

LOOSE HOUSING

for the FARM DAIRY

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By THAYER CLEAVER and DEANE G. CARTER



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LOOSE HOUSING FOR THE FARM DAIRY

By THAYER CLEAVER and DEANE G. CARTER¹

IN THE LOOSE HOUSING ARRANGEMENT for farm dairying, the cows are sheltered, bedded down, and sometimes fed roughage in an open barn or shed. They are brought into a milking room or "milking parlor" to be milked and fed grain and supplement. Loose housing is usually planned to include six parts or elements of structure: milking room, milkroom (which should be next to the milking room to save time and travel), bedded area, feeding area, storage space, and exercise yard.

Greater use is being made of loose housing because it can be fitted to the needs of most farms. It has several advantages over the well-known stall barn, or stanchion barn. This circular discusses these advantages and describes a number of practical plans and arrangements. The recommendations apply especially to Illinois conditions and to the production of Grade A milk. They are based on research and on work with practical dairymen.

Whatever system is chosen, there are four primary considerations in planning dairy structures. They are:

Save labor. Time, travel, and heavy labor in doing daily chores can be cut down by using rec-

ommended plans and methods. Some hard jobs can be done away with; many others can be made easier.

Produce high-quality milk. In most respects the regulations for Grade A milk are an excellent guide to follow. The market demand is for clean milk, and the premium prices that are paid for Grade A milk will generally make it profitable to meet the requirements.

Plan for the future. In considering what is best for the present herd, the buildings can be so planned as to take care of a larger herd later without much extra cost, or so they can be used profitably in some other way if the dairy enterprise is cut down.

Count the cost carefully. Save costs, wherever possible, by choosing among different materials, using prepared plans, and doing some of the construction work yourself. Spend for things that will save labor or get a better price for milk. As a general guide, the cost of buildings and equipment used only for dairying should be about equal to the gross income from dairying for a year. You can afford to spend \$100 for an improvement if it will return \$8 a year in added value or savings.

Values of the Loose Housing System

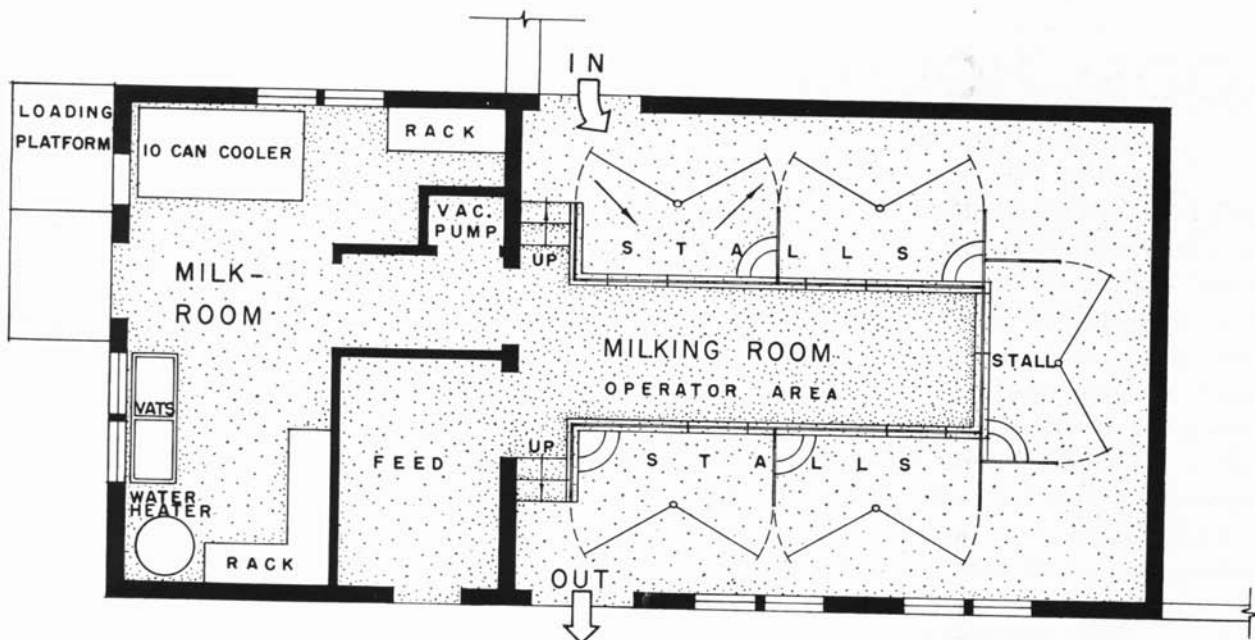
The advantages of this system over the stall barn are:

Less investment may be required. Old barns or other farm buildings can often be remodeled or rearranged to provide shelter and feeding and bedding space. Loose housing requires less expense than the stall barn for doors, windows, ceiling, insulation, and equipment. The milking room, ground-feed storage, and milkroom, which are the most expensive features of the loose housing system, can be put in a comparatively small building or in an addition to a suitable loose housing space.

More adaptable to changing needs. The same milking room and milk-handling facilities can be used with little or no change for herds of 8 to 20 cows. Increases in herd size can be taken care of by additional shelter and roughage-feeding space. Part of the barn or shed area may be used for calves and young stock. The open barn can be used for other livestock or for storage, if dairying is discontinued.

Better management can be practiced. A herd can usually be milked faster and easier in milking-room stalls. Cows are trained to come to the

¹ THAYER CLEAVER, Agricultural Engineer, Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture; DEANE G. CARTER, Professor of Farm Structures, University of Illinois College of Agriculture. Contributions to this report have been made by KEITH H. HINGCHLIFF, Professor of Farm Structures of the Illinois Station.



Typical of the designs used in connection with loose housing is this U-type elevated milking-stall arrangement, with milkroom and feed storage adjacent. (Fig. 1)

operator. Less work is necessary to keep the milking area sanitary. Walking, stooping, and bending are cut to the minimum.

Manure can be handled better. The manure pack is allowed to build up in the bedded area and most of the fertility value is saved. It is removed and spread on the fields a few times a year when field and weather conditions are right. A tractor-mounted power lift can be used to remove manure.

Loose housing is better for the herd. Those who use the system can expect to benefit by: (1) better herd health, (2) fewer injuries to animals, (3) possibly longer productive life for cows, (4) less danger of loss of animals in case of fire, and (5) early detection of cows in heat.

Loose housing does not meet all needs. If there is a stall barn already on the farm, it may be best to continue with it. Some farmers prefer the stall barn because the cows are retained in stanchions and are fed, bedded, and milked all within one area.

A well-arranged loose housing system may need no more bedding than a stall barn requires, but with a poor arrangement it may take up to two or three times as much. Loose housing requires more total space under roof to provide for a bedded area. Cows cannot be shown to prospective buyers as well as they can in stalls. Also they should be dehorned, and purebred breeders may not want to do this.

Locating and Arranging Loose Housing Structures

Effective planning starts with location of the building and arrangement of the different parts or areas in relation to one another. These are the principal things to watch for:

- Surface drainage away from the building.
- Protection from cold winter winds, which usually come from the north and west in Illinois.

- Barns or sheds opening onto yards to the south and east to take advantage of cooling breeze in summer and sunlight in winter.
- Enough ground space to allow for future expansion.
- Located so as to be readily accessible from the farm service court, especially for milk trucks and equipment used in and around the dairy.

Planning

Several examples of good arrangements are shown in this circular. Because the loose housing system is flexible, the work areas and structures can be changed around in many ways to meet the needs of an individual farm. But the basic recommendations listed here apply to most farms.

Separate bedded area and feeding space, but keep them close together. Separation can be obtained by using movable fence panels, swinging gates, or an electric fence wire. However, keep a gate or a wide doorway open all the time so the cows can move from one area to the other at will.

Locate paved area of outside yard next to both feeding and bedded areas. Then either leave the entire side of the building open, or have a wide doorway open to each area.

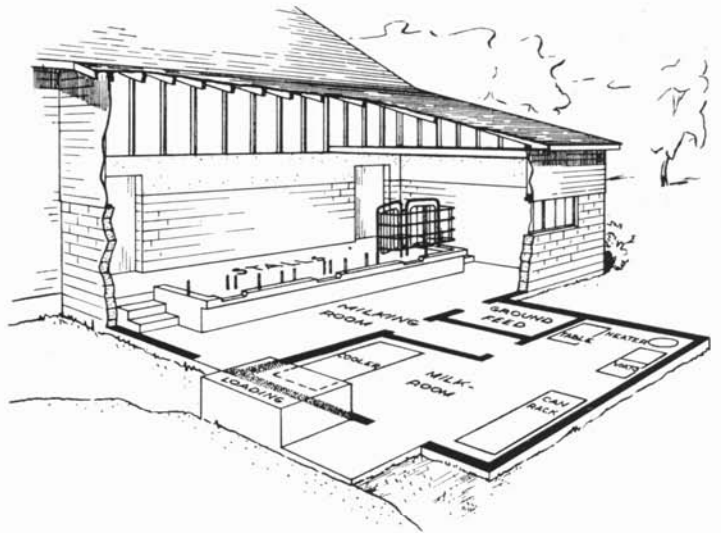
Locate water supply near the feeding area, but never in the bedded area. Usually the tank or an electrically heated watering cup can be outside the building. Protect tanks from freezing by insulating them in winter and using a water heater if necessary. Pave an area of at least 10 to 12 feet around the tank.

Store feed and bedding next to where they are to be used. Examples of good locations are: bedding stored on the ground next to the bedded areas; hay in a covered shed or in a portion of the barn nearest to the feeding space; silo at one end of the feed manger or placed in the lot so that silage can be fed in adjoining bunks outside; grain in an overhead bin above the milking room with a chute and measuring device either to each stall or to one convenient place, or if the feed room is elsewhere put one feeding in a feed cart in the operator's area.

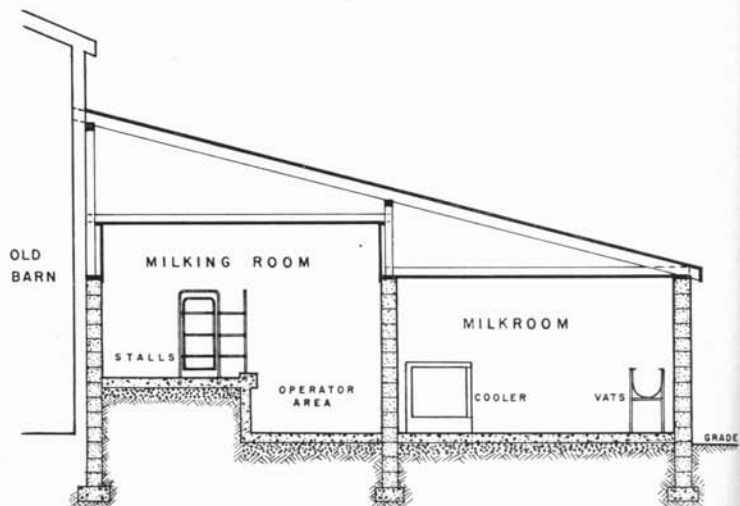
Plan the milking room, milkroom, and usually the ground-feed storage space as a single compact unit. Part of this unit may be within the larger shelter barn or shed or attached to it (Fig. 2). Locate it on any side adjacent to the feeding area;

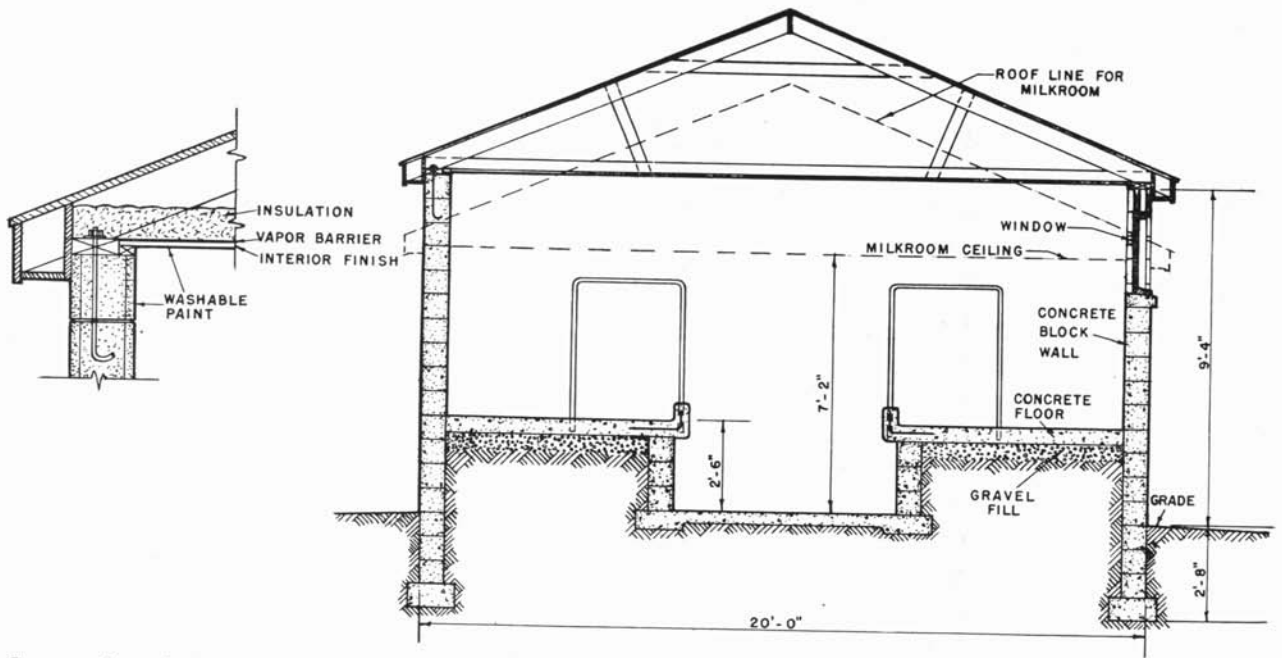
usually the north side is the least satisfactory because of its exposure to winter weather.

Arrange buildings so men, animals, and vehicles can move around easily. The plan should make it possible for: the operator to move directly from the milking room to the milkroom; cows to be admitted to and released from the milking stall in the most direct way; entrance and exit doors of the milking room to be controlled from the operator's area; manure to be handled with power equipment; and trucks for milk pickup and feed-handling to get around easily.

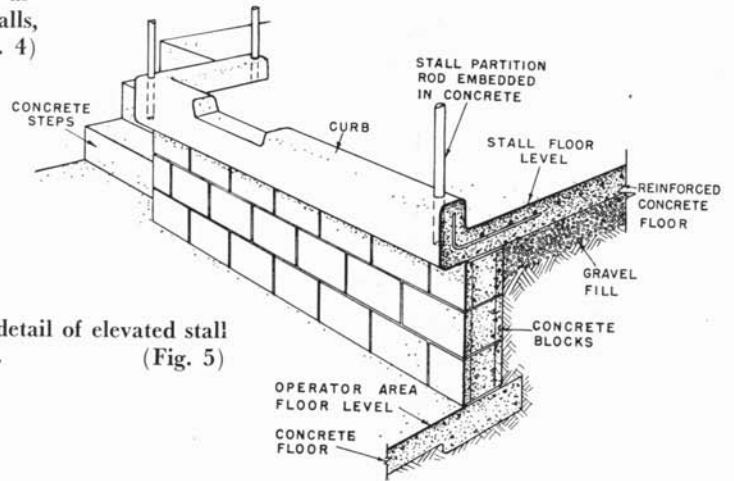


Milking room and milk-handling facilities may be attached to a loose housing barn as shown in Fig. 2, above. A construction view of an addition of this general type is shown in Fig. 3, below.

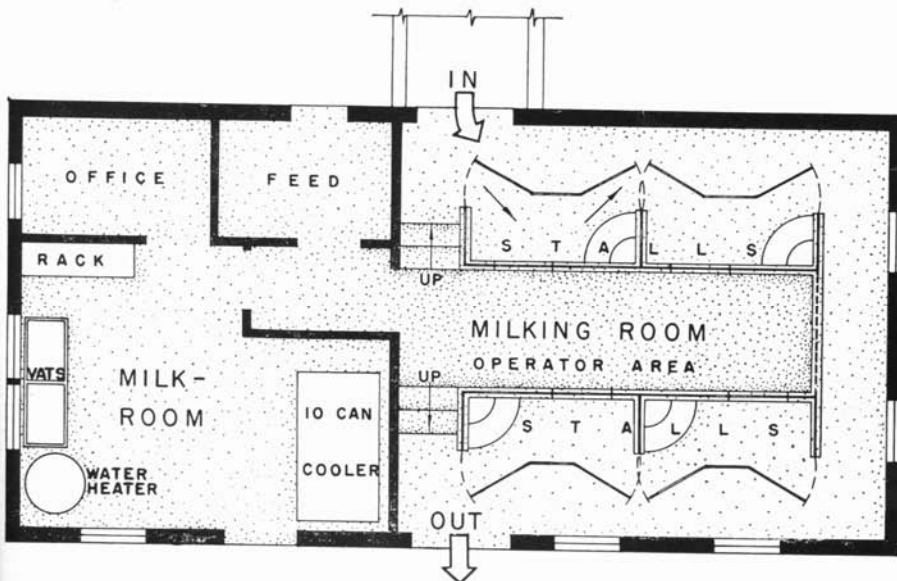




Construction of the milking room with a U-type arrangement, showing operator's area, elevated stalls, and headroom required. (Fig. 4)



Typical detail of elevated stall platform. (Fig. 5)



Four U-type elevated milking stalls. This is a good arrangement when milk is piped to the cooler. (Fig. 6)

Milking Room

The milking room may be arranged in any one of several ways. The U-type and "in-line" tandem stalls are emphasized in this circular as good typical designs. Several stalls abreast give an arrangement similar to a row of stalls in a stall barn. In fact, sometimes in remodeling several of the original stalls are kept as milking stalls. Two or more stalls of the "walk-through" type may also be arranged side by side. In such an arrangement, the stall front with attached feedbox is hinged to form the exit gate. You can get detailed plans for the various types from your state agricultural college.

All plans shown here for the U-type and "in-line" arrangements provide for an operator's area which is 30 inches below the stall platform. One way to get this difference in level is to elevate the milking stalls and build steps or a ramp leading to the milking stalls. Another method is to put

the stalls at, or slightly above, ground level and make a pit for the operator.

The milking rooms shown in Figs. 7 and 8 illustrate elevated stalls in both tandem and U-types arrangements. The number of stalls can be varied—2, 3, 4, or 5 can be planned for by extending or reducing the length of the room. The number needed will depend on whether milking is done by one or two operators and whether 2, 3, or 4 milker units are used. Time studies indicate that 2 stalls are suitable for 8 to 15 cows; 3 stalls are preferable for 12 to 25 cows. Up to 45 cows can be handled in 3 stalls, but some operators like to have an extra stall to allow some leeway for feeding time and for handling the cows.

A small feed cart to hold grain for one feeding is recommended to save time in moving feed from storage to the operator's area. A cart about 16 inches wide, 30 inches long, and 24 inches deep holds enough feed for about 25 cows.

Milkroom

The milkrooms in Figs. 7 and 8 are planned for a production range of 50 to 100 gallons of milk a day. For less than 50 gallons a day, the length of the milkrooms can be reduced by 16 inches, and a similar reduction made in the feed room.

These milkrooms for handling whole milk must meet the exacting requirements of state and local regulations for high-quality production. Make sure that your milkroom and milking room are acceptable to the inspection authorities in the community if you are going to sell Grade A milk. Inspectors and fieldmen in each milkshed know the requirements that must be met. The University of Illinois College of Agriculture has planning helps for meeting the requirements. The exact specifications of the Illinois law are given in Circular 135 of the Illinois State Department of Public Health. In brief, however, the main requirements are:

1. Milkroom 10 by 14 feet or a minimum of 140 square feet of area; 160 square feet for 20 to 50 gallons per day; 216 square feet for 50 to 100

gallons; and 240 square feet for larger amounts.

2. Smooth, durable, impervious floors; provisions for waste disposal; and drainage of nearby ground.

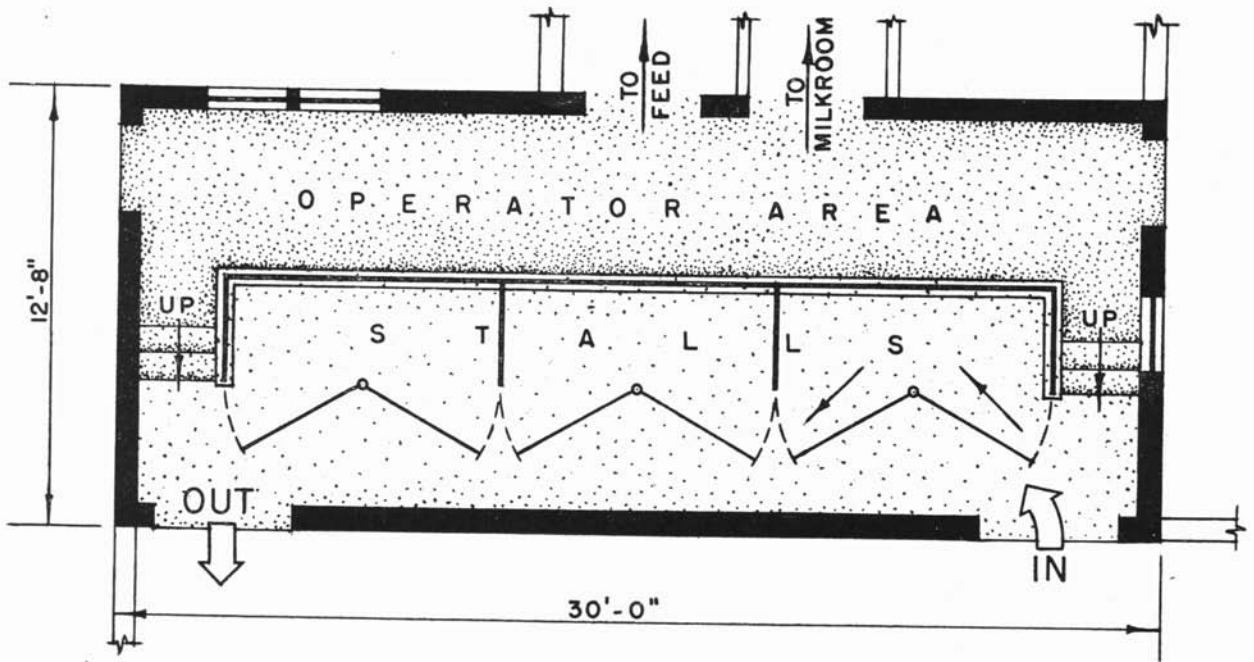
3. Walls of impervious material to height of 12 to 18 inches above floor; interior surfaces and finish smooth and in good repair; painted washable surface where necessary to preserve materials.

4. Natural light openings equal to 10 percent of the floor area; equivalent of one 100-watt electric light for each 100 square feet of floor space, with special attention to lighting for cleaning milking equipment.

5. Ventilation provided by ceiling ventilators or louvers together with inlet ducts near floor; each at least 100 square inches in area.

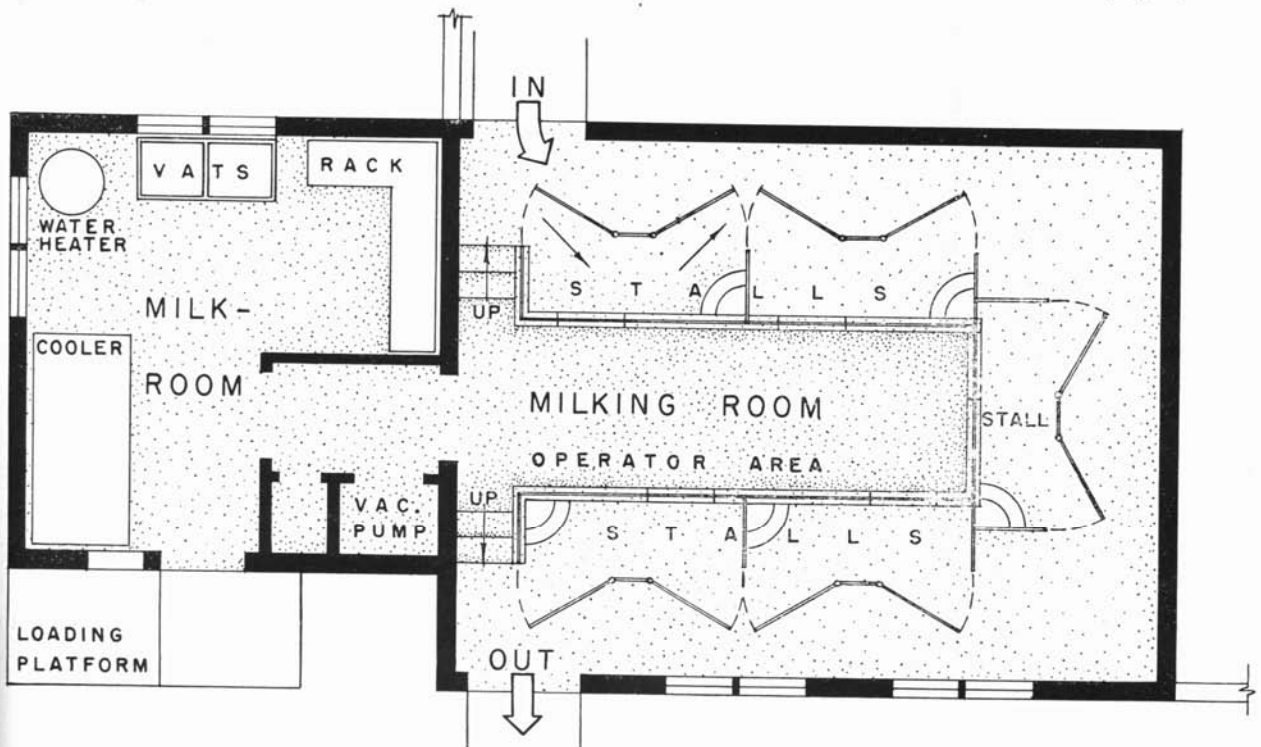
6. An outside entrance or a vestibule entrance; direct connection to the milking area is prohibited except in places where milk is piped directly to the coolers.

7. Water heater, washing and rinsing vat, effective screening, and storage cabinet.



Three-stall in-line tandem arrangement. Stalls are elevated for the convenience of the operator. Room should be located so that cows come directly in from the loose housing area and the operator has ready access to the milkroom. (Fig. 7)

A variation of the U-type milking room, designed especially for feeding from overhead feed bins. The bins may be installed with downspouts, preferably one to each feedbox. (Fig. 8)



Loose Housing Barns and Sheds

Open or semi-open barns and sheds can be used throughout Illinois. Warm temperatures are not necessary within the building — just shelter from wind and snow, a clean dry bed for the animals, and hay feeding space under shelter. In general, loose housing barns and sheds can be the same kind of buildings as used for beef cattle. These are discussed in Regional Publication No. 6, "Beef Cattle Housing" and Regional Bulletin No. 7, "Dairy Cattle Housing." You can get these on request from the College of Agriculture at Urbana.

Barns and sheds should be 20 or more feet deep, front to back, both for shelter and economy. Headroom of at least 9 feet is needed to allow for the accumulation of manure and bedding and so a power loader can get in. The fact that the buildings are open reduces the need for windows and does away with the need for a ventilating system.

Divide barn space into at least two sections:

1. Feeding area. Locate so hay can be moved readily into the racks. Pave but do not keep bedded. Allow 25 square feet for each cow. Provide about 30 inches of rack and feed bunk space per cow for hay and silage. If hay is kept before cows at all times, 18 to 20 inches is enough.

2. Bedded area. Floor may be paved or unpaved. With a good arrangement, 50 square feet of bedded space per cow is enough, although as much as 60 square feet may be needed unless recommended plans are followed.

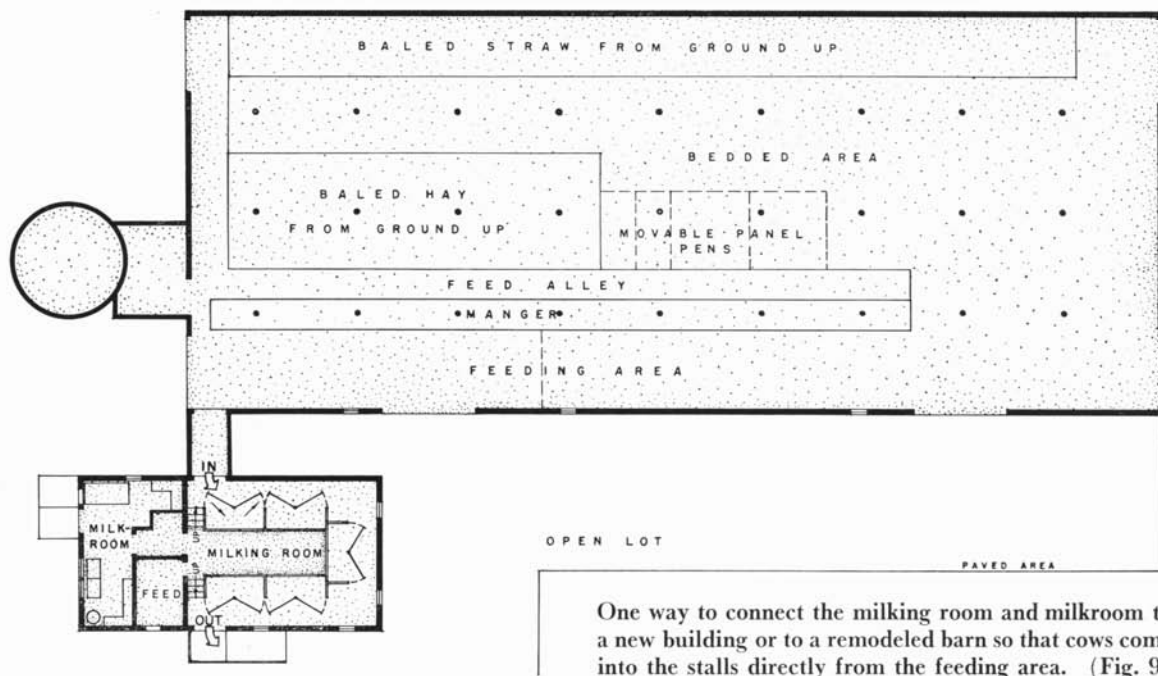
Straw, usually baled, is often stored within the bedded area. Then as the bedding is used, more of the space can be used for animals. When pens are needed, part of the loose housing space may be divided by temporary gates and panels.

Exercise Yards

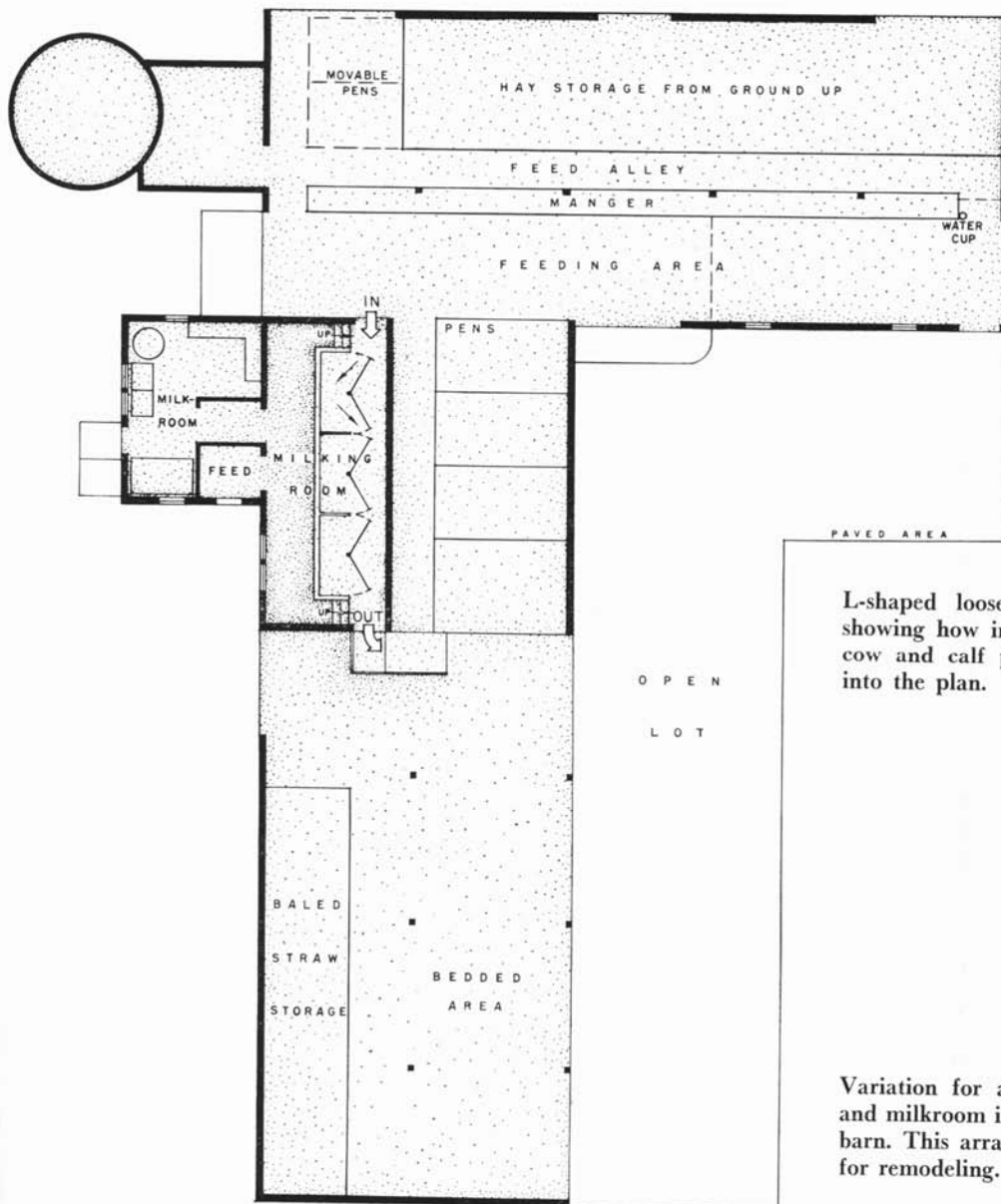
Locate yard space next to the feeding and bedded areas, just to the south or east of the building. In most localities the barnlot should be paved to keep it from getting muddy, to make it easier to remove manure, and to keep it sanitary. Allow about 100 square feet of paved yard for each cow. Slope the surface for drainage at the

rate of 1 foot in 50 feet. If only part of the yard can be surfaced, pave a strip 15 to 20 feet wide at the entrances to the building, around the watering device, and along the outside feed bunks.

A restraining chute or squeeze gate in or near the barnyard is desirable for dehorning or other veterinary work.

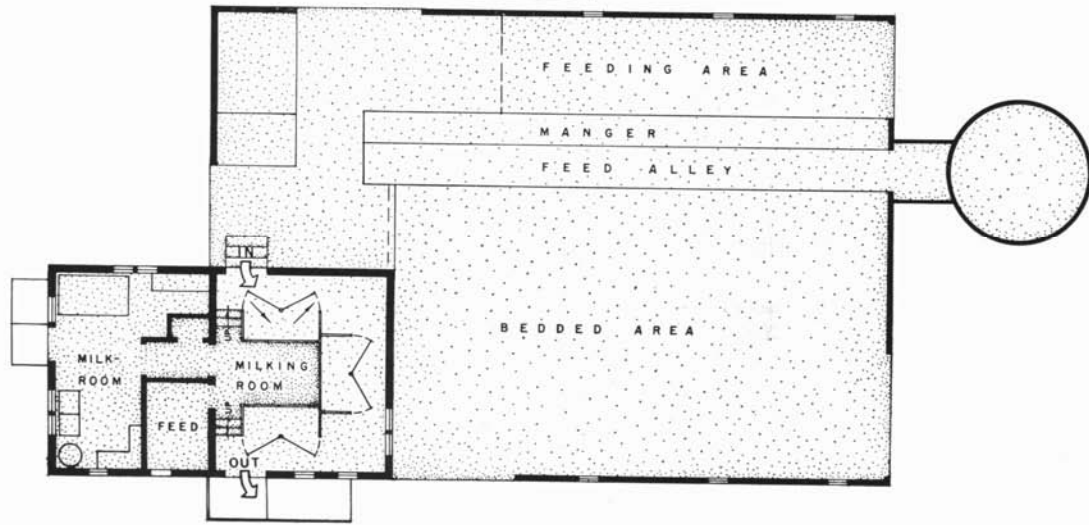


One way to connect the milking room and milkroom to a new building or to a remodeled barn so that cows come into the stalls directly from the feeding area. (Fig. 9)



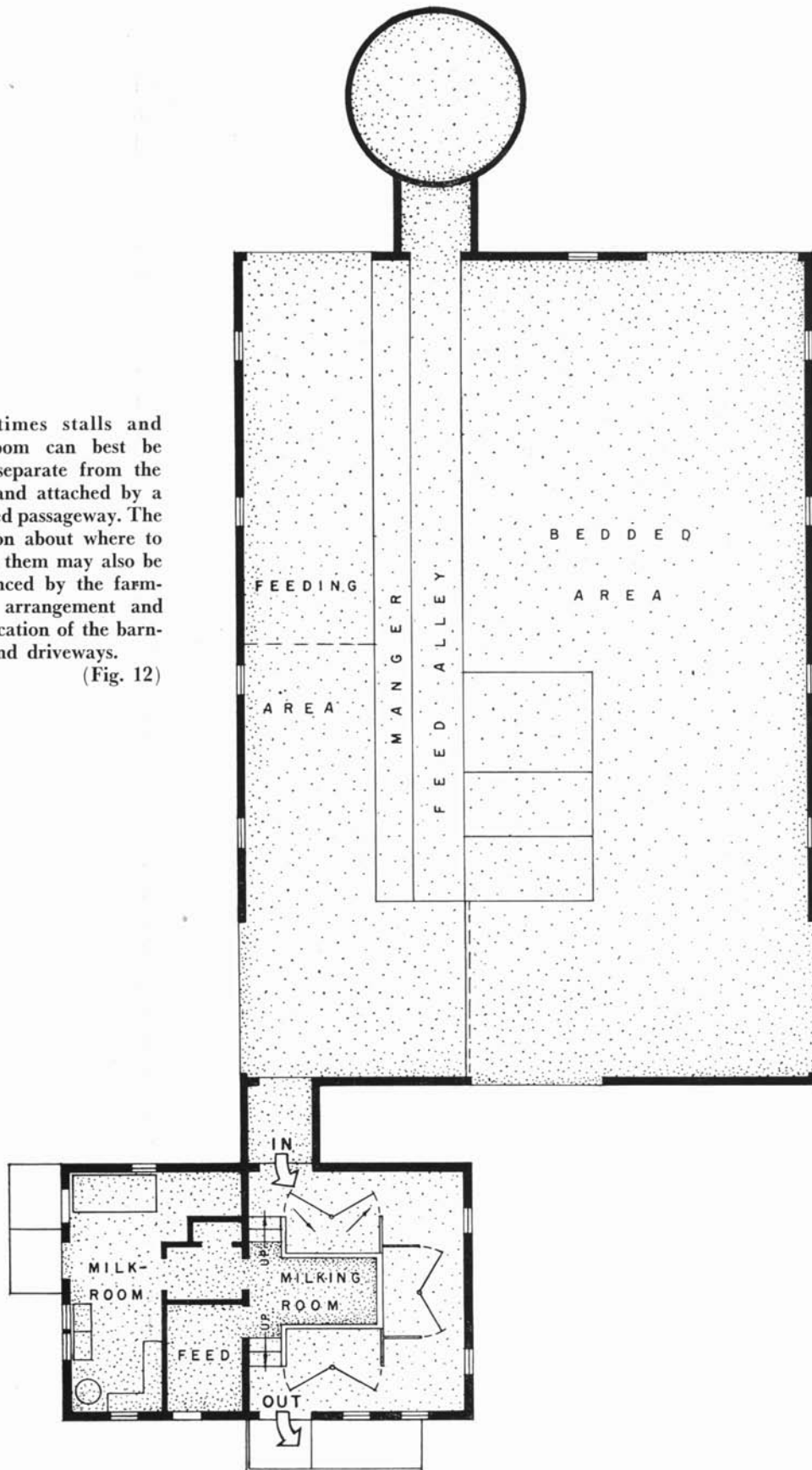
L-shaped loose housing arrangement, showing how in-line milking stalls and cow and calf pen space can be fitted into the plan. (Fig. 10)

Variation for a U-type milking room and milkroom in connection with a new barn. This arrangement is also suitable for remodeling. (Fig. 11)



Sometimes stalls and milkroom can best be built separate from the barn and attached by a covered passageway. The decision about where to locate them may also be influenced by the farmstead arrangement and the location of the barnlots and driveways.

(Fig. 12)



Equipment and Sanitation

The following discussion is concerned with features of the farm dairy that are either required for production of high-quality milk or are desirable for convenience, sanitation, and labor saving.

Lighting. Natural lighting is desirable. At least one window is needed in each exposed wall of the milking room and milkroom. A minimum of 4 square feet of window opening for each stall is required in the milking room, and window area equal to 10 percent of the floor area in the milkroom. Use 100-watt bulbs or larger for electric lighting with an outlet for each two stalls.

Have electric service installed by licensed electricians who understand and will follow the provisions of the National Electric Code. Follow manufacturer's directions for connecting heaters, cooling equipment, and other appliances. Consult your local power company for detailed recommendations.

Heating. Provide at least enough heat in the milking room and milkroom to keep the temperature above freezing. A reasonable degree of comfort for the operator calls for a temperature of 40° to 50°. Often an electric space heater will furnish the necessary heat. Heat lamps directed on the operator's hands are sometimes used.

Water supply. A pressure water system, with water piped to the milking room and milkroom, is highly desirable for sanitation and labor saving. If you put in a pressure system, make connections to water heater and wash vats, install a hose bib in the milking room, and install pipe to the cooler if water is used for milk cooling.

Hot water. An abundant supply of hot water is essential for washing equipment and udders. Electric water heaters having a capacity of at least 12 gallons are efficient and convenient and are preferable unless another satisfactory method of water heating is already available.

Milk cooling. Electrically operated milk coolers are generally recommended. Cooling units can be installed in concrete tanks already on the farm, or fully equipped metal tanks can be purchased.

Milking machines. Because of the wide choice

of milking machines and the likelihood that most operators already have them, no recommendation is made here. Some machines, however, are better suited than others for use with piping which conveys milk directly to the milkroom or the cooler.

Milking stalls. These can be bought ready-made or built on the job. Metal pipe is better for stall frames, but wooden stalls are allowed in some milksheds.

Other equipment. Can racks, wash vats, wash bowls or basins, and containers for washing and rinsing solutions are standard items to be included in planning.

Drainage. Drains from equipment and the milkroom floor should have water-seal traps to keep out odors from the drain line. Extend tile underdrains at least 100 feet away from the building. A slope of 1 foot in 40 feet should take care of surface drainage from the buildings. It is best to raise the floor level of the milkroom about 2 to 3 inches above grade. This helps to keep out trash, dirt, and other waste.

Ventilation. Ceiling vents, together with louvers in gable ends or a roof cupola and inlet ducts near the floor, generally supply the air circulation needed in milkroom, vestibule, and milking room. Allow at least 100 square inches of opening in the milkroom for both ceiling and wall ventilators. The vestibule vent must have a 6-inch opening. Some owners will want the additional comfort of an electric exhaust fan in the milking-room wall. A fan capacity of 400 to 600 cubic feet a minute is enough for a milking room of 3 or 4 stalls.

Fly screens. Provide screen doors and windows fitted with 16-mesh galvanized, copper, or bronze screening in milking and milk-handling rooms.

Personal sanitation. Minimum need for washing up is a wash basin on a bench or table with soap, water, and towels at hand. An outdoor pit-type toilet is acceptable if built to conform to directions in Circular 137 of the Illinois State Department of Public Health, Springfield, Illinois, or if it is built according to plans from the University of Illinois College of Agriculture.

Construction Suggestions

Concrete makes the best floors and foundations for milking room, milkroom, and the more permanent barns and sheds. Use a fill of 6 inches of crushed rock or gravel under floors. Finish the surfaces where cows will walk with a wood float, broom, or roughening tool to get an even but gritty, roughened surface. Have smooth-finished surfaces in milkroom, feed alleys, mangers, and operator area. A recommended graded mix for concrete is 1 part Portland cement, 2¼ parts sand, and 3 parts coarse aggregate, with only enough clean water (5 or 6 gallons for each sack of cement) to make a plastic, workable mixture.

Walls of the milkroom and milking room must be smooth, hard, and nonabsorbent. Use concrete or clay blocks or wood frame for the walls. Finish unglazed interior masonry walls first with cement

wash, then with a washable mineral paint.

If walls are wood frame, build the concrete foundation up 12 to 18 inches above the floorline. Line the milkroom and milking room with a material that can be kept painted or that has a naturally durable, washable finish. Insulate exterior frame walls, preferably with a 2-inch blanket-type insulation having a vapor-barrier face on the inside surface.

Barns and sheds can be built with pole frames or stud walls, or masonry blocks may be used. Only a single layer of covering of wood or metal is needed on wood walls. Build the foundation wall at least 30 inches high to protect the wood frames or metal siding. Use cast-in-place concrete or masonry blocks or pressure-treated plank according to the type of construction desired.

Suggestions for Operation

Cleaning. Sanitation can be improved and labor saved by observing a few simple routines in and around the buildings. Droppings in the milking room can be scooped up and the floor washed down with a hose after each milking time. Gentle handling and immediate releasing of the cows after milking reduces the amount of manure dropped in the milking stalls. Give the cows time to move about for a few minutes in the morning before bringing them in. Turn fresh manure pads in the bedded space once or twice a day and keep fresh straw on top. This helps to conserve bedding and keep the cows cleaner. Clean the feeding area as needed or as local regulations prescribe, from daily to at least once a week, and do not bed this area.

Milking and feeding. If the entrance and exit doors to the milking room are controlled by the operator from his working area, little trouble or time is involved in handling the cows. Cows can generally be trained to the milking-room system as readily if not more easily than to the stall barn.

After being trained, the cows appear eager to enter the stalls to be fed and milked.

Time studies show that one man using two machines and a 3-stall unit can milk about 25 cows in one hour. Two operators with 3 or 4 milker units and either 4 or 5 stalls can milk 30 to 40 cows in an hour. A good way to divide the work is for one man to operate the milking machines and assist with washing udders and admitting and releasing cows, while the other carries milk, does the feeding, and assists otherwise as he has time. Having one more stall than milker units saves time because a cow can be brought in and readied for milking without causing idle time for the milker unit.

The time available for the cows to eat is determined by the rate at which the cows are milked, the number of stalls, and the kind and number of operations as well as the order in which they are done. With one man, two milking machines, and three stalls, each cow has about 6 minutes to eat her feed. More time is gained by using four stalls.