

Open Shed Milking Stable Plan of Housing the Dairy Herd

By

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Montana State College and United States Department of Agriculture cooperating.
Distributed in furtherance of the Acts of Congress, May 8 and June 30, 1914.

Important Factors In Successful Operation of the Open Shed System

The open shed system of housing the dairy herd is most successful where the following favorable conditions are met:

First. The buildings and cow yard should be located and arranged so that cold winds do not blow directly into the shed.

Second. All cows should be dehorned.

Third. The cows should be productive animals to warrant liberal feeding. The extra heat resulting from heavy feeding will keep the animals warm in fairly cold weather without loss of nutrients.

Fourth. The cows should have free access to a nearby water supply. Preferably warm water in winter.

Fifth. The shed must be liberally supplied with bedding at all times.

Sixth. The shed must be well built to avoid drafts.

Seventh. The shed should be large enough to provide 70 square feet or more per cow.

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By this plan of housing the cows are turned loose in a large, well-constructed open shed. In the shed, or preferably out in the yard adjacent to the shed, the cows have free access to hay, water, and salt.

At milking time the cows are relayed in groups through the milking stable where they are fed grain, are cleaned, and milked.

The milking stable generally accommodates four to twelve cows at a time, depending upon the size of the herd. A few operators have milking stables that accommodate all of their cows at one time, thus eliminating the interruption of relaying smaller groups through at milking time.

After the cows are milked they are again turned loose where they have access to the shed, hay, water, and salt.

Separate quarters are provided for calves, heifers, sick animals and the herd sire.

This system of housing the dairy herd has been successfully practiced by several Montana dairymen for many years.

There are several advantages of the open-shed-milking stable plan:

First. The cost of construction is usually less than that of the standard type, dairy barns. Only a few cow stalls are required and concrete floors are limited to the milking stable and milk room. The sheds are generally made of lighter and less expensive timbers and in many cases old buildings may be reconstructed into satisfactory sheds, or may be taken down and the materials used in building new sheds.

Second. Good dairymen who have used this system say that their cows appear to be more comfortable than when confined to stalls. Tests conducted at several experimental stations in the northern states show that the milk flow is maintained in winter as well under this system as when cows are stabled in well constructed, standard type barns. Well fed cows produce more heat than is generally needed for body maintenance and therefore do not need additional feed to keep warm in moderately cold weather. Cows will adapt themselves to rather cold weather without any apparent discomfort or loss in production, provided they have a deep bed of dry straw to lie on and are protected from cold drafts.

Third. Experimental data indicate that the total amount of labor required is nearly the same as in the standard type barn. One advantage of the open-shed system, however, is that the shed, aside from picking up the droppings daily, need be cleaned only occasionally as time and opportunity offers. Bedding the shed and the feeding of roughage is also done in a more wholesale way. By having the milk room made a part of the milking stable or built adjacent to it, less time is required in carrying the milk out.

In some cases a little more labor is required at milking time in relaying the cows through the milking stable.

Fourth. A higher quality of milk and cream is generally produced. Cows kept in a large, well-bedded shed are generally cleaner than those confined to stalls. The milking stable has less dust and barn odors, and is more easily kept clean.

Fifth. More manure will be produced, due to the large amount of bedding required, and the manure will be better preserved.

Sixth. The number of cows may be increased without any great expense in altering the buildings.

This system also has some disadvantages that should be considered.

First. The milking stable in subzero weather may be uncomfortably cold for milking unless it is especially well built for warmth or some means of heating is provided.

Second. Considerable more bedding is required than when cows are kept in stables.

The Shed

Good drainage is one of the most important considerations in locating the shed and milking stable. If the shed must be located on low, poorly drained ground, the situation may be improved by building a high foundation permitting filling the yard and shed with gravel. A well drained soil is preferable to a concrete floor in the shed. The shed should be located to admit sunlight directly into it and to give protection from storms and cold winds. A south exposure is preferable. However, facing the shed either east or west is satisfactory providing there is ample protection from cold winds. The shed also should be located so as to facilitate getting the herd to and from the pasture in summer with the least effort and to provide the most convenient and sanitary arrangement of the farmstead as a whole.

The arrangement of doors, posts, and height of shed is such that a wagon may be drawn through or backed in for cleaning out manure and bringing in bedding. To keep the cows clean and avoid injury, at least 70 square feet of space per cow and a large amount of bedding is needed. The bedding is drawn into the shed and scattered around every two or three days as required. To save bedding and keep the cows in more sanitary condition it is advisable to remove the droppings daily. The litter may be allowed to accumulate 30 to 60 days and then be hauled directly to the fields as time and opportunity offers. In spring or early summer all manure and litter should be removed to eliminate it as a breeding place for flies. Unless the shed is well made and is deeply bedded with dry straw this plan of housing is not satisfactory.

In building a substantial shed it is advisable to make the concrete foundation 16 inches above the dirt floor, to prevent rotting the walls as the litter accumulates.

The walls, roof, and doors should be made tight to prevent drafts through the building. Some of the better sheds are made of rough lumber nailed to the studdings and then covered with building paper and galvanized steel. Dropsiding or rustic is often used on the walls. Galvanized steel, shingles or composition roofing is commonly used. Many serviceable sheds are made of rough, low priced lumber.

The inside wall in the shed should be boarded up to a height of five feet to prevent cows from injuring themselves on the studdings. The best sheds are made deep (22 feet or more) from the front to the back wall to eliminate as much draft as possible. Some dairymen leave the entire side or end open while others limit the opening to a space 12 to 14 feet wide. In cases where the opening is limited, a few windows are necessary for additional light. Unless the shed is deeply bedded and well lighted, the cows will prefer being outside.

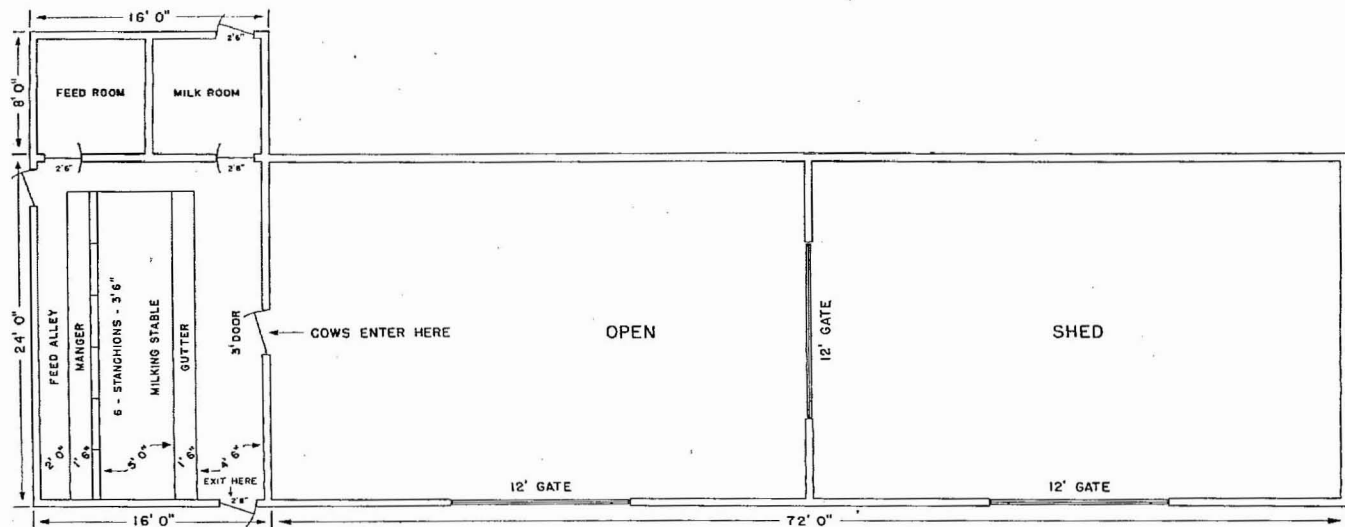


Figure 1

Figure 1—A simple shed and milking stable for a herd of approximately 25 cows. At milking time the cows are driven into the end of the shed nearest the milking stable and the two gates closed. The cows are then relayed through the milking stable for milking. After each group is milked the cows pass out into the yard where they have access to the far end of the shed. When milking is completed all the gates are opened. For bringing in bedding and removing litter the vehicle is backed into the shed. The milk room, as shown in this figure, should be used for straining and storing the milk temporarily as it is produced. The milk is then carted to the milk house. A concrete floor and sewage disposal is necessary to permit cleaning.

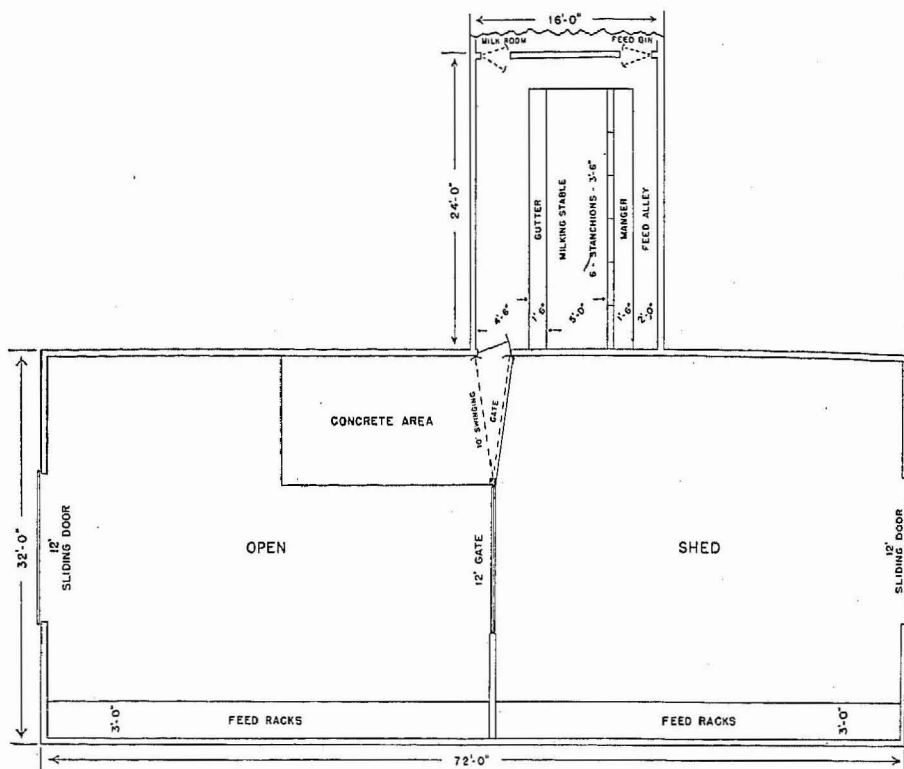


Figure 2

Figure 2—A very practical shed with milking stable attached to side. This shed will accommodate about 30 to 34 cows. At milking time the cows are driven to the left end of the shed and the center gate closed. The cows are admitted to the milking stable through the swinging gate. After the cows are milked they are released from the stanchions and turned into the right end of the shed. Much of the manure and litter that usually clings to the feet will be left on the concrete area as the cows pass over it into the milking stable.

The feed racks in the shed are used for feeding roughage in bad weather only. See figure 3.

The milking stable is 16 feet wide and calls for stanchion stalls. Walk-through stalls as shown in figure 7 can be used by increasing the width and having the cows exit into the right end of the shed through a door at the end of the feed alley. The type and size of milk room will vary with the size of the business.

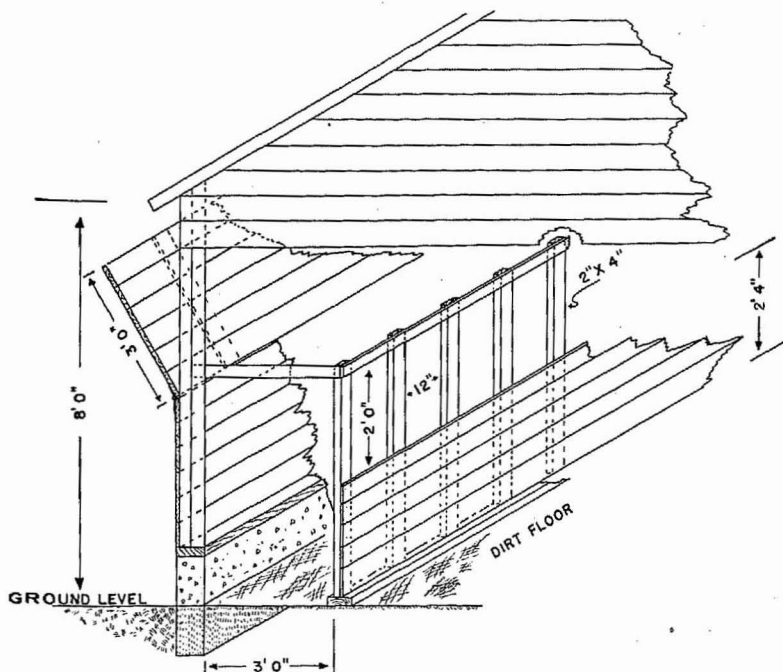


Figure 3

Figure 3—A convenient rack for feeding hay in the shed during bad storms, otherwise the roughage is fed from racks out in the lot. The door on the side of the shed is swung out for feeding hay. It also serves in lighting and ventilating the shed.

The Milking Stable

The milking stable and milk room are generally combined in one building, which in turn may be a part of the shed, attached to the shed or built adjacent to it. Two types of milking stables are in use, one large enough to accommodate the entire milking herd and the other consisting of four or more stalls, depending upon the size of the herd. The latter system has several advantages, especially where the milking stable is combined with the shed so that relaying the cows through may be accomplished quickly and with the least excitement to the cows. The smaller milking stable costs less, is easier to keep clean and the milking is done closer to the milk room and thus, time is saved in carrying the milk out. The principal disadvantage is that in some cases a little more time is required in relaying the cows through. This, however, is negligible in well planned setups. There is also some irregularity in the time individual cows come in to be milked. Most operators, however, do not consider this a serious objection, claiming their cows generally line up before the door in about the same order. A few operators have avoided this irregularity by building milking stables

large enough to accommodate the entire herd or one-fourth to one-third of the milking herd and then providing separate yards and shed space for each group.

The small milking stables are usually 14 to 18 feet wide to accommodate one row of cows while the large milking stables are 28 to 36 feet wide for two rows of cows. In the large stables the cows generally face toward the walls, leaving a wide walk in the center. To produce milk of high quality, a vestibule or holding pen with concrete floor for the cows is sometimes built between the shed and the milking stable. Such a pen facilitates relaying cows through the milking stable and much of the manure and straw that is clinging to the feet is left on the concrete floor.

The milking stable should be made relatively warm and must be constructed so that it will be sanitary and easily cleaned. The floor, gutter, platforms, and manger should be made of concrete. The concrete floor should be slightly roughened by stroking the concrete lightly with an old broom before it sets. This is done to keep the cows from slipping and falling. To protect the walls from moisture the concrete foundation should extend 12 inches above the floor. The inside walls and ceiling should be made of matched lumber, hard pressed composition board, or water proof cement plaster and then given two coats of white or light gray paint.

Two types of cow stalls are used, namely, "the stanchions" and the "walk through stalls." Well made, ridged wood stanchions are very satisfactory when cows are stabled for milking only. They are less expensive, and not as noisy as the swinging steel stanchions. Ridged stanchions may be made of 2 x 4's or 2 x 6's. By means of a lever, connecting all the movable members, all the cows in a section may be fastened or turned loose at one time or the cows may be fastened or loosened one at a time as desired. See figure 5. Swinging steel stanchions, however, are often used to good advantage. The walk through stalls can be made on the farm or purchased from companies dealing in farm equipment. Generally with this type a gate, in front of the cow or at the side, opens up permitting the cow to pass through in place of backing out. In the more elaborate systems (sometimes called milk parlors) the floor of the cow stalls is raised about 30 inches permitting the milker to do his work without stooping. For details regarding the milking parlors, write companies dealing in barn equipment. A very efficient home made walk-through stall is shown in figures 7 to 11.

A feed storage room should be built into or attached to the milking stable and located conveniently to the feed alley. Since no hay is fed in the milking stable a concrete manger as shown in figure 4 is recommended for the stanchion stalls. The floor of the manger should be 2 or 3 inches higher than the platform on which the cows stand. The concrete manger should be made smooth to facilitate cleaning.

The gutter should be 18 inches wide and 3 to 4 inches deep from the platforms and 2 to 3 inches deep from the walk back of the cows. To facilitate cleaning and washing, the gutter should slope at the rate of three inches per hundred feet toward a drain.

Each stall should be at least three and one-half feet wide when cows are milked in stanchions. Even a greater width is desirable for large cows.

The length of the platform will vary with the breed of cattle used. The following lengths are recommended from feed alley curb to edge of gutter:

Holsteins and Brown Swiss.....	5 feet to 5 feet 8 inches
Ayrshires and Guernseys.....	4 feet 8 inches to 5 feet
Jerseys	4 feet 4 inches to 4 feet 8 inches

The milking stable should have at least four square feet of window light per stall. To facilitate good ventilation the windows should swing in at the top as shown in figure 6. All windows and outside doors should be well screened to keep flies out.

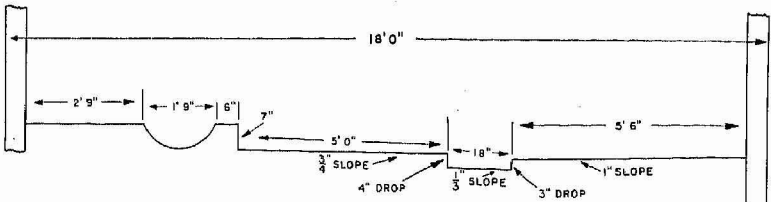


Figure 4

Figure 4 a cross section of the floor arrangement of an 18-foot milking stable, showing feed alley, manger, curb, stall platform, gutter and passage back of cows. Note the wide, shallow gutter especially designed for milking stables. The length of stalls should vary with the breed of cattle used. See page 8.

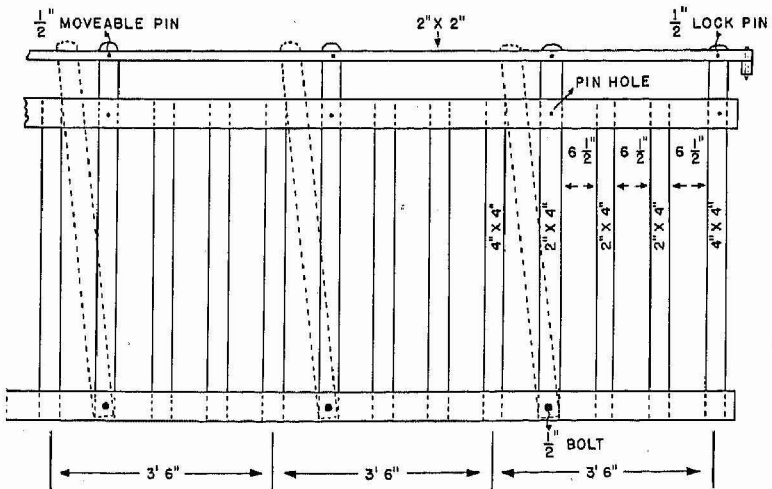


Figure 5

Figure 5—This shows how ridged wood stanchions are made to fasten or loosen all the cows in a section in one operation. If so desired an individual animal may be fastened or loosened in the stanchion independently of the other cows by changing the movable pin from the lever on top to the pin hole in the frame.

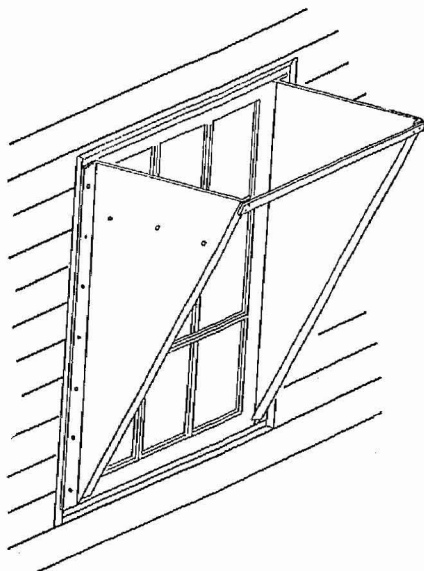


Figure 6

Figure 6—A convenient and practical arrangement for ventilating the milking stable.

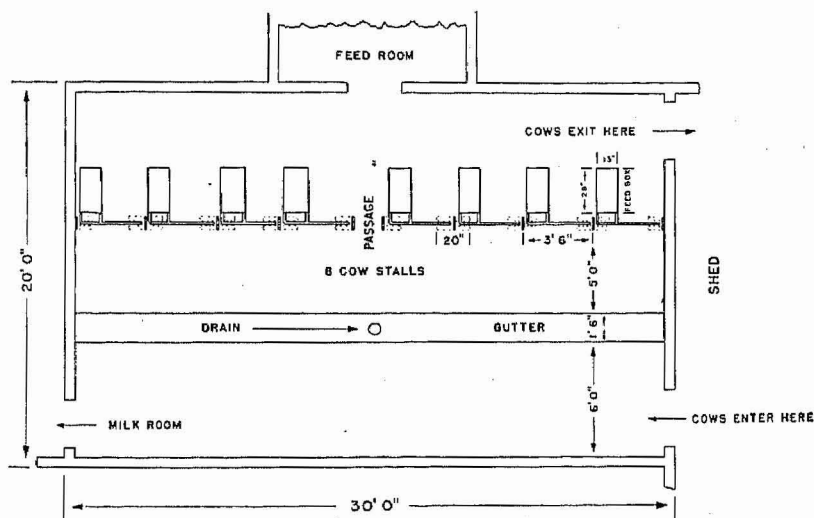


Figure 7

Figure 7 shows the general plan of a milking stable developed by Harold Hagen of Stevensville. As the cows enter they are locked into stanchions,

fed grain, udders washed and milked. After the cows are milked the operator pulls a rope which raises the stanchion and feed box up to the ceiling permitting the cows to go forward through the stall and out into another portion of the shed again. See figures 8 to 11 for details of the stanchions as developed by the Hagen family. The milk is taken to an adjoining milk room as it is produced.

The entrance door and exit door are opened and closed by means of ropes to reduce labor.

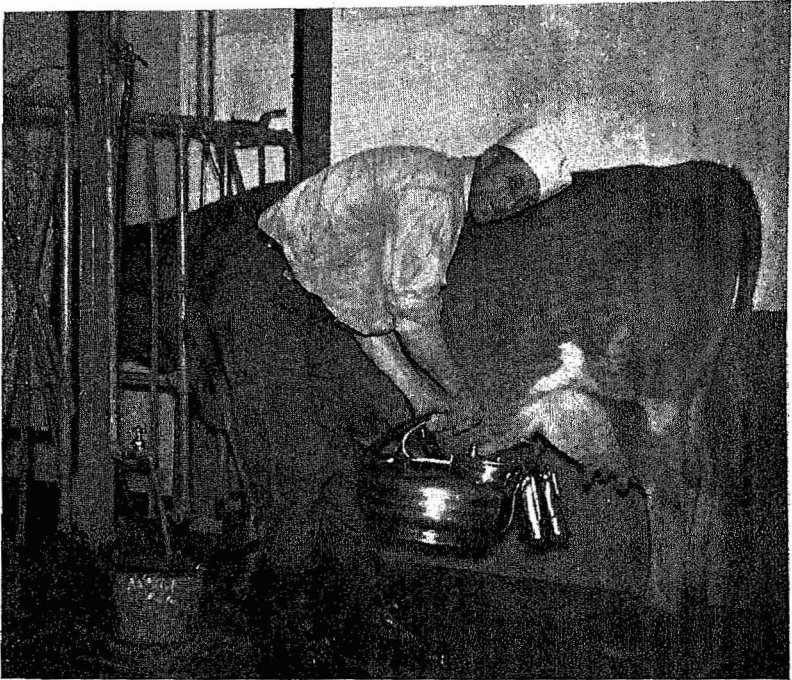


Figure 8

Figure 8 shows a cow in the stanchion on the Clarence Hagen farm ready to be milked. Note: the water faucet and stream of water flowing into the bucket. This is the water used in aerating the milk. In the bucket is a towel used for washing the cow's udder and flanks before milking. The water may also be used to flush away any litter or manure that may be left on the platforms where the cows stand. A water bucket and faucet is placed between every other cow. Two good men, each with two single unit machines, can feed concentrates, clean and milk 80 cows in two hours by means of these stanchions in a milking stable as shown in figure 7.

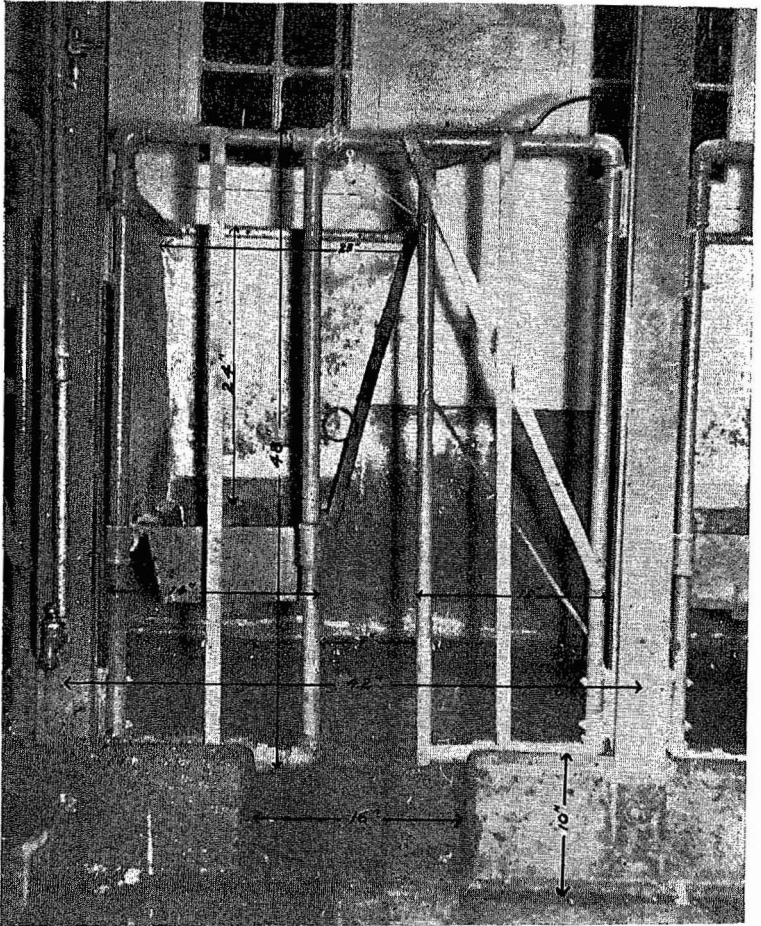




Figure 9

Figure 9 shows the Hagen stanchion and feed box. The stanchion, made of 1 inch pipe and 1 inch strap iron for braces, is 4 feet high and rests upon concrete blocks 10 inches above the floor. The neck space in the stanchion is 7 inches wide. The pipes are screwed together and spot welded at joints. A groove in the top of the concrete block supports the bottom of the stanchion. The stalls are 42 inches wide from center to center and the concrete blocks are set 16 inches apart giving cows ample space to pass through.

The top of the feed box is set 24 inches above the floor and 10 inches out from the stanchion. It is 18 inches long, 13 inches wide and 7 inches

deep and is supported by $\frac{3}{4}$ inch pipes, 30 inches long, screwed into tees as shown in the picture. The bottom and sides are made of sheet metal and the ends of wood. A light metal shield 2 feet high partially surrounds the feed box to prevent waste of feed. Note from figure 11 that the side from which the cow eats is also partially enclosed by the shield (within 16 inches of the stanchion); also note that the shield is made wider at the top.

To permit the cows to pass out under the stanchion when it is raised to the ceiling, the milking stable should be 9 feet high.

The stanchion and feed box slide up and down in a -shaped steel channel support on each side. The channel is made of two pieces of $1\frac{1}{2}$ inch angle iron set one inch apart. The  is then completed by bolting an iron bar $\frac{1}{4}$ inch thick by 4 inches wide to the two angle irons and this assembly to an upright 2×4 . To add strength this bar can be spot welded to the angle irons.

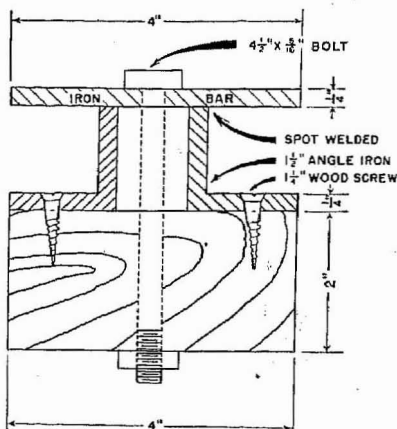



Figure 10

Figure 10 shows a cross section view of the assembly giving two -shaped channels as is required between two stanchions.

Bolted on to the stanchion frame are 4 oiled hard maple blocks, two on each side, that serve as guides in the steel channels. To make a better base for fastening the hardwood blocks, a piece of strap iron 1 inch wide and $\frac{1}{4}$ inch thick are welded on to the round stanchion frame. Bolt heads are counter sunk into the blocks.

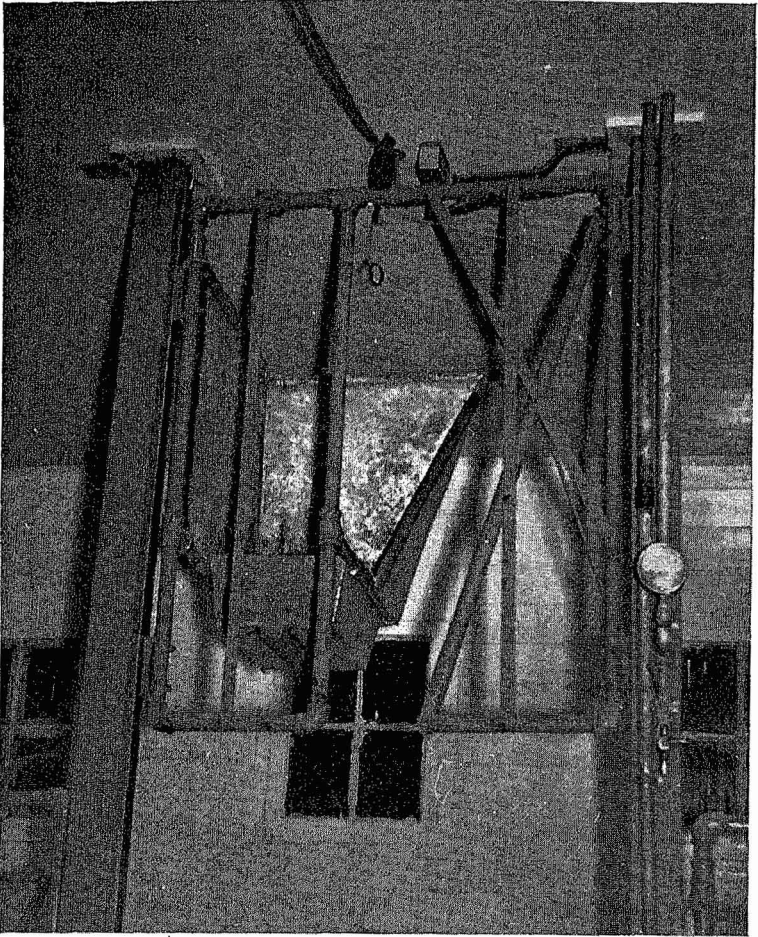


Figure 11

Figure 11 shows the stanchion and feed box raised to the ceiling. Note that there is no cross member at the bottom of the stanchion, thus the stanchion can be raised up from the cow's neck permitting the animal to walk forward through the stall and out to the shed after she is milked. One of the ropes attached to the top of the stanchion frame extends up through the ceiling, over a pulley and fastened to a counterbalance. The other rope passes through a pulley at the ceiling and is then fastened to the wall back of the cows. This makes it possible for the operator to raise the stanchion by pulling the rope while standing back of the cows. As the stanchion hits the ceiling the latch or lock is released and the stanchion is automatically opened by means of a coil spring and is ready for the next cow as it is lowered to the original position again. The latch or lock at the top is made of a common strap hinge fastened on the under side of the top cross member and is released or opened by a rocker arm which raises the latch as the arm contacts the ceiling.

Milk Room or Milk House

There are two plans regarding the location of the milk room or milk house. In either case the milk room or milk house should be located to the front of the milking stable where there are sanitary surroundings and convenience for transporting the milk.

First Plan. The milk room is made a part of, or is attached to, the milking stable with a vestibule and double doors between. With this arrangement the milk is taken to the milk room as it is produced.

Second Plan. A separate milk house is built away from the barn. With this plan it is desirable to have a small room adjacent to the milking stable that can be kept clean and free from flies, where the milk is strained as produced and then carted to the milk house at intervals during the milking period or after the cows are all milked.

The first plan has several advantages over the second that should be considered before building.

1. The milk may be separated or aerated as produced by the milkers without much additional effort or time.

2. The skimmilk is available for feeding calves soon after the milking process is completed.

3. Building costs are less.

4. The boiler or heating system may be used to warm the milking stable in cold weather.

The principal disadvantage is the added fire hazard resulting from the boiler or hot water heating system. This, however, may be largely eliminated by the use of electric, gas or oil water heaters and the use of chlorine sterilizers in place of steam. The advantages of the first plan on most moderate size dairy farms seems to more than offset the disadvantages.

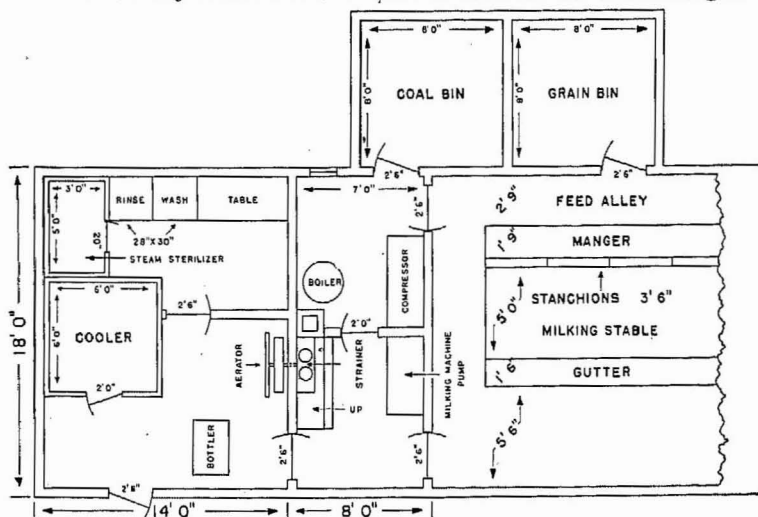


Figure 12

Figure 12—Milk rooms suitable for a medium sized retail milk trade. As the milk is produced it is carried into the first room where it is strained. From the strainers it flows through the wall over the aerator and into supply cans. A raised concrete platform permits straining the milk above the aerator. This plan shows a mechanical walk-in cooler and a steam cabinet sterilizer as described on page 18. If so desired the utensils and

milk bottles can be sterilized by means of a chlorine solution by installing a three compartment vat and using the space now occupied by the steam sterilizer for a table. By this arrangement the steam boiler may be eliminated and a hot water heater used instead.

For large dairies more room is required.

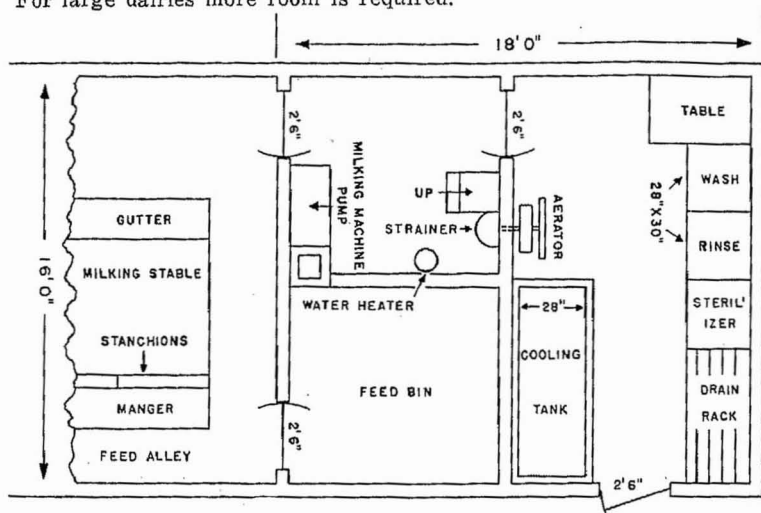


Figure 13

Figure 13—Milk rooms suitable for moderate sized wholesale milk trade. The milk utensils are sterilized by means of a chlorine solution after they are washed and rinsed. The cooling tank is made of concrete and will hold 12 ten-gallon cans. It extends eight inches above the floor and is 24 inches deep.

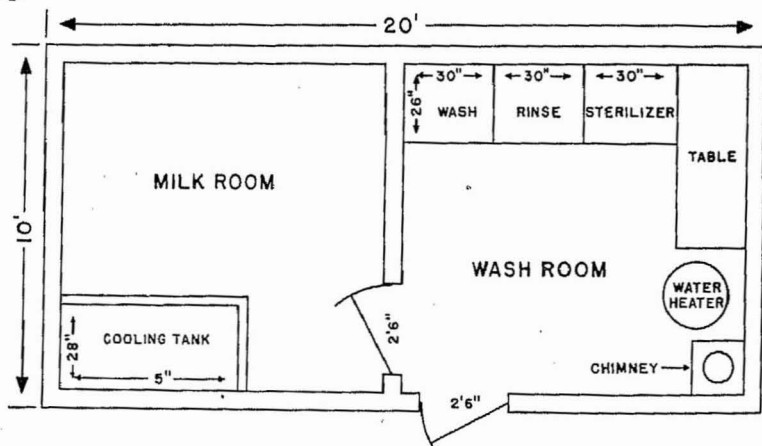


Figure 14

Figure 14 shows a separate milk house which may be used for wholesale or a small retail trade. If so desired it may be attached to a milking stable by means of a vestibule.

Sanitary Regulations

The following is taken from the Regulation Promulgated by the Livestock Sanitary Board in Accordance with the Provisions Contained in Chapter 281, Political Codes of Montana, 1935.

"Item 8-R:—MILK HOUSE OR ROOM, CONSTRUCTION:—There shall be provided a milk house or milk room in which the cooling, handling, and storing of milk and milk products and the washing, bactericidal treatment, and storing of milk containers and utensils shall be done. (a) The milk house or room shall be provided with a tight floor constructed of concrete or other impervious material, in good repair, and graded to provide proper drainage. (b) It shall have walls and ceilings of such construction as to permit easy cleaning, and shall be well painted or finished in an approved manner. (c) It shall be well lighted and ventilated. (d) It shall have all openings effectively screened including outward-opening, self-closing doors, unless other effective means are provided to prevent the entrance of flies. (e) It shall be used for no other purposes than those specified above except as may be approved by the Livestock Sanitary Board; shall not open directly into a stable or into any room used for domestic purposes; shall have an adequate water supply approved by the Livestock Sanitary Board; shall be provided with adequate facilities for the heating of water for the cleaning of utensils; shall be equipped with two-compartment stationary wash and rinse vats, except that in the case of retail raw milk, if chlorine is employed as the principal bactericidal treatment, the three-compartment type must be used; and shall, unless the milk is to be pasteurized, be partitioned to separate the handling of milk and the storage of cleansed utensils from the cleaning and other operations, which shall be so located and conducted as to prevent any contamination of the milk or of cleaned equipment."

Sterilization of Utensils

The quotations in the following paragraphs on sterilization of utensils are taken from Public Health Bulletin No. 220 entitled "Milk Ordinance and Code."

"All multi-use containers, equipment, and other utensils used in the handling, storage, or transportation of milk or milk products shall between each usage be subjected to an approved bactericidal process with steam, hot water, chlorine, or hot air."

"Satisfactory compliance—shall be deemed to have been satisfied if all milk containers, utensils, strainer cloths, and other equipment have been:

(1) Exposed for at least 15 minutes to at least 170° F. or for at least 5 minutes to at least 200° F. in a steam cabinet equipped with an indicating thermometer located in the coldest zone; or

(2) Exposed to a jet of steam for at least 1 minute; or

(3) Immersed in or exposed to a flow of a chlorine solution of approved strength for at least 2 minutes."

Steam Cabinet Sterilizers

For medium to large dairies steam cabinet sterilizers made of heavy galvanized steel or concrete are very satisfactory. See figure 12.

"The size of cabinet must be determined by each individual dairyman to suit his conditions. The best method of determining the size is to stack together all articles to be treated at one time and thus determine the required cabinet dimensions. Care should be taken to allow for any immediately expected expansion of business, but an excessively large design which would be wasteful of steam should be avoided."

"A drain pipe should be provided for the escape of water of condensation."

The door should be substantially made of metal and should fit snugly into a metal frame.

"The size of boiler needed depends upon the size of cabinet to be heated and upon the material of which it is made. In general, the following scale of horsepower will hold for brick, concrete, or hollow-tile cabinets."

Size of Cabinet	Boiler horsepower
2½ by 2½ by 4½ feet	2
4 by 4 by 4 feet	4
5 by 5 by 5 feet	5
6 by 6 by 6 feet	6

"For cabinets constructed of wood or sheet iron approximately half the above boiler horsepower will be required. The admission of steam into the cabinet is simple. The steam line should enter the cabinet near the bottom, and the steam preferably be permitted to discharge through a number of outlets. The pipe line between boiler and cabinet should preferably be insulated."

"Steaming should proceed about as follows: Store all containers (bottles, pails, and cans in an inverted position) and other equipment in the cabinet, taking care that no article is closer than 6 inches to the floor. Raise steam to full pressure in the boiler and then admit steam to the cabinet slowly. Do not open the steam valve wide, as this may carry over boiler water and reduce boiler efficiency. Maintain steam flow sufficiently long to keep the thermometer reading above 170° F. for 15 minutes, or above 200° F. for 5 minutes."

A ventilating flue, 8 to 10 inches in diameter, extending from the top of the sterilizer up through the roof of the milk house will aid in drying the utensils and ventilating the room. The flue should have a protecting cap over the top and a well constructed "cut off" just above the sterilizer which should be closed when the steam is turned on and opened again when the steam is shut off. After the utensils are sterilized the door to the cabinet should be opened slightly to permit drying.

Sterilization With Chlorine Solution

"It is possible to treat bottles and pails with chlorine solution without special apparatus, simply by filling the last compartment of the washing vat with water containing chlorine solution of standard strength, and by fully submerging each article to be treated for at least 2 minutes.

"The principal objection to this method is that it is difficult to make sure that air will not be trapped in some of the bottles, and that there is a temptation to place so many bottles in the tank as to have some of them protrude above the surface of the solution. To meet this objection the Minnesota State Board of Health has suggested the following method:

"As the bottles are washed by hand, revolving brushes, or by machine, they are placed in the crates in an inverted position. A wooden or metal perforated cover or grate is placed over the top of the crate of washed bottles. The crate is then inverted and submerged in the solution, the cover being held in place by gripping it to the top of the crate at both ends with the hands. While the crate is in the solution it is in an inverted position, but the bottles are upright.

"When another crate of bottles has been washed, the crate in the solution is taken out, turned right side up, and drained. The cover is then placed on the freshly washed crate of bottles, and it is inverted and submerged."

"Crates should be washed before immersion in the solution."

In figure 14 is a three compartment vat for cleaning and sterilizing utensils. The vat marked "sterilizer" is used for treating the utensils, bottles and other equipment with a chlorine solution.

It is recommended that all persons before building a milk house or milking stable should obtain from the Montana Livestock Sanitary Board, Helena, Montana, a copy of the rules and regulations regarding the operation of a dairy.

Other Facilities Required

In addition to the open-shed and milking stable, it is necessary to provide a suitable place for calves, heifers, dry cows, herd sires, and one or more hospital pens for sick animals or cows at calving time. Well built feed racks and a good watering system is also necessary.

The hospital pens and quarters for young calves should be in a separate building and must be well constructed to provide warmth in winter and facilitate easy cleaning and sanitation. Herds up to 30 cows should have at least one hospital pen and herds of 30 to 60 cows two such pens. Hospital or maternity pens should be at least 14 feet square. If the pens are too small it is difficult, if not impossible, to give the cows any help in case of difficult parturition. Hospital pens should have concrete

floors with a good drain to facilitate cleaning. A deep bed of straw is necessary to protect cows at time of calving from the cold, hard concrete.

For young calves under 10 weeks of age, individual stalls are recommended. By this arrangement each calf may be fed according to its needs and the calves are prevented from sucking one another. The stalls are 2 to 2½ feet wide and 4 to 5 feet long. At the front of each stall is a rack for feeding hay and a box for feeding grain or concentrates. The calves are tied by means of a light chain or rope snapped to a strap around the calf's neck. Each stall is equipped with a raised removable floor made of metal or narrow strips of lumber nailed to 2 x 4's which will permit the urine to pass through the bedding. By this arrangement the calves are kept drier and cleaner.

Larger calves may be grouped according to size in pens and when fed milk and grain they are locked in stanchions.

Larger heifers and dry cows may be wintered in open sheds where they have access to hay and water.

The best way of handling the herd sire is by means of a "safety bull pen." To facilitate breeding, the bull pen, if possible, should be located so that the yard, including the breeding chute, forms one side of the cow yard. By this arrangement the cows in heat are easily detected and bred. For detailed information about safety bull pens ask your county agent or write the Montana Extension Service at Bozeman, Montana, for Circular No. 2 entitled, "Safety Bull Pens."

A stream of good water flowing through the cow yard close to the shed is the ideal system of watering. Where this is not available, a water tank in the yard with a tank heater to prevent freezing in winter, will prove satisfactory.

With this plan of housing and feeding dairy cows, at least four lineal feet of feed rack should be provided per cow. In other words 10 cows should have a feed rack 40 feet long. The object of so much room at the rack is to avoid crowding and to prevent bossy cows from monopolizing the feed and thus preventing the more timid animals from getting their share. When more space is provided at the feed rack the platforms around the racks do not become so filthy. If possible a 10 to 12 foot space around the rack should be set with stone or covered with concrete.

Acknowledgment is gratefully made to Doctor W. J. Butler and Dr. J. C. Wipf of the Livestock Sanitary Board for ideas and suggestions in the preparation of this bulletin. Also to Harold and Clarence Hagen, dairymen of Stevensville, Montana for pictures and descriptive information regarding the Hagen milking stable and cow stalls.