The Farm Milk House
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THE FARM MILK HOUSE

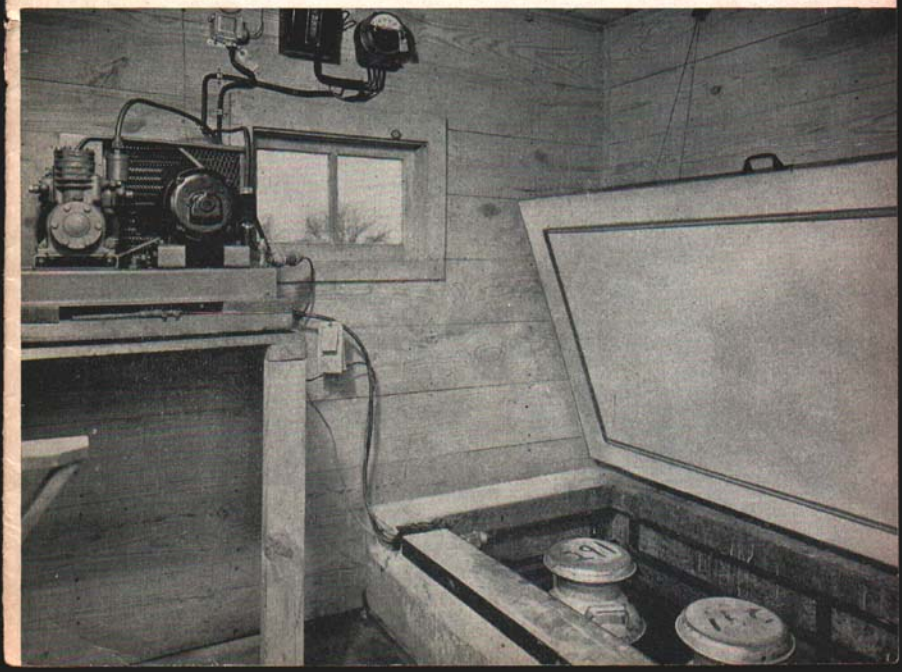
By A. J. Bell and J. M. Jensen

MICHIGAN STATE COLLEGE :: EXTENSION SERVICE

EAST LANSING

Cooperative Extension Work in Agriculture and Home Economics, Extension Service, Michigan State College and the U. S. Department of Agriculture Cooperating.

A Well Built and Properly Insulated Cooling Tank Insures Quality Milk



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Title page illustration, courtesy Detroit Edison Company.

The Farm Milk House

By A. J. BELL and J. M. JENSEN

CARE OF MILK

MILK IS PERHAPS the most delicate of all foods the farmer handles. It readily absorbs flavors from the surrounding atmosphere and is an excellent food for all classes of bacteria. The farmer, therefore, should take every possible precaution to avoid contamination of the milk by bacteria and foul odors. Additional care must be taken to retard the growth of those bacteria that contaminate the milk during its production.

It is recognized that bacteria find their way into milk chiefly from four sources:

(1) Cow's udders
(2) Cow's flanks
(3) Atmosphere
(4) Utensils

Although of a less serious nature than other sources, utensils are generally the cause of the greatest degree of contamination.

Dust floating in the atmosphere is not ordinarily considered a serious source of bacterial infection for milk unless it is excessive—such as would be the case if the barn were swept during milking, or if hay were handled in the barn during or immediately before milking.

Whether in the barn or in some other room where pungent odors exist, milk absorbs odors very readily. As soon as it is drawn from the cow the milk should be removed from the barn to a clean, well-ventilated milk house. Here it should be strained, cooled, and stored until delivered.

Immediate cooling of milk to 50° F. will practically check the growth rate of bacteria for various holding temperatures is cited by Prucha* of Illinois as follows:

Holding Temperatures	Increase in 24 hours
80° F.	3,000 times
70° F.	750 times
60° F.	15 times
50° F.	5 times
40° F.	0 times

Cooling tanks as a holding and cooling arrangement are favored more than surface cooling in conjunction with the holding tank. Surface coolers

*University of Illinois Circular No. 341—"Producing High Quality Milk," by M. J. Prucha.

are effective in lowering the temperature but, owing to difficulty in sterilizing, frequently add many bacteria to the milk.

The so-called in the can coolers have found favor with numerous producers. These coolers stir the milk with a small propeller, while cold water flows over the outer surface of the can. Where these coolers are employed it is essential to provide a rapid flowing drain from the milk house.

Milk utensils should be washed and housed in the milk house. Hot water heaters of various types which are now on the market, make this possible. Perhaps the most common form of heater is the kerosene stove. Where electricity is available a very convenient heating unit can be purchased that is placed in the water to be heated. It is very quick in action, does not present a fire hazard, and can be hung out of the way after each usage.

Milk utensils should be placed on a rack following washing. It is best to have such a rack near the window where sunshine enters. Sunshine freshens the milking equipment and is in itself an excellent destroyer of bacteria.

One of the important factors in the production of quality milk is the proper cooling and holding of milk until it reaches the consumer. An efficient milk house makes this easy to do. It is the purpose of this bulletin to show plans of houses conveniently located and arranged which will permit the production of high quality milk with a minimum of time and labor.

LOCATION OF MILK HOUSE

The milk house should be located on a clean, well-drained site, away from the manure pile and other objectionable surroundings.

It need not be more than a few feet from the barn. A covered passageway may separate the two, provided a swinging door is placed at each end of the passageway. At least one door should be closed at all times to prevent the entry of dirt and odors from the barn to the milk house.

THE COOLING TANK

The heart of the milk house is the cooling tank. In former years the galvanized tank and the plain concrete tank were accepted for milk cooling purposes. Investigations disclosed that these tanks did not permit proper cooling and storing. The insulated cooling tank with insulated cover is now required by boards of health of all milk producers whose milk is sold in the larger cities of Michigan.

CONSTRUCTION OF TANK

It was thought formerly that the entire house should be insulated. Recent experiments indicate that it is more economical and just as satisfactory to confine the insulation to the tank. Fig. 1 shows how the insulation is used in constructing the tank.

The foundation and walls may be erected first, or the tank may be made first with the foundation and walls built around it. In no case should the wall of the tank serve as the wall of the house. These should be separate units with tar paper between so as to separate them completely. This is to reduce the chances of damage to the tank by frost heaving the walls of the house.

Under ordinary conditions, an excavation 18 inches deep is made. After setting the intake and overflow pipes, 4 inches of concrete are poured to form a sub-base. After this has set, 3-inch waterproofed insulation packages* are laid on this sub-base. The outside and inside forms are next placed, and the insulation packages are stood on edge in the middle of the forms. These are held in position by triangular wedges while the floor and walls are being poured.

The drain pipe should be 2 inches in diameter. It should terminate with a coupling at the bottom of the tank. This is to allow easy draining of the tank. When the tank is to be filled, a pipe 21 inches long is screwed into the coupling. Anchor bolts are placed in the top of the tank by which a 2 x 10 coping is fastened.

AMOUNT OF INSULATION FOR TANKS OF VARIOUS SIZES.

No. of cans	Ends		Sides		Bottom	
	18 x 36	9 x 36	18 x 36	9 x 36	18 x 36	9 x 36
2.....	2	2	4	2	2	2
4.....	2	4	4	6	4	3
5.....	2	4	6	5	5	3

The cover is made of a 2 x 6 frame covered on the underside by 26 gauge galvanized iron and on top by 6-inch matched flooring. The 2-inch space between is filled with four layers of ordinary one-half inch board insulation. If desired, a gasket of soft rubber may be nailed around the cover to seal the tank completely. Counterweights may be added to assist in raising the cover.

The insulation in the bottom must be cut at the in-take and out-take pipes. The hole should be cut at least an inch larger than the pipe. This hole is filled with asphalt mastic to insure a moisture-tight joint.

The end insulation must also be cut to allow it to fit inside the side insulation. This raw edge must be covered with asphalt mastic.

*Owing to war conditions this waterproof package is not available. Use 3 layers of 1-inch board cut to fit.

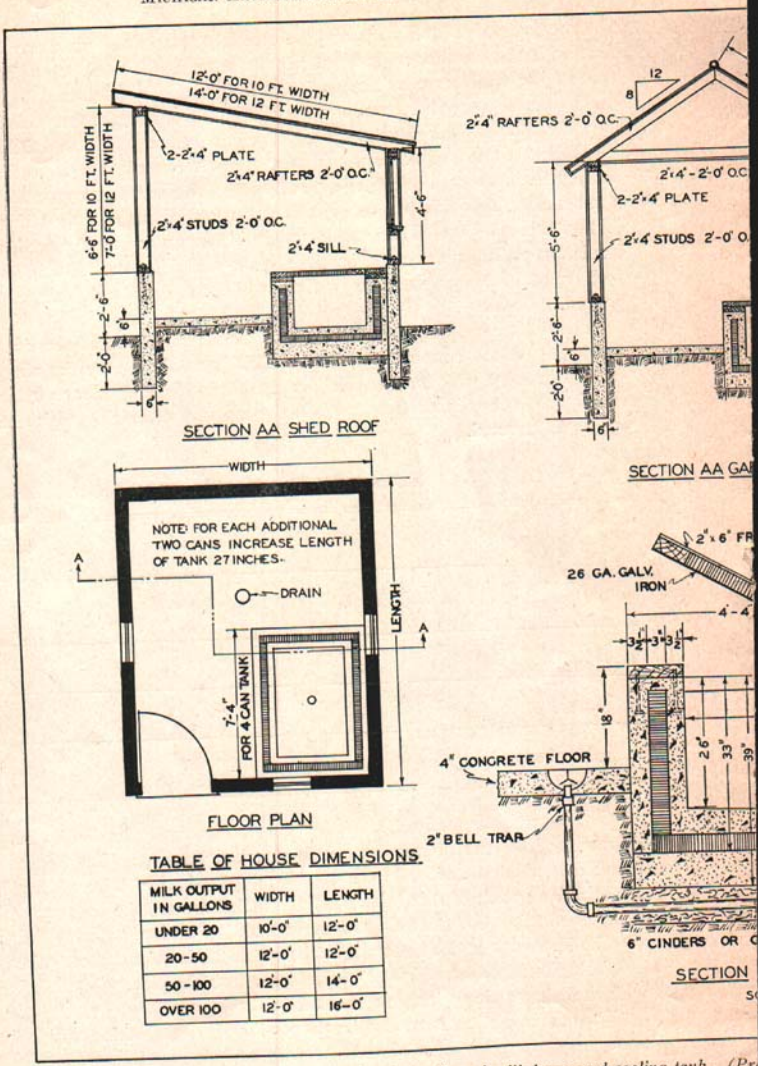
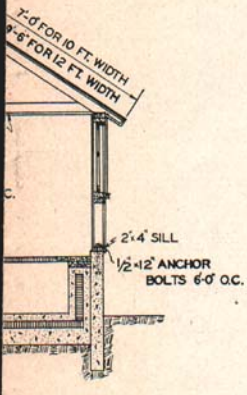
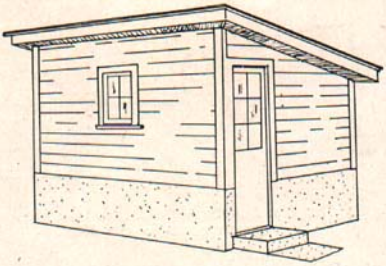


TABLE OF HOUSE DIMENSIONS

MILK OUTPUT IN GALLONS	WIDTH	LENGTH
UNDER 20	10'-0"	12'-0"
20-50	12'-0"	12'-0"
50-100	12'-0"	14'-0"
OVER 100	12'-0"	16'-0"

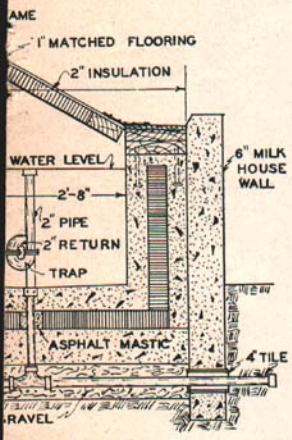
Fig. 1. Details of construction of milk house and cooling tank. (Pr





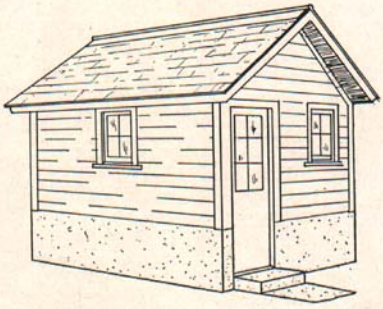
PERSPECTIVE - SHED ROOF

BLE ROOF



THRU TANK

CALE: 1" = 1'-0"



PERSPECTIVE - GABLE ROOF

MICHIGAN STATE COLLEGE AGRICULTURAL ENGINEERING DEPT. EAST LANSING MICH.		
MILK HOUSE		
PLANNED - C.H.J DRAWN - H.J.F. TRACED - H.J.F. CHECKED - C.H.J	APP. BY DATE 5-15-38 SCALE 3/8"=1'-0"	SHEET 1 OF 1 FILE 1-C NO. 75210-13

(Prepared by C. H. Jefferson of Agricultural Engineering Department.)

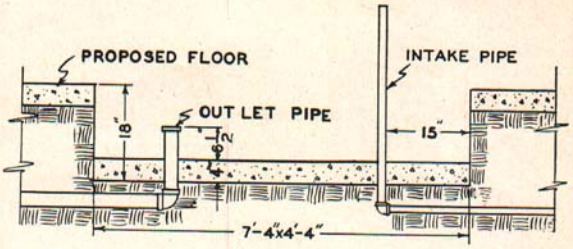


Fig. 2. Step No. 1 shows the excavation for the tank with the concrete sub-floor in place.

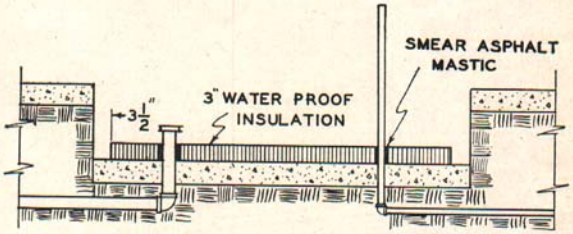


Fig. 3. Step No. 2. Here the 3" water-proof package insulation has been placed on the cement floor. Note that a 3½" space is left all around the insulation for the concrete wall. The insulation should be arranged as shown in Fig. 4 (below).

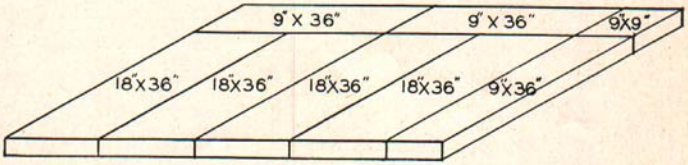


Fig. 4. Method of arranging the insulation packages for the floor of a four-can tank.

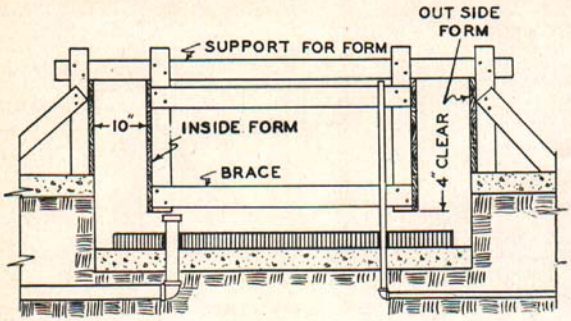


Fig. 5. Step No. 3. The outside forms have been placed for the wall of the tank and the inside forms are supported on the outside forms. Bottom of inside forms should be 4 inches above floor insulation.

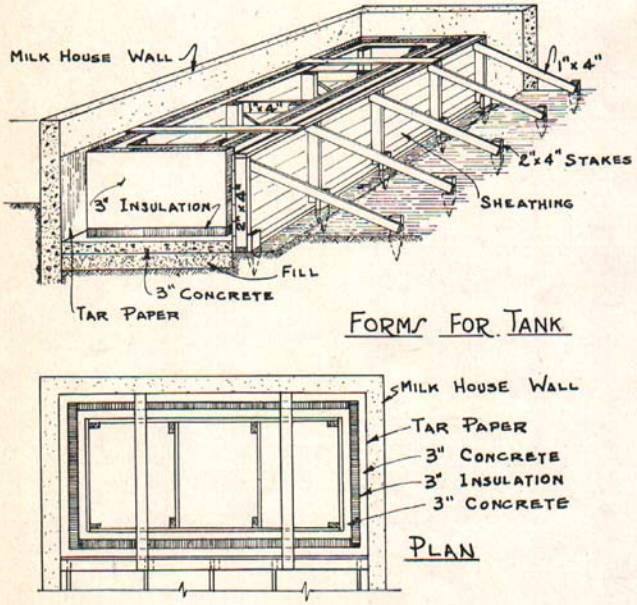


Fig. 6. Another method of setting inside and outside forms for the concrete tank. Note the insulation in place before the concrete is poured.

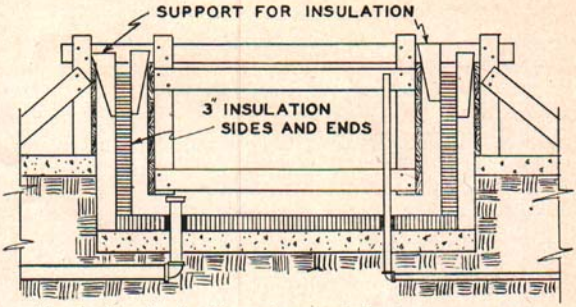


Fig. 7. Step No. 4. The package insulation is placed in the center of the wall space and held in place by the wedges at the top. See details for arranging insulation in Fig. 8 (below).

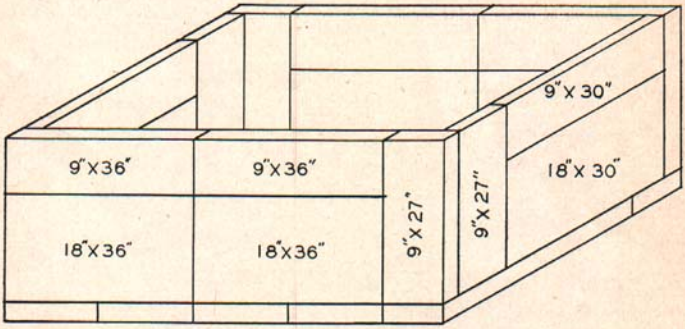


Fig. 8. Method of arranging the insulation for the side walls of a four-can tank.

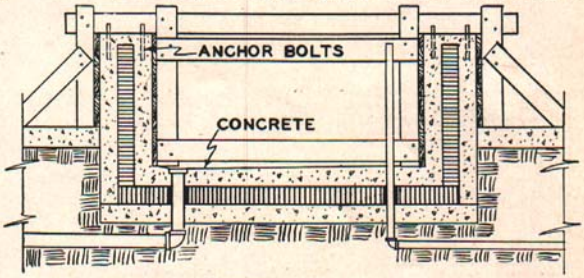


Fig. 9. Step No. 5. Concrete is first placed on the floor to the height of the side forms, then the wall space is filled on either side of the insulation. Anchor bolts should be placed in the top of the concrete wall for attaching the plate. The nuts of the bolts should be countersunk below the top of the plate.

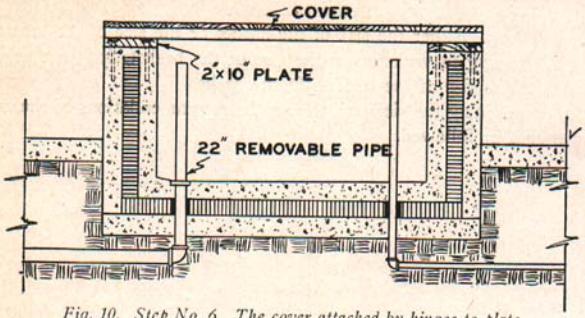


Fig. 10. Step No. 6. The cover attached by hinges to plate.

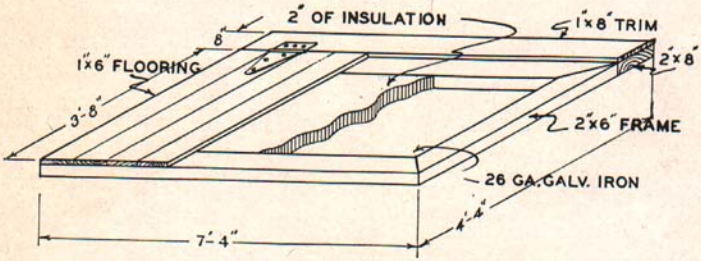


Fig. 11. Step No. 6 shows details of the construction of the cover.

It is suggested that the walls of the house be built of concrete 6 inches above the top of the tank. The superstructure may be of cement, cement blocks, or lumber.

This tank is adaptable to electric cooling, either when new or later. There are two types of cooling units: (1) The immersion, and (2) blower. There are two kinds of immersion coolers. The older type is a series of copper tubes built into a basket that extends around the sides of the tank. This coil is connected to the compressor which may be some distance away. The other one is a self-contained compact unit with the compressor and coils close-coupled. The compressor is located on top of the cooling box with the coils extending down into the water.

The blower type operates without water. Air, cooled by the compressor, is blown into the holding compartment, thereby preventing any rise in temperature.

Any of those types, except the coil basket, may be used in this tank without alteration. Either the size of the basket or the size of the tank must be changed. Owing to variation in the size of the baskets it is not practical to standardize the size of the tank to fit the basket.

When determining the size unit to use, the recommendations of the manufacturer should be followed.

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