

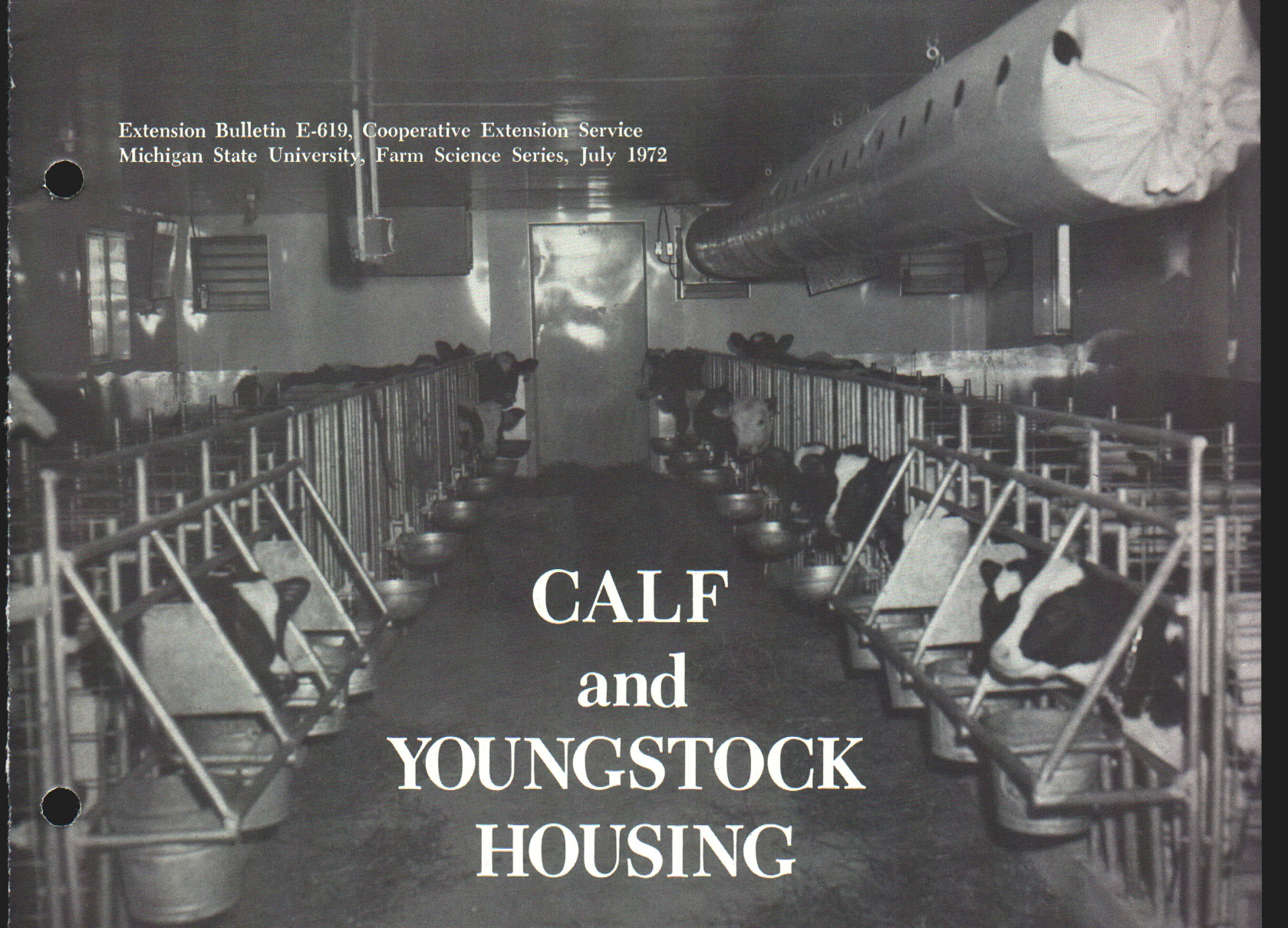
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Calf and Youngstock Housing
Michigan State University
Cooperative Extension Service
Farm Science Series
James S. Boyd, Professor Agricultural Engineering
July 1972
12 pages

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CALF and YOUNGSTOCK HOUSING

Small Calves (Birth to 8 Weeks)

Small calves are the most neglected animals on a dairy farm. In small herds, a few little calves are often tied in a manger, or in any old building. Even though caring for them is inconvenient, the animals usually survive. But, as herds increase in size, more minutes are lost caring for each calf and more calves may die of neglect.

On most dairy farms, calves are taken from the maternity area as soon as possible (12 to 24 hours) and placed in a special calf raising area.

TYPES OF HOUSING

Good calf housing should provide (1) an environment in which the calf not only survives, but grows, (2) facilities to reduce the labor required for raising calves, including feeding and cleaning. With proper facilities, wives, children or the retired can do a good job of raising calves. And, when calf raising is one

By JAMES S. BOYD, Agr. Engineering

person's major responsibility, calf mortality is usually very low. Two methods are used to house calves:

1. A cold, dry, draft-free cubicle.
2. An artificially heated calf barn.

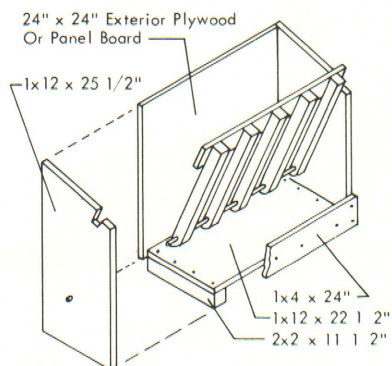
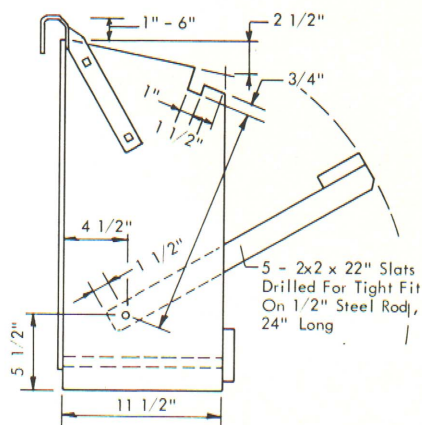
COLD CALF HOUSING

With good planning, cold calf housing can be very satisfactory. This system is usually used in smaller herds where not more than six or eight calves are handled at one time.

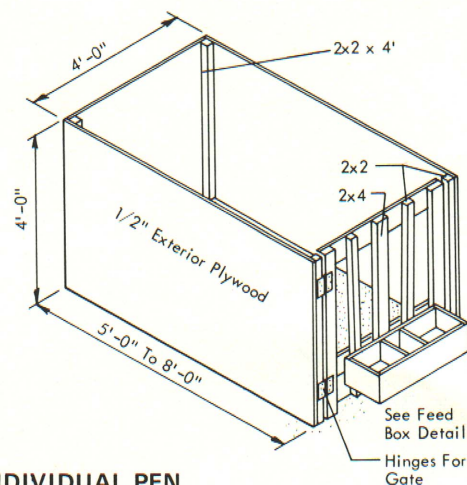
A cold calf cubicle should have at least three solid sides, Figure 1. This prevents drafts and isolates the calf from all other calves. The cubicle can be made 4' x 8' so that plywood can be used economically for the partition walls, Figure 2. A slotted or wire floor with bedding allows liquids to seep through to keep the floor dry. However, cleaning under the slotted floor is difficult. Feeding and watering is done by



Figure 1—In cold calf housing, a loose pen should have at least three solid sides to prevent drafts. For newborn calves, a plywood sheet over the top forms a cubicle so heat from the calves cannot escape.

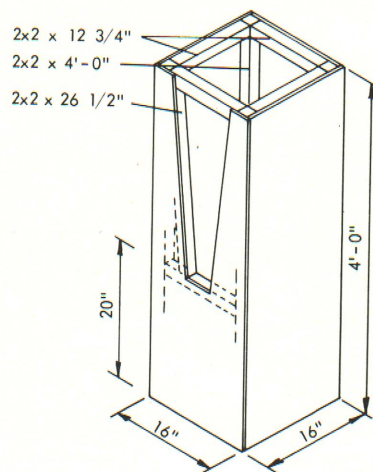


HAY FEEDER



INDIVIDUAL PEN

Figure 2—Small individual calf pens two x four feet are used in cold calf buildings.

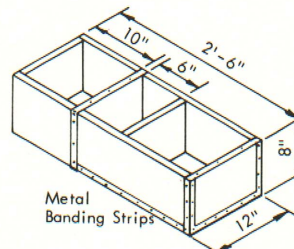


Materials:
2/3 sheet 1/4" plywood
or hardboard

2x2 Frame:
4 - 4'-0"
9 - 12 3/4"
2 - 26 1/2"

Glue and nail panels over
2x2 frame. No bottom re-
quired. Fasten feeder in
corner of pen. Fill to bot-
tom of opening.

HAY FEEDER



FEED BOX

Figure 3—Some type of hay and grain feeder is desirable for calf stalls or pens.

hand since cold temperatures would freeze water piped into the pens. Feeders for grain and hay are shown in Figure 3.

During extremely cold weather, a sheet of plywood placed over the pen will conserve heat from the small calf (See Figure 1.)

WARM CALF HOUSING

As calf numbers increase, so do problems in raising calves. Careless methods used for a small number of calves multiply until calf losses are unreasonably high. These losses may be reduced in a warm calf barn by:

1. Reducing the labor required to care for small calves.
2. Providing a relatively uniform environment conducive to good health.
3. Making equipment and supplies used in good calf management easily available.

An environment of 50° F. offers a good chance for calf survival. With this temperature, water under pressure can be provided to each pen. Calves can be tied in a 2' x 4' stall, one half the space required in cold housing. Manure drops in a small area behind the calf and can be easily removed, Figure 4.

Feeding is usually done from pails set in holders in the front of the stall. Each calf is fed from a separate pail which can be removed to a service room to be washed and sanitized between each feeding, Figure 5. A plastic nipple bottle and a metal rack on the pen wall can be used. A dozen bottles can be picked up and distributed about as fast as one can walk down the alley.

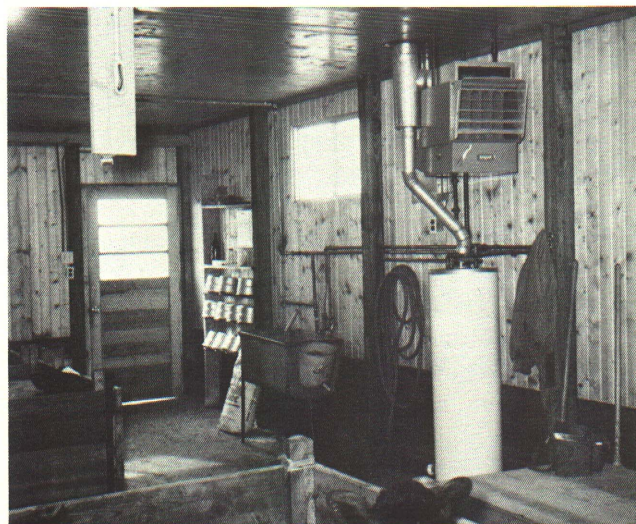
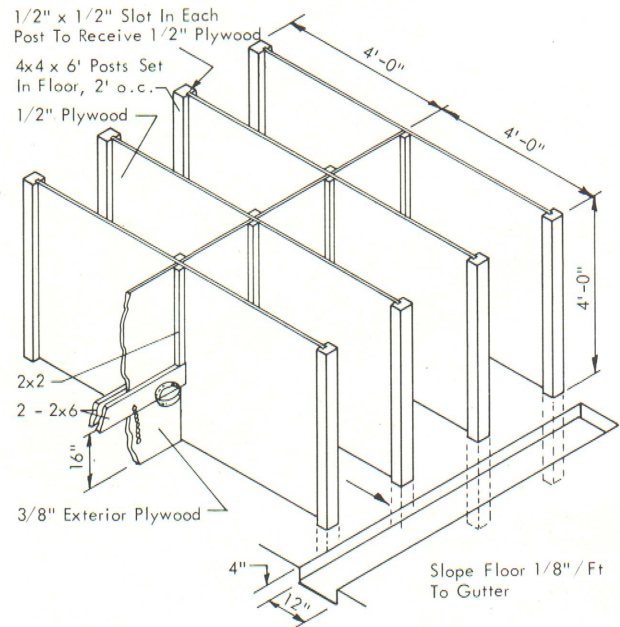


Figure 5 — A utility area is a labor saver for a calf facility.



INDIVIDUAL PENS



Figure 4 — A shallow gutter behind the stalls collects manure and prevents liquids from running into the alley.

Usually, these small stalls have a flat concrete floor sloped three or four inches from front to a shallow gutter in the back of the stall. The partitions are solid so each calf is isolated from the others. Manure accumulates in the gutter where it is cleaned-out periodically by hand or scraped into a gutter cleaner to be moved outside, Figure 6.

In warm barns, calf stalls can be elevated and have a steel-mesh or slotted floor, Figure 7. This requires a liquid manure system so water can be used to clean under the slotted floor, Figure 8. If the farm does not have a liquid manure system for older cows, slotted floors should not be used.



Figure 6 — A gutter cleaner running through pens is a convenient system for moving manure.

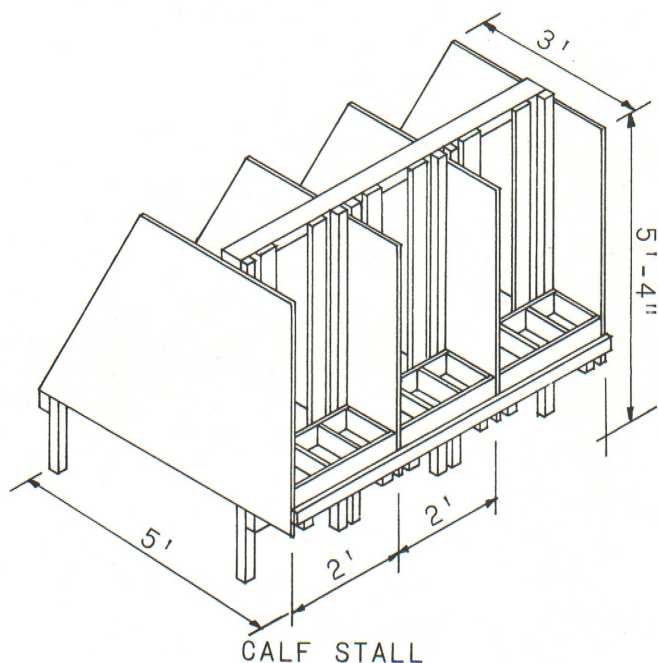


Figure 7 — Where a small number of calves are raised, a slotted floor pen can be used, but cleaning under the slats is a problem.

Some farmers prefer to have calves loose in a pen. Figure 9 is a pen where animals are not tied. This pen requires more bedding and is harder to clean. Usually, this is a manual job.

Insulation

A warm calf barn is a well insulated building or room. There should be a minimum of $3\frac{1}{2}$ inches of insulation in the walls and 6 inches of insulation in the ceiling to make the ventilating and heating system work. Condensation will form on poorly insulated walls and an excessive amount of heat will be used.



Figure 8 — In warm housing, calves can be raised on slats. Water is used to clean so facilities for handling liquid manure should be available.

Cover the inside of the insulation with a polyethylene vapor barrier before applying the inside sheathing.

Ventilation

When animals are confined, moisture accumulates, humidity rises and the room feels damp. Fans are used to remove this moisture, Figure 10. For winter operation, provide 0.1 cfm (cubic feet per minute) of air per one pound of animal when all stalls are full. Be sure to get a small enough fan or a two-speed fan with a low volume equal to the calculated rate. Air should enter the building through the attic. A slot along the wall which is opposite the fan or an inlet in the ceiling over an alley keeps cold air off the calves and provides good ventilation, Figure 11. Sometimes the slot is located in the center of the ceiling and equipped with a nylon curtain to prevent backdrafting when the fan is shut off.

In another system, a fan and plastic duct are used to circulate air within the building. This system must also have an exhaust fan to remove moisture-laden air from the building.

For summer ventilation, windows providing cross ventilation are satisfactory. When this is not possible, a fan capacity of 2 cfm per one pound of animal or an air change every two minutes is recommended.

Moisture is given off 24 hours each day so a fan should run continuously. Since the amount of ventilation for winter operation is quite low for most rooms, it is difficult to buy a fan small enough. To control the fan, use a time clock which allows the fan to run at intervals during 24 hours. The proportion of time the fan runs will depend on how many calves are in the room.

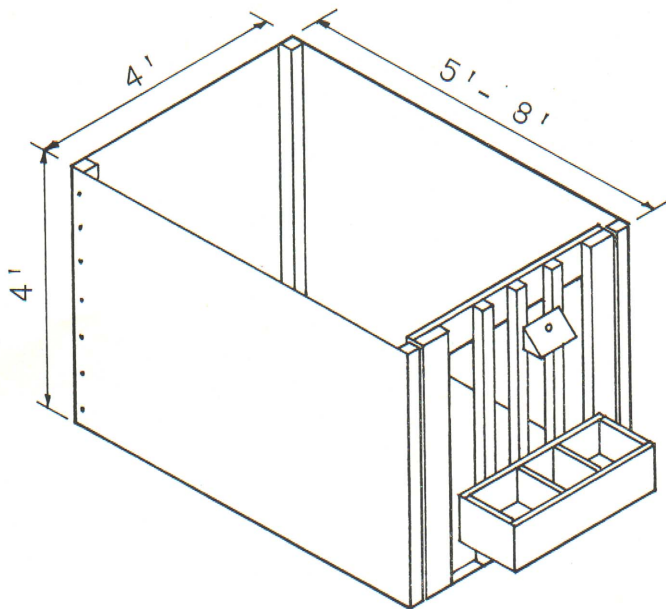


Figure 9 — When a calf is not tied in a stall, a box pen with 20 to 25 sq. feet can be used. These can be used in both warm and cold housing.

Heating

Since vented air removes heat, the small amount of heat the calves give off must be supplemented. The amount of supplemental heat depends upon the number of animals and amount of wall and window space.

Heat is usually measured in BTU's (British Thermal Units). To determine the amount of supplemental heat necessary:

Multiply —

Weight of calf (pounds) x 4 _____

Wall area (square feet) x 5 _____

Glass (square feet) x 10 _____

Total (add) _____

BTU Required

This amount of heat can be supplied by either gas, oil, or electric heaters. A non-directional heater equipped with a fan for circulation is recommended, Figure 12.

Since a radiant heater is directional, all objects or animals in its rays get very warm before animals outside the rays are warmed. If a directional heater is used, be careful not to aim it at a calf stall. When electric heaters are used, the kilowatt rating is equal to total BTU's divided by 3000.

Each heater should be controlled by a thermostat.

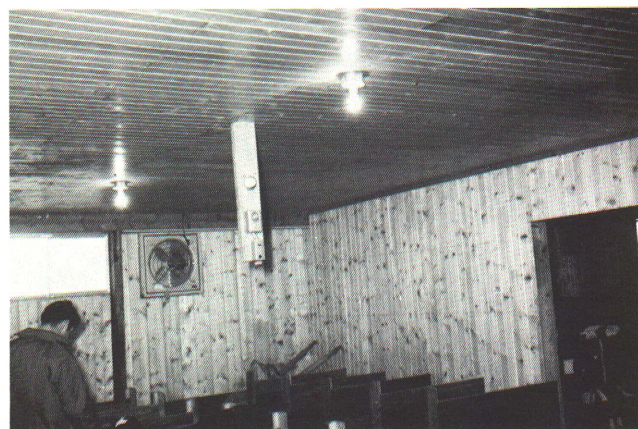


Figure 10 — A ventilation system should include a fan, a timeclock controller and fresh air inlets.



Figure 11 — A 3-inch slot along the ceiling provides space through which dry, cold, fresh air can enter the building. Hinged flaps can be used to deflect the air across the ceiling.

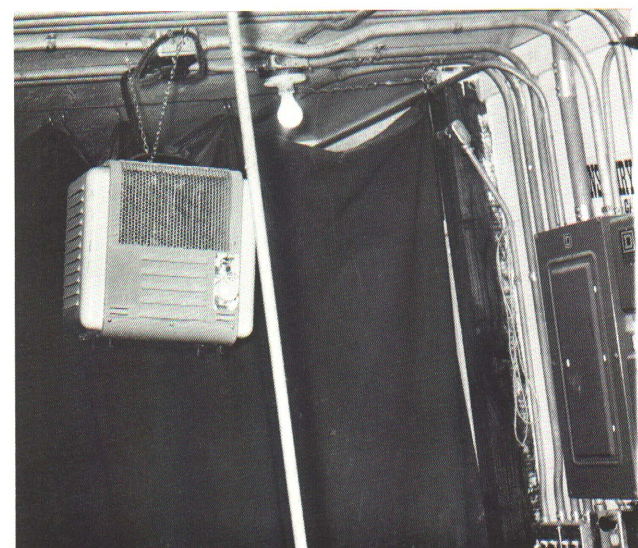


Figure 12 — A heater with built-in fan is recommended as a source of heat.

Grouping Pens

When calves are 6 to 8 weeks old, or on solid feed, they can be moved to group pens. Now each animal must compete for its share of feed so this grouping pen is usually protected from very cold weather but does not need to be heated. It serves as a conditioning period before moving to a cold barn. The pens should be kept dry and protected from cold winds.

Grouping pens should be planned to minimize hand labor. Pen partitions can be hinged so that a tractor and loader can be used to remove manure. When silage is fed to these young animals, an access to the silage bunk can be provided for mechanical feeding of the young animals and dry cows. A concrete alley along at least one side of the pen permits the use of a cart for baled hay, grain, and bedding.

Many farms have stanchion barns that can be remodeled into very adequate calf raising facilities. The feed alleys can be used for feeding with carts. The

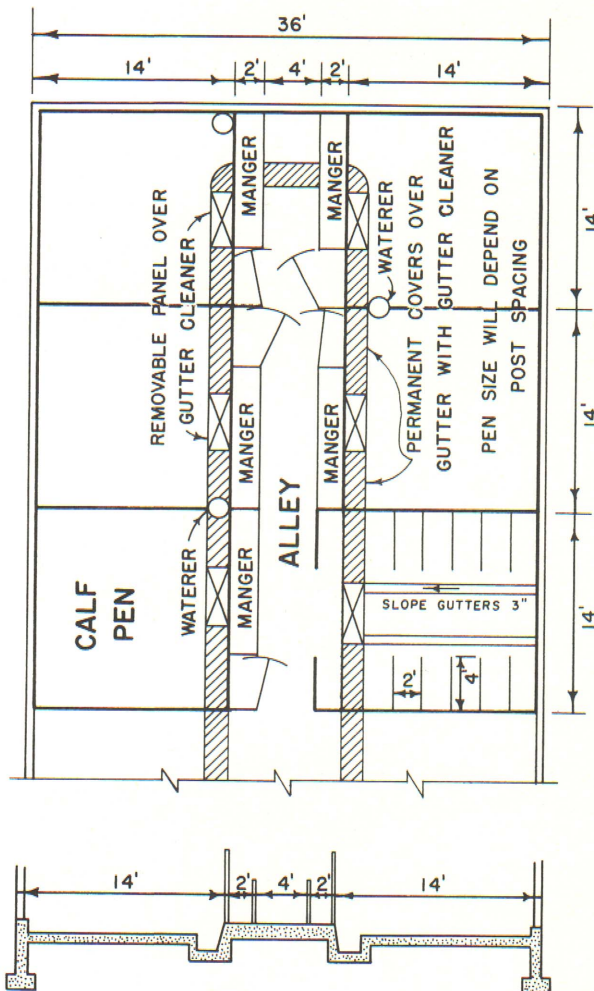
gutter cleaner can be used to remove manure without having to make large doors in the walls, Figure 13.

Service Area

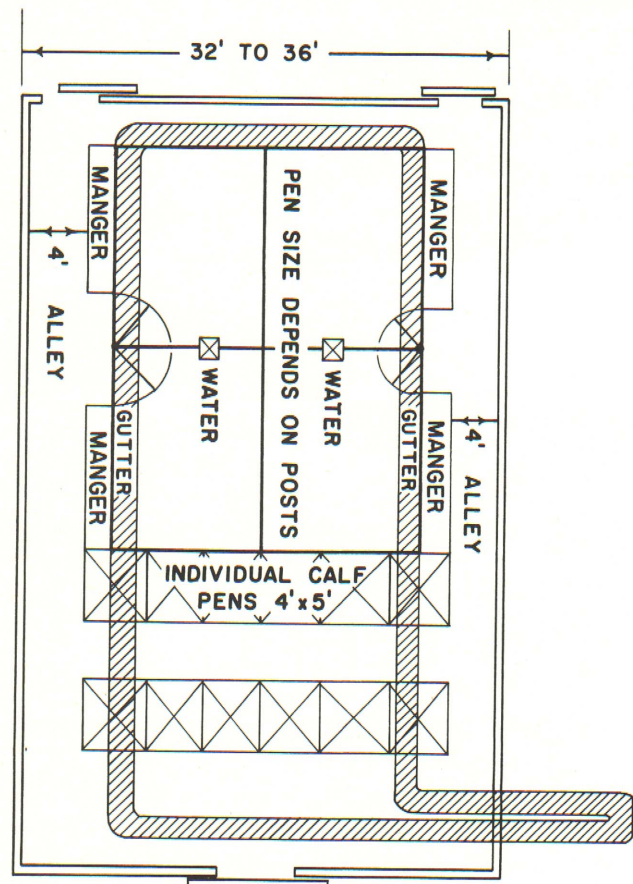
A utility area (Figure 5) is one of the important features of a good calf barn. It should provide:

1. Hot and cold water under pressure.
2. Good drain facilities for urine and washing wastes.
3. Wash vats for washing and sterilizing calf pails.
4. Storage racks for clean utensils.
5. Cabinets for storing veterinary and other supplies.

A completely equipped service area will also provide refrigerated storage for pharmaceutical and veterinarian supplies. Freezer storage is often provided to store surplus colostrum milk when it is fed to small calves.



"FACE-OUT" BARN



"FACE-IN" BARN

Figure 13 — Old stanchion barns can be converted to excellent youngstock facilities when gutter is available for removing manure.

Youngstock Area (6 to 8 Weeks and Older)

Animals 6 to 8 weeks old and older can best be handled in groups. They can withstand very cold conditions and do not require individual attention. The emphasis should be on reducing the hours of labor and manual energy required to take care of them.

Systems for feeding and handling manure should be the same for the older cows. This reduces the amount of equipment and storage for feeding and hauling manure.

If a bedded area system is to be used, the pen partitions should be gates that can be swung against the wall. This allows a tractor and loader to come in to remove manure. Because bedding is often so scarce, free stalls are used for all animals over 6 to 8 weeks old. Animals must be grouped according to size so they will fit the free stalls, Figure 14. From two to four different sizes of free stalls should be used, depending on the size of herd. The following sizes are suggested:

Age	
2-4 months	2'-4'
4-8 months	2'6" x 5'
8-14 months	3' x 5'6"
14-20 months	3'6" x 6'6"

The partitions between animals must be high enough or the animals will turn around and lay down backward in the stalls. For smaller animals, the height could be three feet but for the older animals it should be four feet high.

Figure 15 shows a plan for a small cold calf barn with an outside lot and fenceline feeding. Figure 16 illustrates an open lot system using a mechanical feeder. Calves are grouped according to size. Figure 17 shows a small warm barn with individual stalls and grouping pens. An insulated partition between the two areas permits heating only the small calf area. The ventilation systems in the two areas are independent of each other.

Plan No. 723-C1-95 is a large heifer barn for a herd of 100 milking cows. Free stalls are used and fenceline feeding. When some hay is to be fed, the bales can be stored in the alley, convenient to the feed manger. To reduce initial cost, the feed alley sometimes is not covered as shown in Figure 18.

Plan No. 723-C1-96 is the same general type of plan but the alleys run across the building rather than lengthwise. This plan includes a heated room for the small calves. Fenceline feeding is used.

Plan No. 723-C1-97 is a free stall heifer barn for a 100 milking cow herd using a mechanical feed bunk. This arrangement would be preferred by farmers who use tower silos and mechanical bunk for the milking cows also.



Figure 14 — Different sizes of free stalls should be provided so animals can be moved to larger stalls as they grow.

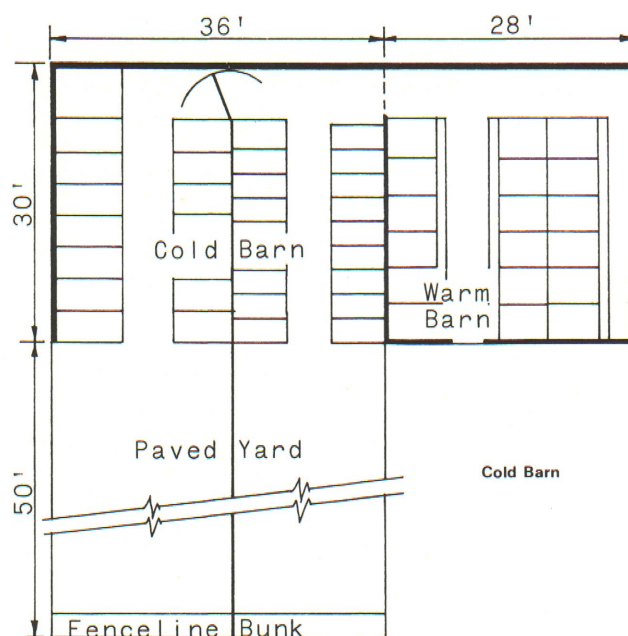


Figure 15 — A warm area for small calves 0-8 weeks with cold housing in free stalls 8 weeks and older.

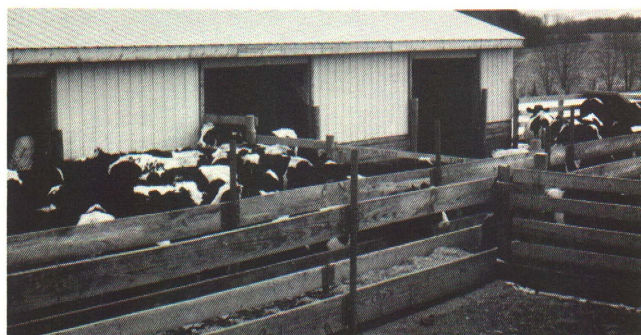
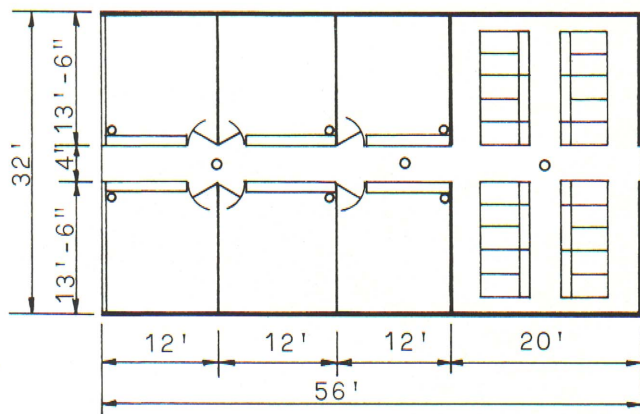


Figure 16 — Youngstock grouped according to size with access to a feeder on outside lots.

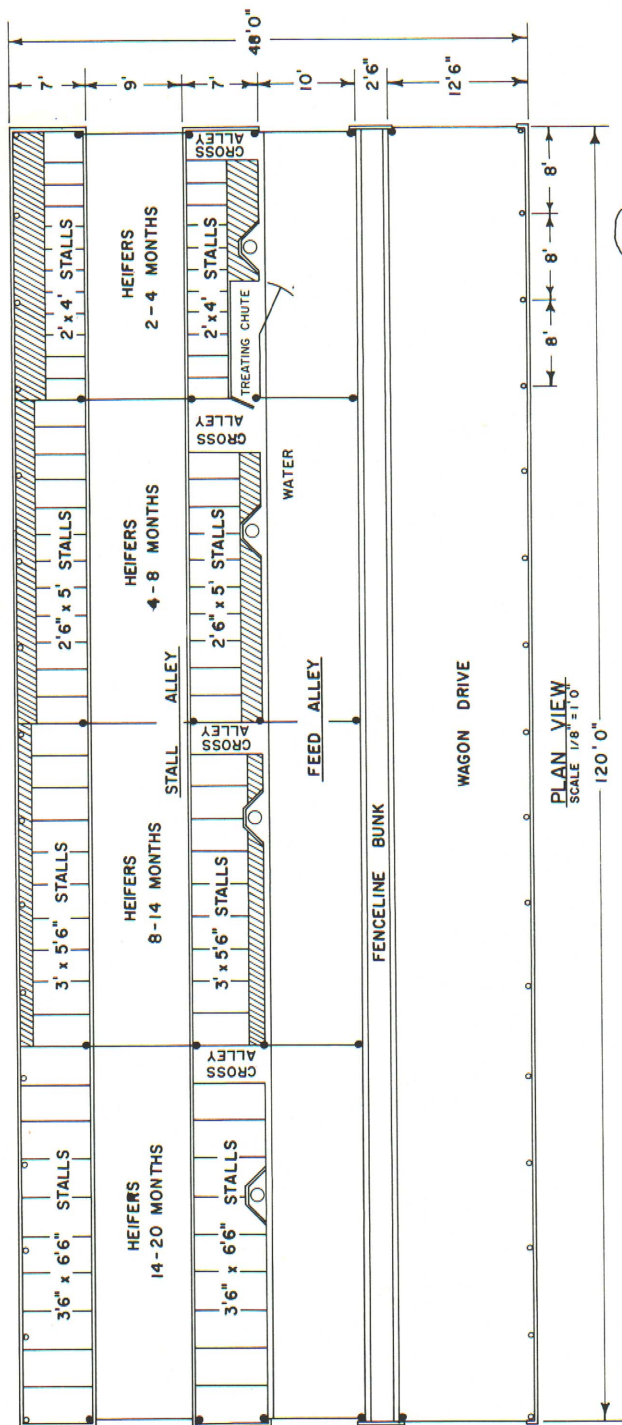


WARM CALF BARN

Figure 17 — A warm calf barn. Area for calves 0-6 weeks is heated. Grouping pens for older animals should be well ventilated but need not be heated.



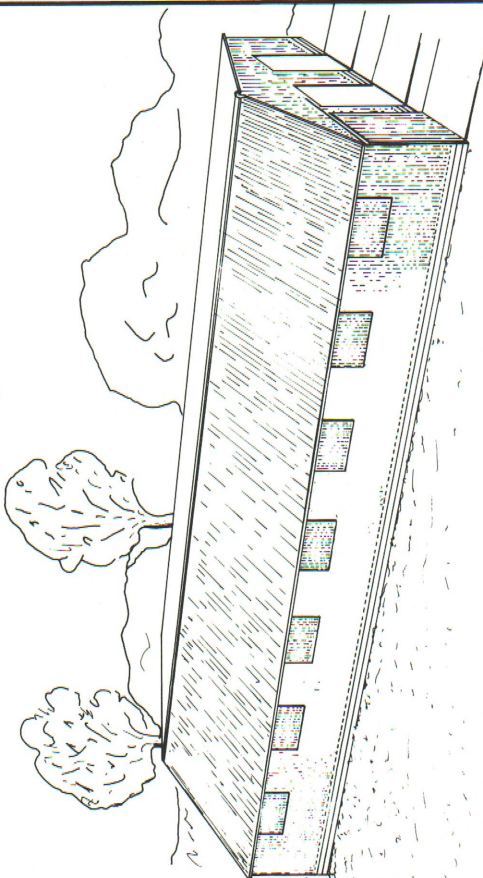
Figure 18 — Fenceline feeding bunk on the open side of a free stall youngstock building.



PLAN VIEW
SCALE 1/8" = 1'0"

NOTES:

1. PLAN IS FOR YOUNG STOCK FOR HERD OF 100 COWS. FOR 50 COWS USE HALF OF EACH SIZE STALLS.
2. TO CLEAN FEED ALLEY DRIVE ANIMALS TO FREE STALL ALLEYS
3. FEED IS DELIVERED BY SIDE UNLOADING WAGON TO BUNK. FEED CAN COME EITHER FROM HORIZONTAL OR TOWER SILO.
4. WHEN SMALL ANIMALS MOVE FROM AREA 1 TO AREA 2, THEY SHOULD PASS THROUGH THE TREATING CHUTE TO BE VACCINATED, DEHORNE, EXTRA TEATS CUT OFF, ETC.
5. 2' x 4' FREE STALLS TO 450 lb. ANIMAL
 2'6" x 5' " " TO 650 " "
 3' x 5'6" " " TO 875 " "
 3'6" x 6'6" " " TO 1150 " "



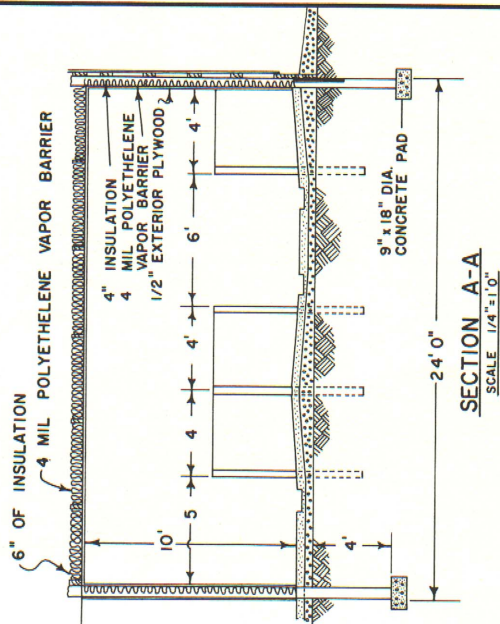
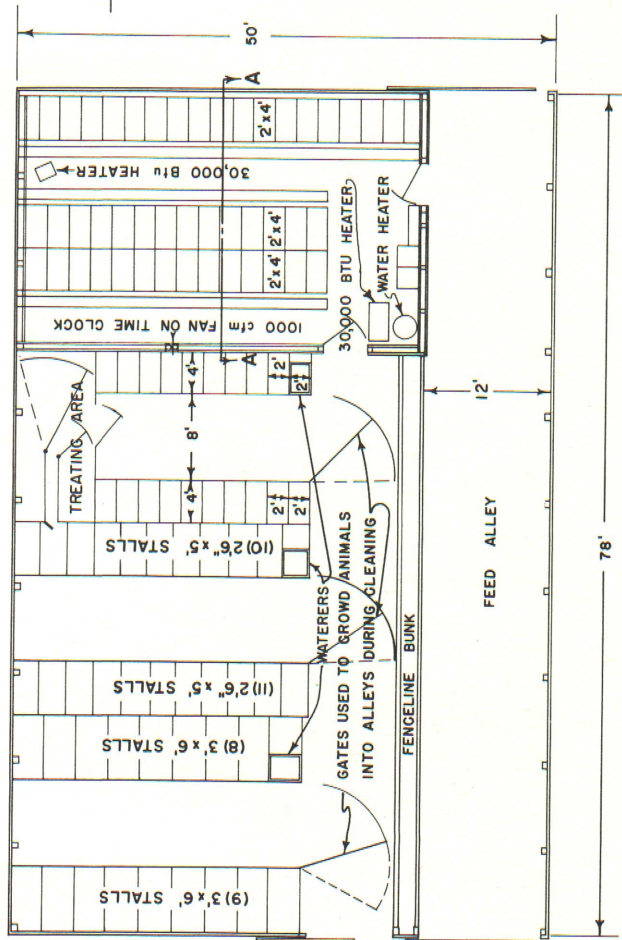
MICHIGAN STATE UNIVERSITY
COOPERATIVE EXTENSION SERVICE
AGRICULTURAL ENGINEERING DEPT. - EAST LANSING

HEIFER BARN-WAGON
FEEDING

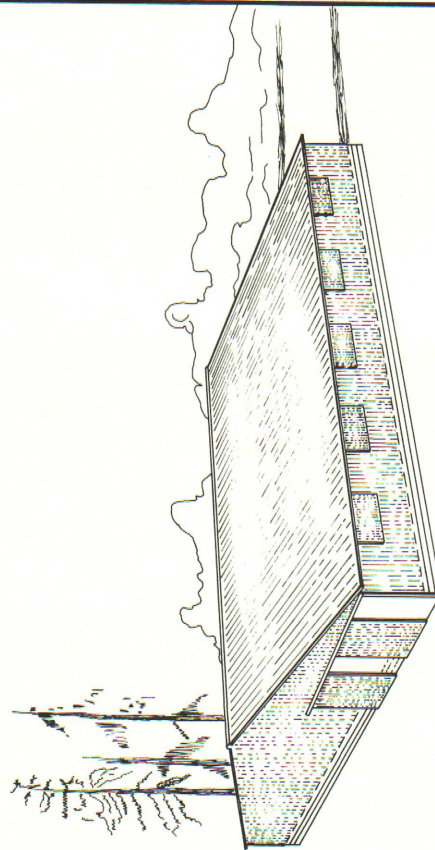
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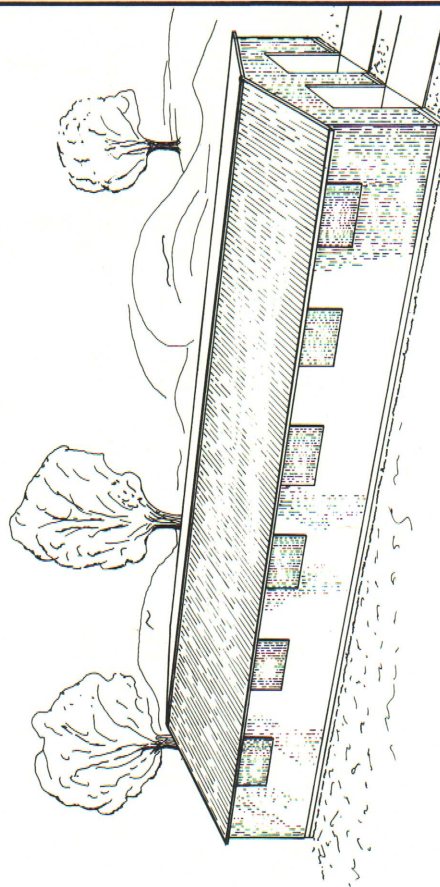
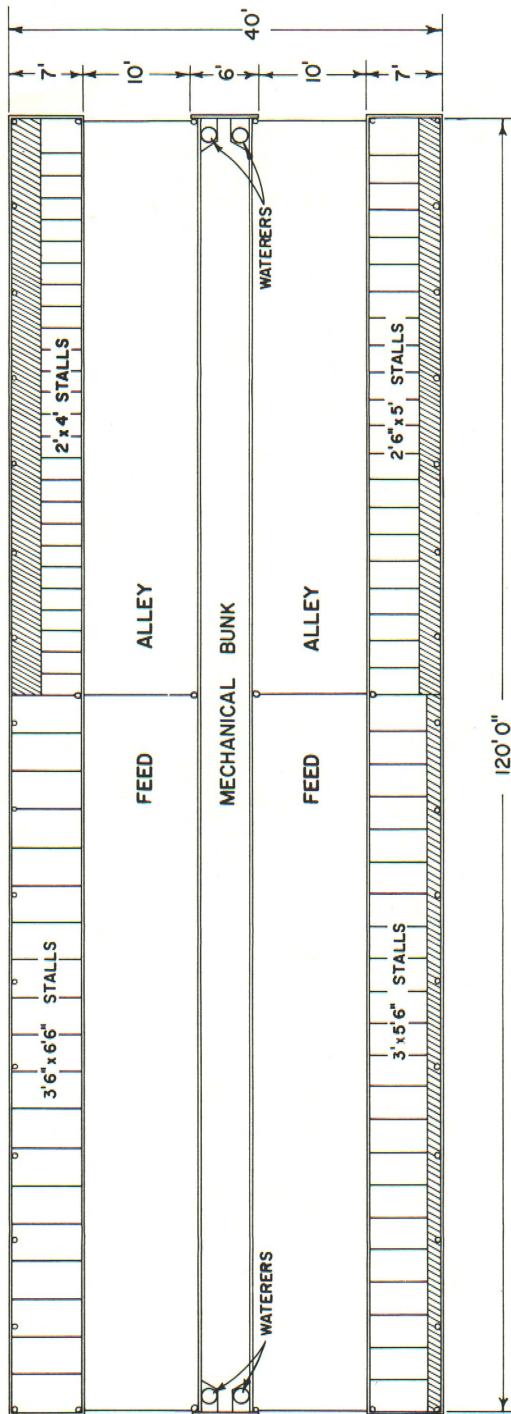
SECTION A-A
SCALE 1/4" = 1' 0"



OPERATION NOTES

1. SMALL CALF AREA FOR CALVES 6 TO 8 WEEKS IS HEATED & WALLS ARE INSULATED.
2. WHEN CALVES LEAVE THE SMALLEST FREE STALL AREA THEY PASS THROUGH THE WORKING CHUTE TO BE DEHORNED, VACCINATED, ETC.
3. A 6" OR 8" OPENING AT BOTH EAVES AND A 6" SLOT AT THE RIDGE ALLOWS FOR VENTILATION.
4. THE FENCELINE BUNKS ARE USED WITH SILAGE STORED IN HORIZONTAL SILOS. WAGONS CAN ALSO COLLECT FEED FROM TOWER SILOS.
5. WHEN CLEANING ALL ANIMALS CAN BE CONFINED TO THE ALLEY BEHIND FREE STALLS BY SWING GATE FROM THE FEED BUNK TO THE FREE STALL.

MICHIGAN STATE UNIVERSITY COOPERATIVE EXTENSION SERVICE AGRICULTURAL ENGINEERING DEPT. - EAST LANSING	
HEIFER & DRY COW BARN - WAGON FEEDING & CROSS ALLEY	
PLANNED J.S.B.	APPR. SCALE 1/8" = 1' 0"
DRAWN W.O.C.	DATE 2- -71 SHEET 1 OF 4
TRACED	CHECKED
NO. 723-CI-96	



NOTE:

1. A BARN THIS SIZE WILL HOLD ANIMALS FOR A 100 COW HERD. IT CAN BE MADE SHORTER FOR SMALLER HERDS.
2. MECHANICAL FEEDER WILL BE USED WITH SILAGE FROM A TOWER SILO CONVEYED ON TO BUNK FEEDER.
3. VENTILATION IS PROVIDED BY CONTINUOUS OPENINGS AT THE EAVES AND AT THE RIDGE. LARGE DOORS ON EACH SIDE ALLOW FOR SUMMER CROSS VENTILATION.
4. CALVES 6 OR 8 WEEKS OLD CAN BE PUT IN SMALL FREE STALLS AND PROGRESS TO LARGER STALLS AS THEY GROW OR SPACE BECOMES AVAILABLE.
5.

STALL SIZE	450 lb. ANIMAL MAXIMUM
2'x4' FREE STALLS	650 "
2'6"x5' "	875 "
3'x5'6' "	1150 "
3'6"x6'6' "	" "

MICHIGAN STATE UNIVERSITY COOPERATIVE EXTENSION SERVICE AGRICULTURAL ENGINEERING DEPT. - EAST LANSING			
FREE STALL HEIFER BARN WITH MECHANICAL FEEDER		PLANNED J.S.B.	SCALE 1/8" = 1'-0"
DRAWN W.O.C.	DATE 5-3-71	APPR.	SHEET 1 OF 4
TRACED	CHECKED	NO. 723-CI-97	

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