EXTENSION BULLETIN 325

MILKHOUSES

Planning and Construction

Milkhouse attached to bank barn. (*See page 2*)

By J. S. Boyd, C. W. Hall, R. L. Maddex, and D. L. Murray

MICHIGAN STATE COLLEGE
COOPERATIVE EXTENSION SERVICE
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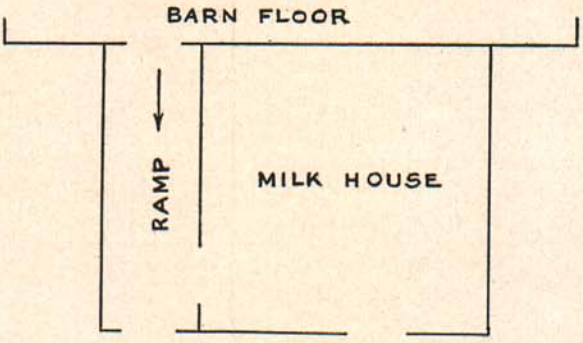
CONCERNING THE COVER PHOTO—



The milkhouse pictured on the cover is on the Lewis Wilson farm, near Mason, Mich. This simple floor plan shows how it solves one problem always encountered when the milkhouse is attached to a bank barn—that of providing a convenient loading level for the milk hauler (door at right in the photo). A ramp (door at left in the photo) permits raising the level of the milkhouse floor about 30 inches above that of the barn floor. It also provides an entrance to the barn without going through the milkhouse.

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Milkhouses: Planning and Construction

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The dairy farmer who has a milkhouse appreciates its value as a labor-saver, and as an aid to marketing a high-quality milk or cream. There are few investments on a dairy farm for equipment or facilities used more. Twice-daily the milkhouse provides the space and equipment for the handling and storing of milk, and for washing and storing the equipment used in the production of milk. For greatest convenience and saving of labor, the milkhouse should be located as close as possible to where the cows are milked.

Though a milkhouse is required by law on farms where milk is sold for bottling purposes, every dairyman should plan to provide such facilities. The cash outlay can be small or large, depending upon (1) whether or not labor for construction is hired; (2) whether the main building materials are home-grown or purchased; and (3) how "dressed-up" the finished structure is.

This bulletin tells how to locate, plan, and construct milkhouses that will meet requirements of the Michigan code and, so far as is known, all of the local milk ordinances. *However, it is always well to check your plans with the local inspectors before building.*

LOCATION

The usefulness of a milkhouse, to both the farmer and the hauler, depends principally on its location. Some of the factors affecting location are surface and sanitary drainage, accessibility to haulers, distance between stable and milkhouse, location with respect to other buildings and barn lots, and location with respect to prevailing winds.

In practically all areas of Michigan, the milkhouse can now be attached directly to the barn, or located in the barn and be separated from the milking area by a swinging door that closes tightly. A location in the barn, or attached to the barn, is desirable from the standpoint of the amount of walking required to handle milk, and of preventing freezing in the milkhouse during the winter months.

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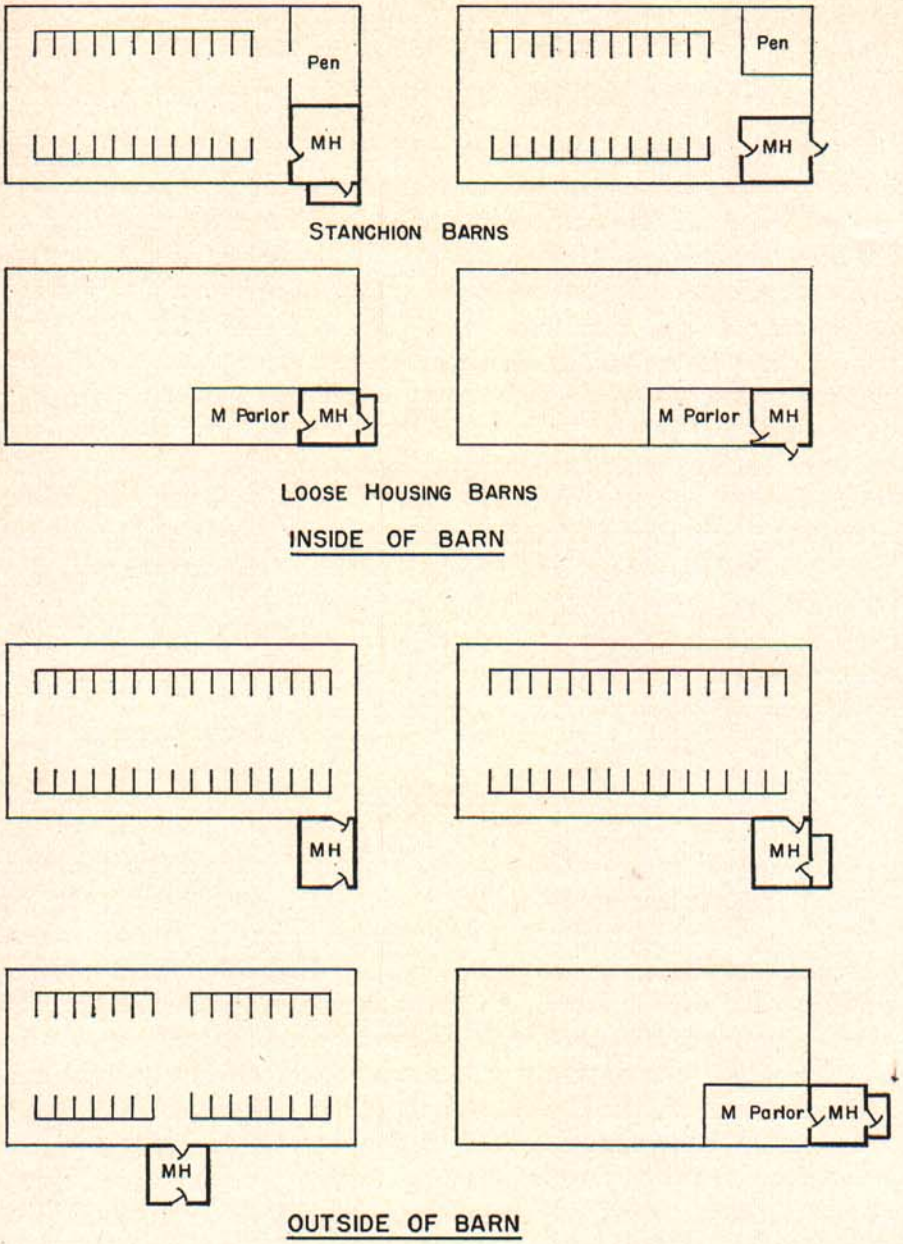

Fig. 1. Suggested locations for milkhouses.

Generally, it is better to locate the milkhouse on the side of the barn, rather than at the end of the barn. A milkhouse on the end of the barn prevents extension of the barn in that direction. Figure 1 shows some suggested locations for the milkhouse, both within the barn or attached to it.

Drainage

So the milkhouse will be useful the year around, considerable planning should be done to make sure water will drain away. Eave troughs on the barn should be fitted with downspouts so roof water will be directed away from the milkhouse. Barnyard water should be diverted by raising the floor and placing fill sand around the milkhouse. It may be necessary to construct the floor higher than the stable floor, connecting the two with a ramp. When the milkhouse is located in the corner of the barn, be careful to provide good drainage for waste water to a suitable disposal system.

Access to Service Drives

Accessibility to the service drives will affect noticeably relationships between the farmer and the hauler. The access drive should be planned so it will be easy to bring in the truck for milk pickup. Arrange the doors so there will be as little maneuvering as possible to get to the loading door. With bulk milk pickup, a good drive is indispensable because of the increased size and weight of the tank trucks. A circular service drive is very convenient for truck movement. A gravel or hard surface drive is preferred.

Distance Between Stable and Milkhouse

In a study made of a number of farms it was found that the farther the milkhouse was from the stable, the less its facilities were used. Those farmers who built adjacent to the barn, or within it, made full use of the labor-saving material and equipment that is a part of every complete milkhouse.

Orientation on the Farmstead

Orientation on the farmstead is an important consideration for many farmers. For example, the milkhouse should not be a vestibule into the stable, a place where shoes are cleaned or tools are left while moving from the stable to other buildings. The floor should be kept clean and free from trash and tools. Pitchforks and shovels should

not be stored in the milkhouse. If a place is needed for cleaning up and changing clothes a separate room, not directly connected to the milkhouse, should be provided.

When the location is sheltered from the cold winter winds, the amount of auxiliary heat needed will be less. In some cases where the milkhouse is well insulated and protected from the wind by trees or other buildings a large light bulb near the water pipe, or a strip of electric heating tape around the pipe, will prevent freezing.

If possible, the milkhouse should be located away from the barn lots so as to reduce the fly problem. A grassed area around the building will add to the appearance of the building. It will also discourage the accumulation of trash or discarded equipment, such as strainer pads.

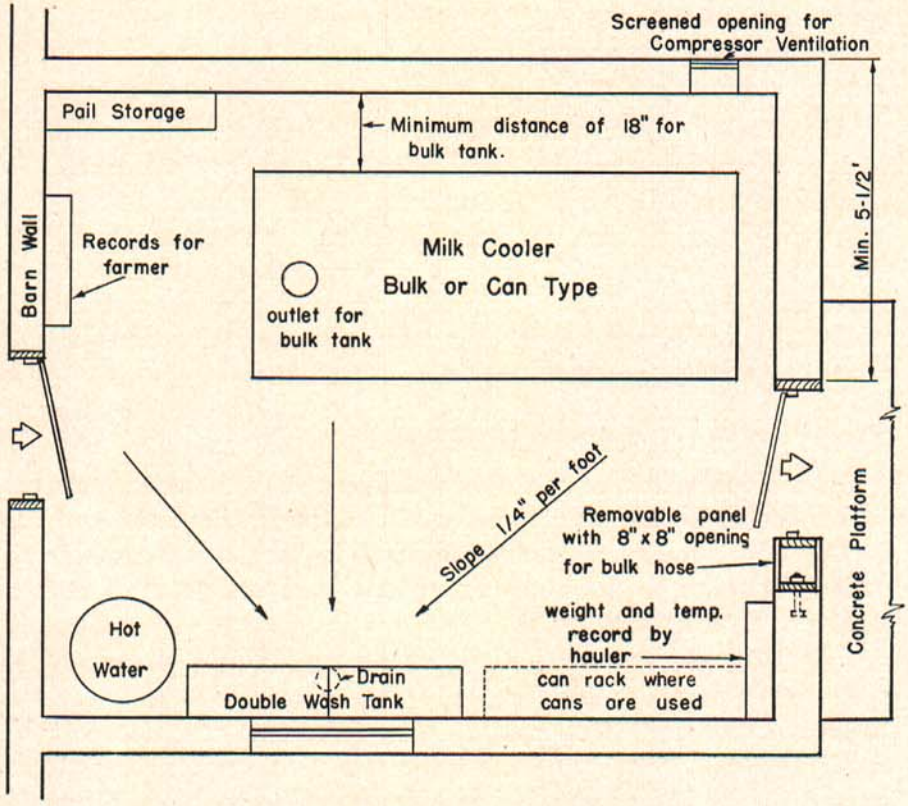

Fig. 2. Suggested layout for milkhouses with doors on opposite sides. (See Table 1 for dimensions.)

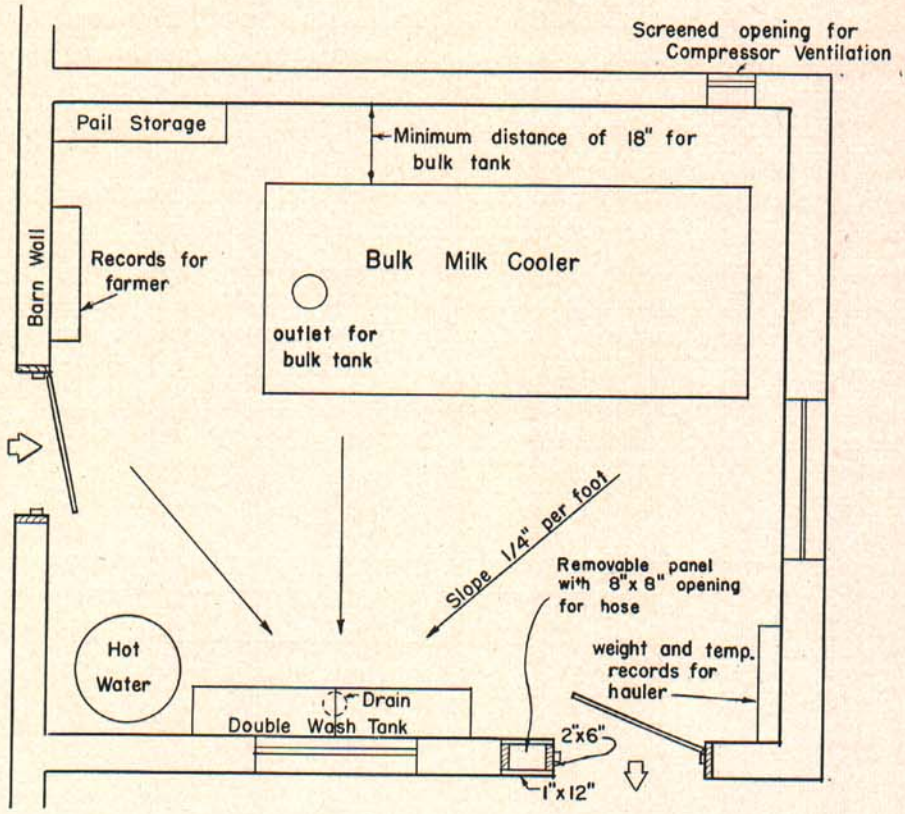

Fig. 3. Suggested layout for milkhouses with doors on adjoining sides. (See Table 1 for dimensions.)

PLANS FOR MILKHOUSES

The location selected for the milkhouse will determine somewhat the plan used. Figures 2, 3 and 4 show suggestions for equipment layout which will suit most of the locations shown in Fig. 1.

For maximum use, it is suggested that one corner of the barn be used for the milkhouse. Where this is not permitted by ordinance, the milkhouse should be connected directly to the barn. Regardless of the location, there are two general arrangements which can be applied to either location.

Figure 2 is a plan for a milkhouse where the doors are on opposite sides. The milk cooler should be close to the barn entrance, so as to reduce unnecessary steps when milk is carried to the cooler. The suggested location for the cooler is satisfactory for both a can-type and

a bulk-type operation. However, when cans are used, a can rack is required and should be placed as shown by the dotted lines. The cupboard provided for hauler records will then be unnecessary.

Wherever possible the water lines should be close to an inside wall to reduce the possibility of freezing.

Figure 3 shows a plan where the doors are located on adjoining sides. Here the cooler should be convenient to the door from the stable. Where a bulk-type operation is used the plan is satisfactory as shown. In Figure 4 the milkhouse doors are on adjoining sides and a can-type cooler is used. The milk cooler should be located convenient for both the farmer and the hauler. The direction for the swinging of the doors is very important; make sure that they do not interfere with the efficient use of the room.

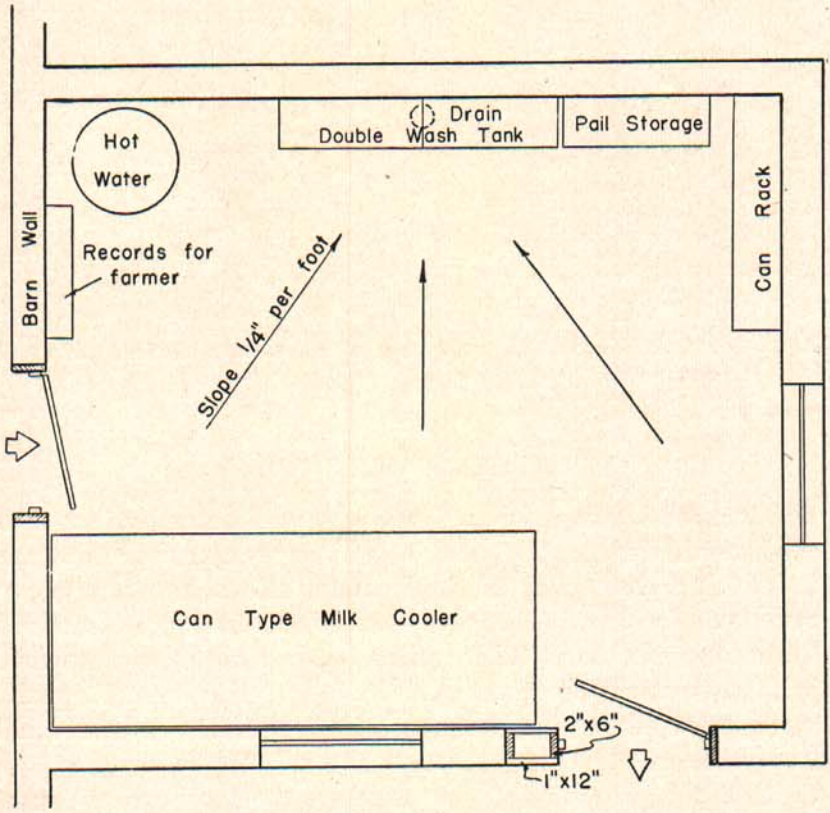

Fig. 4. Suggested layout for milkhouses with doors on adjoining sides, equipped with can-type coolers. (See Table 1 for dimensions.)

CONSTRUCTION DETAILS

The type of construction used will depend on the availability of materials. In some areas native material is available, thus making frame construction desirable. Figure 5 shows a complete cross section of a typical frame milkhouse.

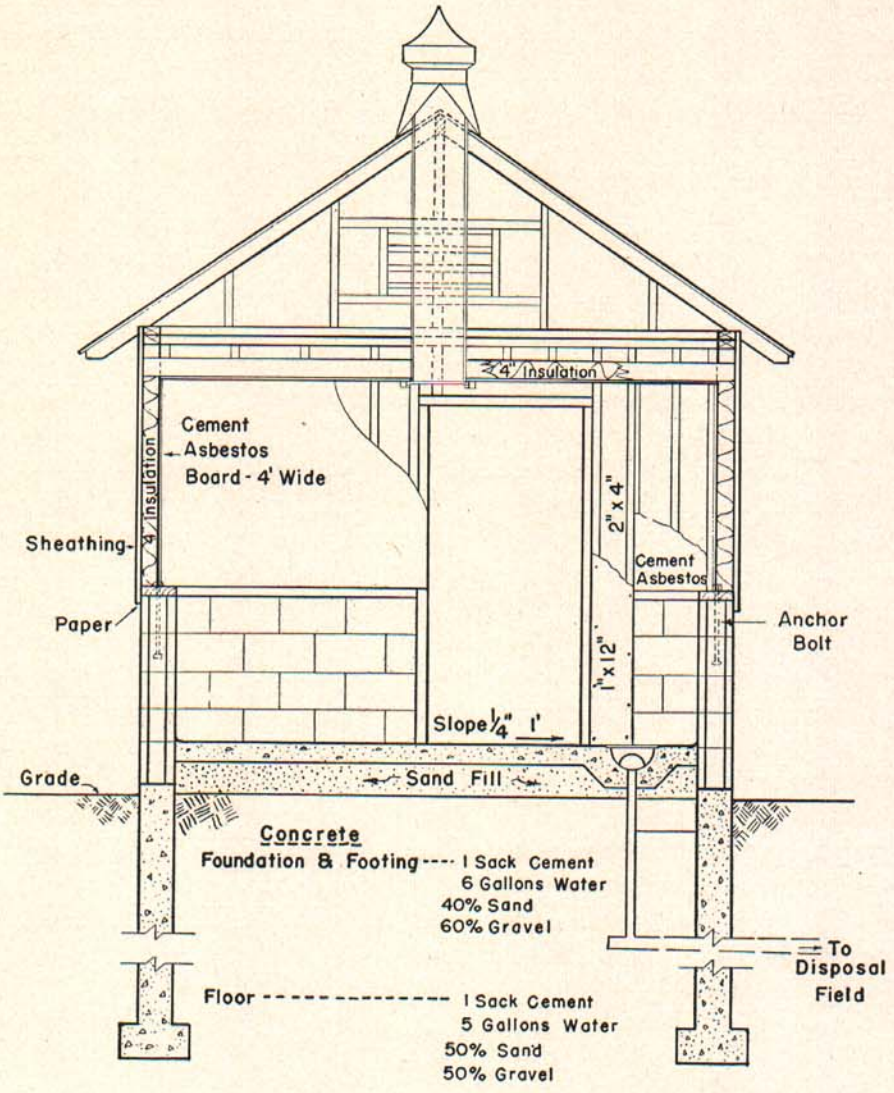

Fig. 5. Cross section of a typical frame milkhouse.

In many cases native materials can be used for insulation; however, the amount required is so small that commercial brands might be most practical.

For other areas, *lightweight* masonry blocks are readily available for wall construction. These walls should be painted with at least 2 coats of cement paint to fill in the rough surfaces and make cleaning easy. For this masonry construction, blocks are laid from the floor to the plate, usually 10 or 11 blocks high, and the roof placed on top.

Figure 6 shows wall sections for various types of construction.

Construction Suggestions

1. Ceilings and exposed outside walls should be insulated.
2. The loading door should be 3 feet wide, with a removable panel provided to increase the width to 4 feet in order to change coolers.
3. All louver openings should be screened to keep out flies.
4. A vent duct with damper shall start at the ceiling line and connect to a roof ventilator. A 10 x 10 inch square duct, or a 11-inch circular duct is sufficient. (Fig. 5)
5. The sewage system should include a floor drain, and an overflow from the cooling tank piped to a trap on the exterior of the milkhouse. From the trap, sewage flows to a field drain or filter trench. A trap, capacity of approximately 50 gallons, made similar to a kitchen grease trap in a house sewage system is satisfactory.

The 4-inch floor line drain should be located under the wash tanks, and placed 1 to 2 inches lower than the floor line. (Figs. 2, 3 and 4) The overflow pipe in the cooling tank should have a coupling at the bottom so that the overflow pipe can be unscrewed for cleaning.

6. Window area should be about 10 percent of the floor area, and be provided with screens and storm sash. Windows hinged at the bottom and swinging in at the top are recommended.
7. The corner between the floor and wall should be rounded, as shown in Fig. 7, to facilitate cleaning.

LIGHTING

Good lighting at the right location in the milkhouse permits the operator to do a more thorough job of cleaning in a shorter period of time. There should be at least one good light over the wash vats,

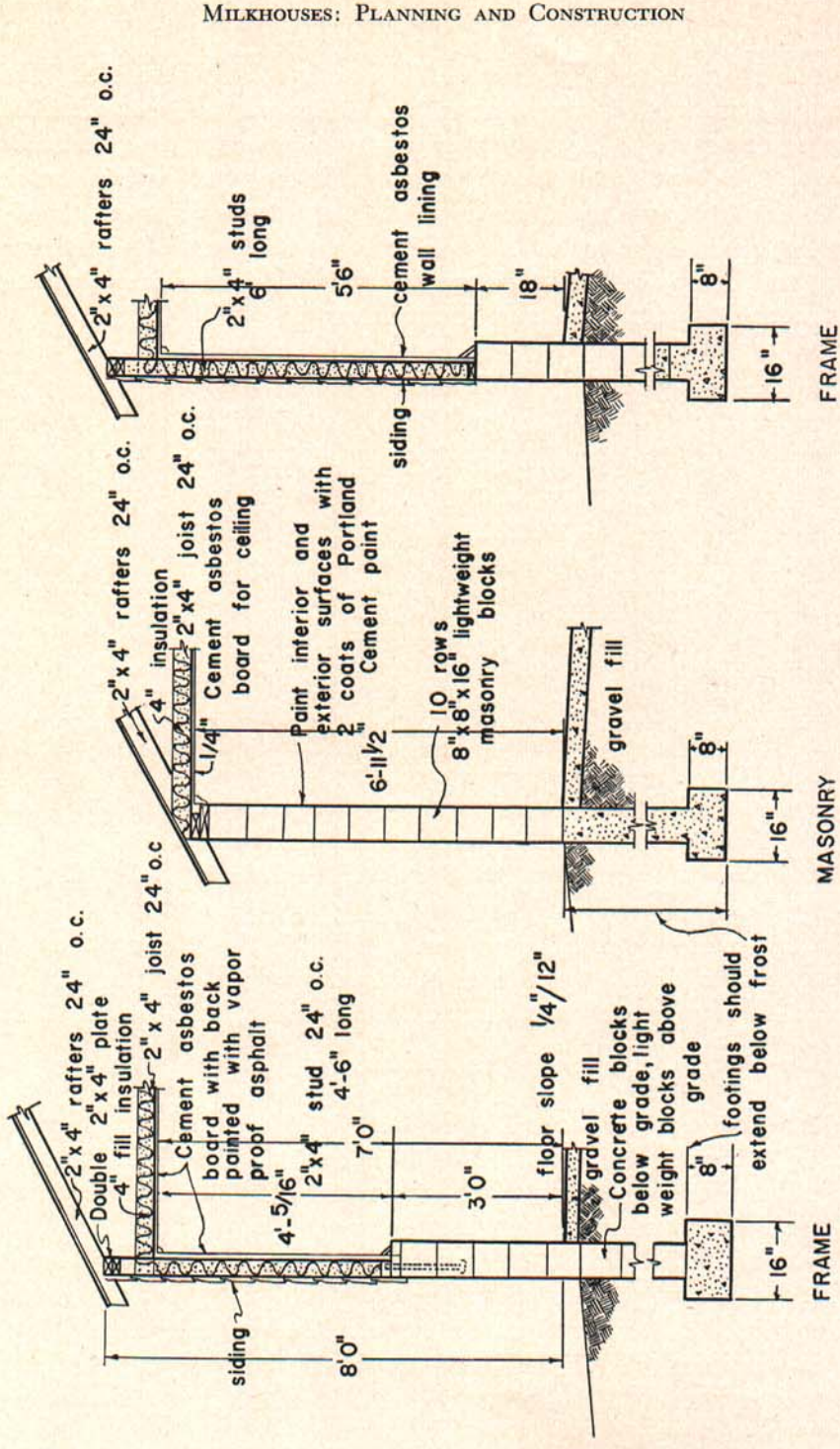

Fig. 6. Wall sections for a farm milkhouse.

and it's desirable to have a second light over the milk cooler. The light over the wash vats may be either a standard bulb and an RLM type reflector above, or a fluorescent type fixture with a reflector above. This light should be placed over the front edge of the wash vat so the light will shine directly into and upon equipment that is being washed in the tanks. An incandescent lamp of 100 watts or a fluorescent lamp of 40 watts is recommended for use in the washing area, and a 75-watt lamp over the milk cooler.

Fig. 7. A cove can be made between the wall and floor with an ordinary milk bottle as a tool.

It is generally desirable to have a light on the loading dock or at the corner of the barn near the loading dock, so the area is lighted during the early morning and late evenings in the wintertime.

WIRING

More and more electrical equipment is being used in the milkhouse. It is much easier to install the electrical circuits at the time the milkhouse is built than to put them in later. The following outlets are recommended for a milkhouse:

Two light outlets; 220-volt outlet for the milk cooler; 220-volt outlet for the water heater; 220-volt outlet for space heater; two 115-volt outlets for portable equipment. And with bulk handling, one 220-volt outlet is needed near the outside entrance for the bulk milk pumper (Fig. 8); this outlet should also be close to the opening for the hose.

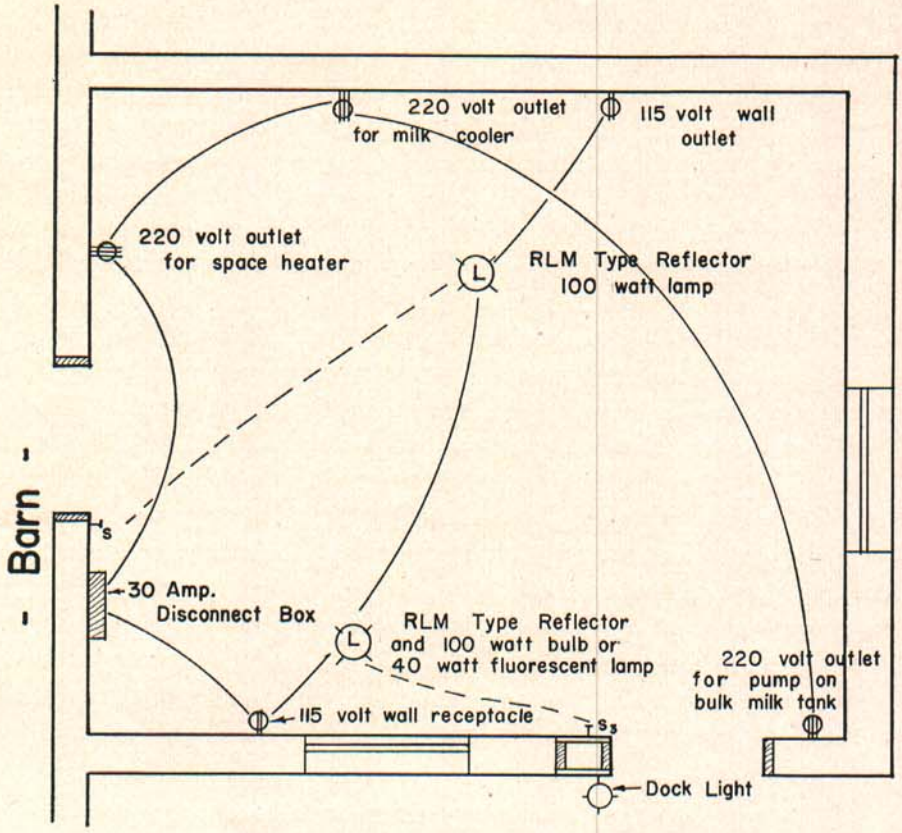

Fig. 8. Suggested wiring diagram for a farm milkhouse.

HEATING THE MILKHOUSE

Many farm operators have found it desirable to provide supplemental heat in the milkhouse to prevent the freezing of water pipes and accumulation of ice on the milkhouse floor.

One of the most satisfactory types of heat has been the 1500- or 3000-watt electric heater of the resistance type. This heater can be plugged into a 220-volt outlet and controlled by a thermostat maintaining a temperature of 32° to 40° F. in the milkhouse. A second economical method uses infra-red lamps over the wash vat to provide heat for the operator, and thermo-tape wrapped around the exposed portions of water pipe where there is danger of freezing. The infra-red lamps are generally controlled with a wall switch, while the thermo-tape is controlled with the thermostat.

Freezing may be prevented in those milkhouses connected to the barn by insulating the ceiling and side walls, if the sidewalls are framed. Storm windows and weather-stripping also help to reduce the heat loss. Locating the hot water heater and water pipes along the inside wall of the milkhouse will reduce the dangers of their freezing.

It is not economical to maintain milkhouse temperatures above 40° F. throughout a twenty-four hour period. It is more desirable to provide a heat source, such as infra-red lamps, to give instantaneous heat only while the operator is using the milkhouse.

Bottled gas heaters in the milkhouse work very satisfactorily. But adequate protection against fire hazard should be provided. All bottled gas heaters should have an automatic shut-off on the pilot, and should be vented to the outside through a flue that does not come in contact with combustible material.

Experience has shown that it costs less to heat a milkhouse if the farm operator chooses that type of heat used in greatest quantities on his farm. If bottled gas is used for other appliances, it is economical to use it for heating the milkhouse. If electricity is used in water heating and cooking, then it will be the most economical method of heating the milkhouse.

EQUIPMENT NEEDED IN THE MILKHOUSE

The purpose of the milkhouse is to provide facilities for (1) cleaning and storing utensils necessary in the production of milk, and (2) to house equipment for cooling and storing the milk.

Cleaning and Storing Utensils

Equipment required by law for a producer selling milk for bottling purposes consists of a two-compartment wash tank, metal rack for storing utensils, and water heating facilities that will provide an adequate supply of hot water.

In addition, a solution rack might be desired for the teat cup assembly of the long tube milking machines if wet storage of the rubber is practiced. A 0.4 percent lye solution for storage has been found to maintain inflations in the most sanitary, as well as the best physical, condition. (See extension folder F-159, *Keeping Your Milking Machine Clean.*)

A hot lye solution treatment once a week is recommended for rubber parts of the machine, to remove the fat and bacteria that have worked into the pores of the rubber. Figure 9 shows an electrical appliance made of stainless steel which will lye-boil two sets of inflations and rubber hoses at each loading. An enclosed container such as this makes it convenient to do a job which is otherwise often neglected.

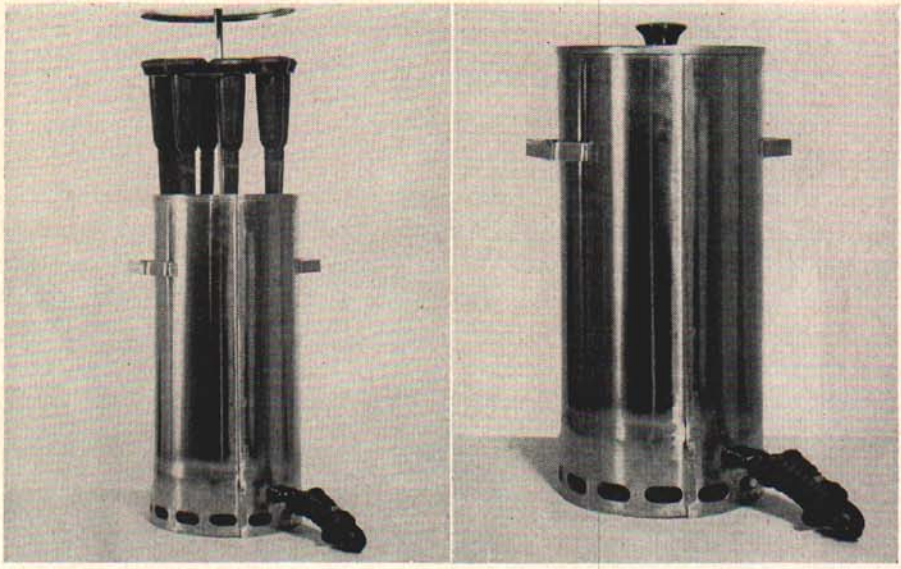

Fig. 9. Stainless steel container, with electrical connections, for boiling rubber milker parts in lye. Container open (left); container closed (right).

Cooling and Storing of Milk

Milk or cream is highly perishable; therefore cooling facilities are needed for their storage. For quick cooling to a temperature below 50° F., some type of mechanically refrigerated cooler is necessary. Two types of can coolers have been widely used for farm cooling:

(1) The immersion or water bath cooler may be of the commercial type, or of the farm-constructed type. The commercial coolers range in size from 2 to 12 cans, while the home-built coolers are generally made for 6 to 8 cans.

(2) The side-opening, spray-type cooler reduces the labor in handling the cans and provides satisfactory cooling. The initial cost of the side-opening cooler is higher than that of the immersion type.

A mechanical cooler in good working condition will use from ½ to 1¼ kilowatts per 10-gallon can. It averages approximately 1 kilowatt for each can of milk cooled from milking temperature to 50° F. The milk cooler should accomplish this within a period of one hour.

PLAN FOR THE FUTURE

Farmers who are now building milkhouses should anticipate that in the future they may shift to bulk handling of milk. (See Extension Folder F-178, *Bulk Tank Cooling of Milk on the Dairy Farm.*) Bulk tank pickup may be contemplated for your area. It is possible to install the bulk tank on legs, and to "can" off the milk for shipment until the route is established.

The milkhouse design should consider the size of the cooler, the position of the cooler in the milkhouse, and the access to the milkhouse by the tanker truck which picks up the milk in bulk. *When milk is handled in bulk, the usual practice is to pick up the milk every other day on what is called "skip-a-day" pickup. Therefore, a bulk*

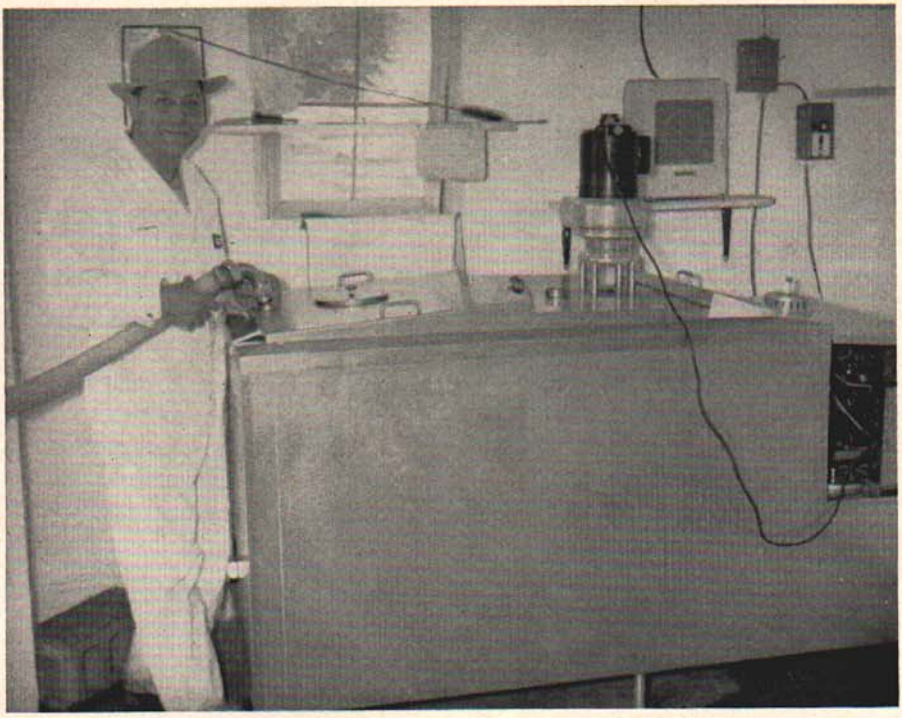

Fig. 10. A top-emptying bulk milk cooling tank.

refrigerated tank should be large enough to hold a minimum of two days' milk. (Table 1.) Figure 10 shows a top-emptying bulk tank. The milk is being pumped out by a pump mounted on the pick-up tanker.

The following factors should be kept in mind when planning a milkhouse for handling milk in a bulk refrigerated tank.

TABLE 1—Capacity and sizes of refrigerated bulk milk tanks

Number of 10-gallon cans of milk produced daily	Minimum size of bulk tank needed, gallons	Minimum dimensions of milkhouse to accommodate bulk tank
5 cans	100 gal.	10′ x 12′
5-7 cans	150 gal.	10′ x 12′
7-10 cans	200 gal.	12′ x 14′
10-15 cans	300 gal.	12′ x 14′
15-20 cans	400 gal.	12′ x 14′
20-25 cans	500 gal.	12′ x 16′

1. At least 18 inches should be provided between the bulk tank and the wall to provide adequate space for cleaning the tank.

2. If a valve is placed at the end of the tank for emptying, additional space is needed for connecting the hose. When end space is limited, a top-emptying tank will work satisfactorily. The top-emptying tank is less expensive because it is not necessary to buy an outlet valve. However, an outlet with a cap is provided at the bottom of a top-emptying tank so that water may be drained out, after washing.

3. It is necessary to provide an electrical outlet for the motor on the bulk pickup tanker in addition to the electrical service for the cooler. This motor is usually from ¾ to 1 hp., 220 volts.

4. The door to the milkhouse must be large enough to get the tank unit in. A 3-foot door with a 12-inch removable panel will allow the movement of coolers up to 500 gallons in size.

5. A small 8 x 8-inch opening with a hinged door should be provided for placing the hose from the tanker to the bulk milk tank in the milkhouse. A commercial unit is manufactured for this purpose. This opening should be placed next to the main entrance door to the outside.

6. It is important that good ventilation be provided around the refrigeration unit. It may be necessary in some cases to cut an additional louvered opening through the wall to get sufficient ventilation.

7. Cold water must be provided by a pressure system for the tanker operator to rinse the tank after he removes the milk.

8. A record box, chart, or board must be handy for the tanker operator to record the temperature and weight of the milk removed from the bulk tank. This box should be separate from the one provided by the farmer for his own information.

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