quickly than any other nutrient deficiency.

There are a number of ways to provide adequate water supplies. During the winter, a partially covered tank with a heater can be used to serve up to four pens. However, the newer well-insulated and heated units usually require less energy to provide ice-free water.

Drinkable water is normally considered to be in the range of 40 to 50 degrees F. Keeping water at the supply temperature or just slightly cooler will result in the lowest cost for operating a heated waterer.

Figures 17 through 19 show a typical installation for an automatic waterer. While no waterer is completely trouble-free, ice melting mats, extra insulation and protection from the weather can greatly reduce the amount of time that must be spent keeping the units open for the animals. Proper installation with a large heat well (about 12 to 15 inches diameter) extending 10 feet into the ground and insulation around the top 3 feet of riser pipe are useful in reducing energy required to keep the water ice free.

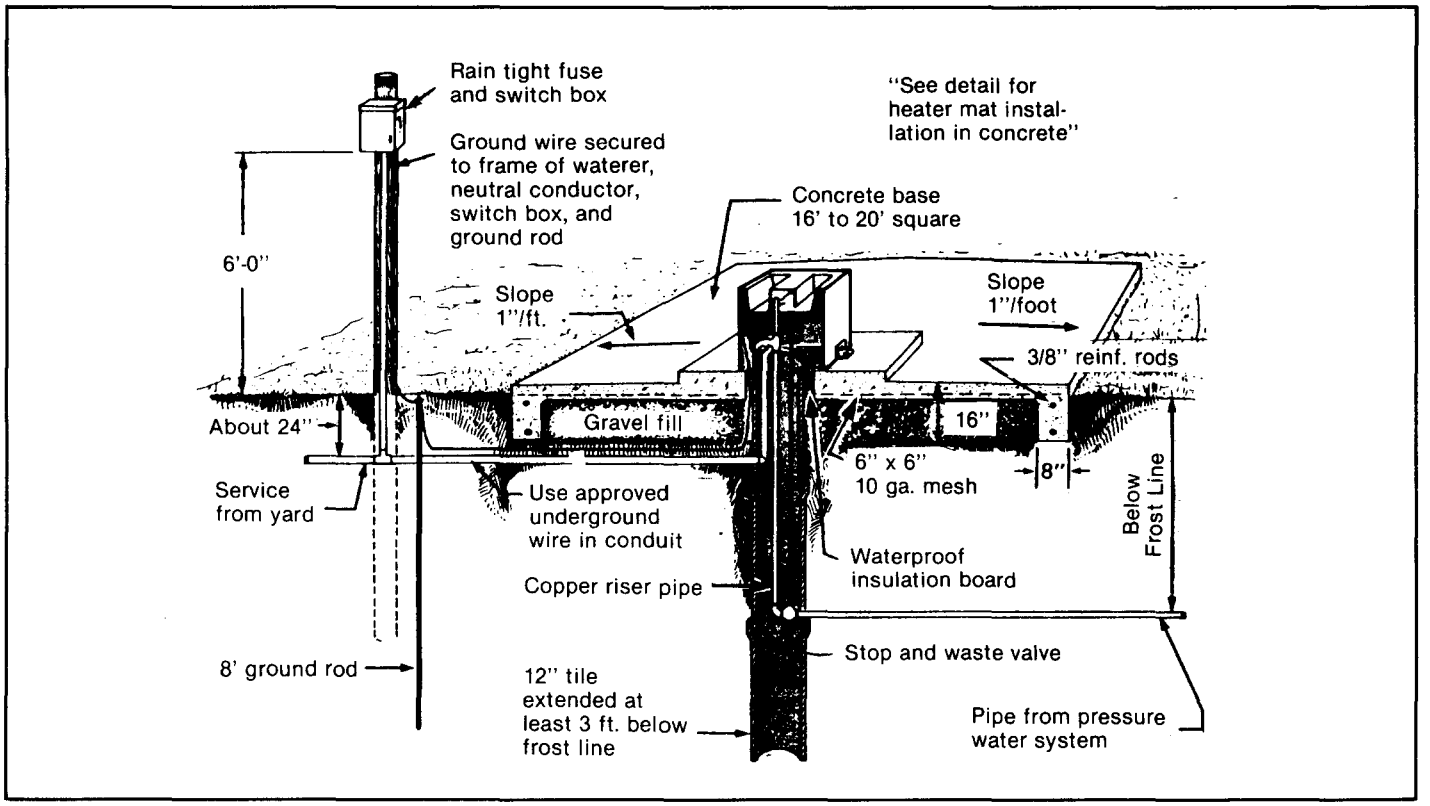


Figure 17. Typical automatic livestock waterer installation.

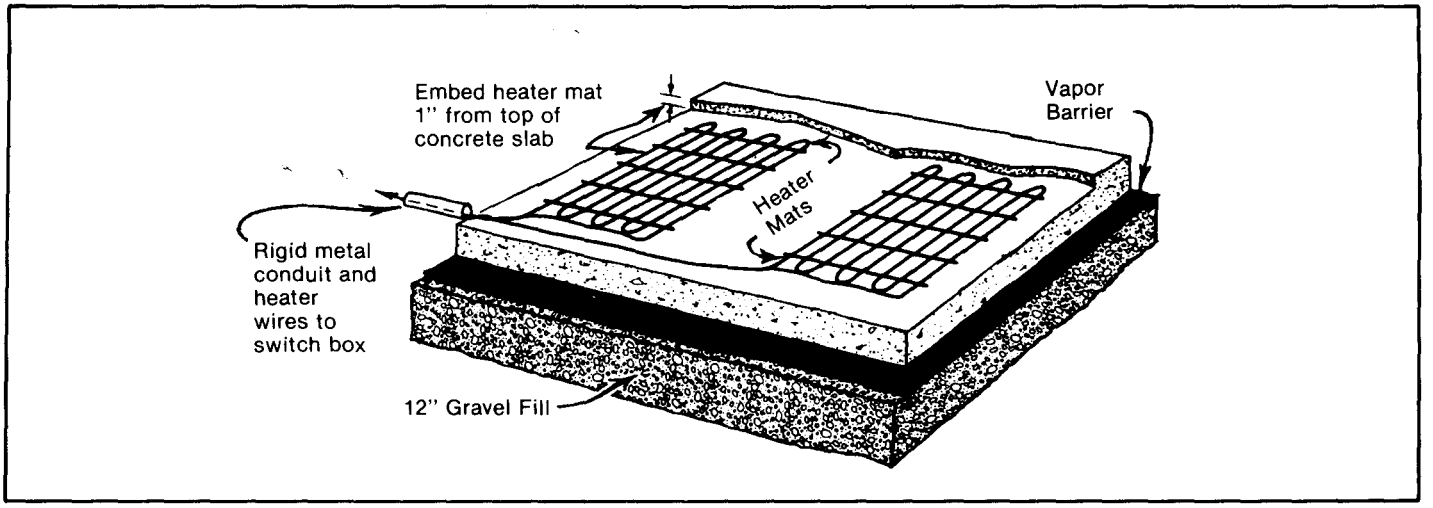


Figure 18. Heater mat installation.

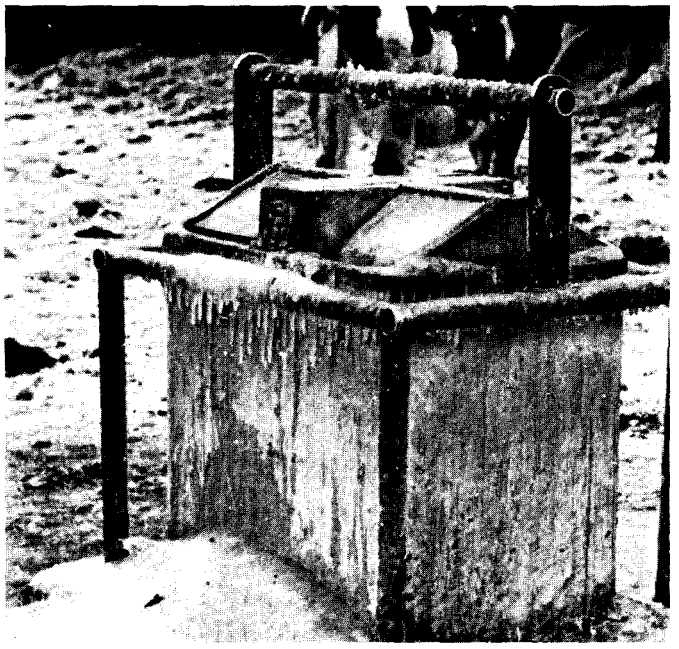


Figure 19. Ice can be a problem around automatic waterers. An electric heating system can be used to melt ice and snow.

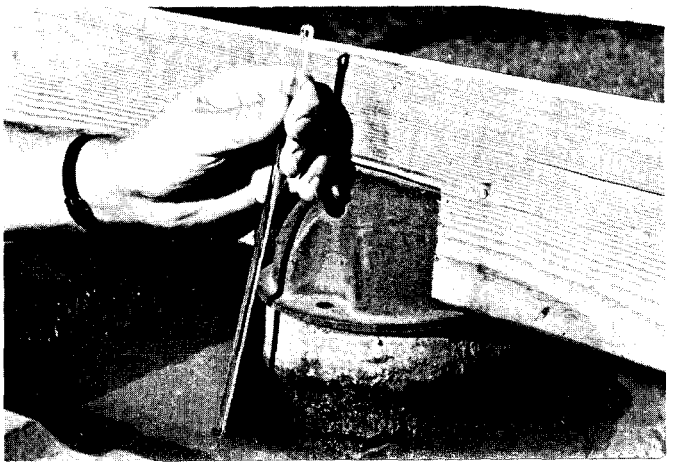


Figure 20. Check the temperature of the water periodically to make sure that the thermostat is working properly.

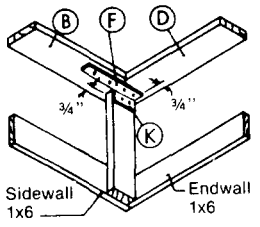
More details on livestock waterers are available in extension publications AE-62, "Automatic Stock Watering," and AS-954, "Livestock and Water." Both publications are available from county extension offices.

Feeding Equipment

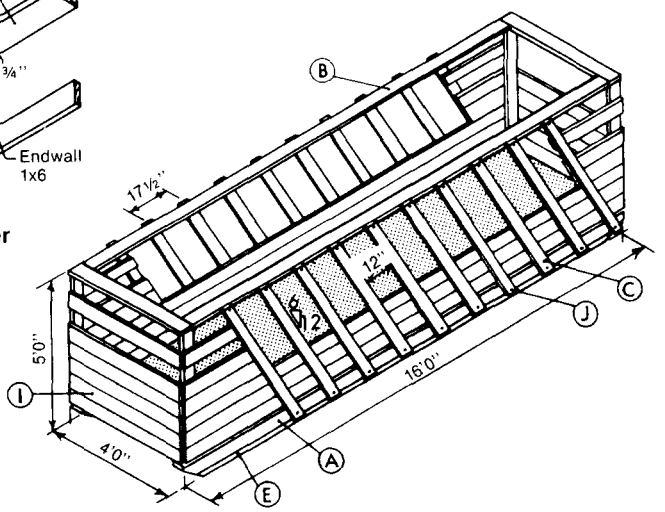
Hay feeding equipment can be as simple as leaving bales in the field and allowing the cows to graze on them or feeding on clean ground in the pasture. However, when the hay lost due to weathering is considered along with the waste from trampling, the total hay wasted can exceed 50 percent. Limiting access to the hay can reduce wastage to about 10 percent.

An electric fence can be used to limit access to the amount of hay the cattle can eat each day. Moveable feeders with slanted bars keep wasted hay to about 5 percent. Figures 21 through 23 show several type of feeders that have worked well.

Commercial round metal bale feeders are made in various qualities. Durability is the watchword. Lightweight feeders are less expensive but do not stand up as well. Inverted tractor tires are very durable, relatively inexpensive and can be used by animals with horns and horses. Silage can also be fed in tire feeders.

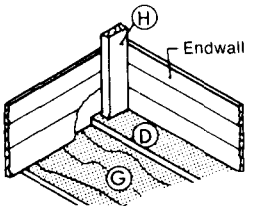


Top Corner



Cutting List

Item	No.	Description
A	2	4x4 x 16'-0"
B	2	2x6 x 15'-¾"
C	20	2x4 x 5'-9"
D	4	2x6 x 4'-0"
E	2	2x4 x 16'-0"
F	4	2½"x2½" x ¼"x12" angle
G	2	¾"x4'x8' C-C ext plywood
H	4	2x4x4'-4¾"
I	232 In ft	1x6
J	40	3/8"x4" lag screw
K	24	½"x2½" bolt



Bottom Corner

Figure 21. Wooden hay and silage feeder.

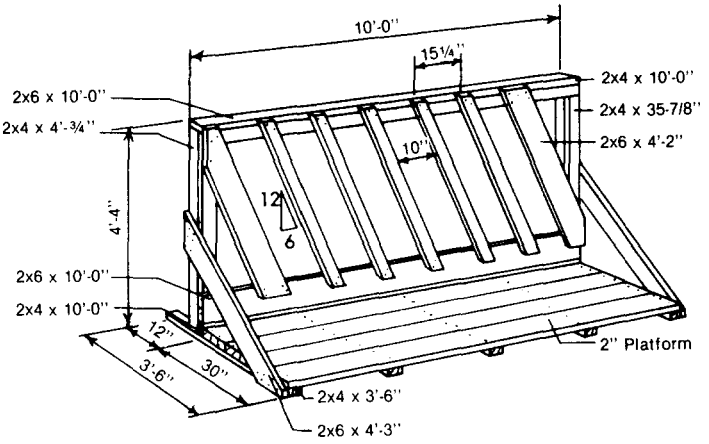


Figure 22. Portable feeding panel.

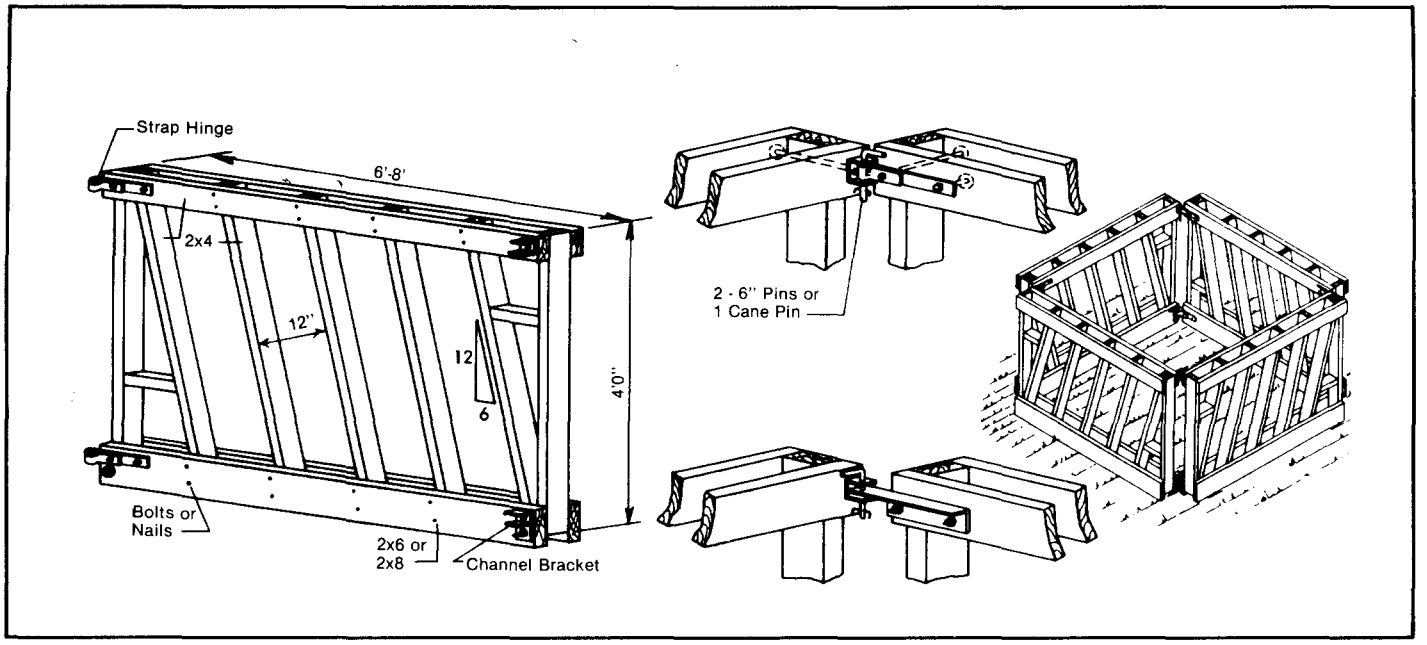


Figure 23. Portable box feeder for large round bales.

Helping You Put Knowledge To Work

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