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Trade increases the wealth and glory of a country; but its real strength and stamina are to be looked for among the cultivators of the land.—*Lord Chatham*

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The Farm Supply of Ice Should Be Stored Now*

A Plentiful Supply of Ice is the First Essential in the Care of Milk and Cream—*By Prof. R. W. Brown*

THE principles underlying the proper care of milk and cream are fairly simple. They are summed up in two words—clean and cool. Both are important, since milk or cream produced under the best of conditions from the standpoint of cleanliness may be of poor quality when delivered to the milk depot or creamery, if it has been sufficiently cooled upon being drawn from the cow, or after coming from the cream separator.

Air and water are the natural cooling mediums. The temperature of air during the season in which the bulk of milk and cream are produced is too high to be a good cooling medium. Air has a very low capacity for heat compared with water. One cubic foot of water will absorb as much heat as 3,520 cubic feet of air for the same rise in temperature. Water, in the majority of cases, is too scarce or too high in temperature to be a suitable cooling medium alone. On the average it will require three times as much cold well water as there is milk to cool it sufficiently to be safely left overnight. It is obvious, then, that special provision should be made for a supply of ice.

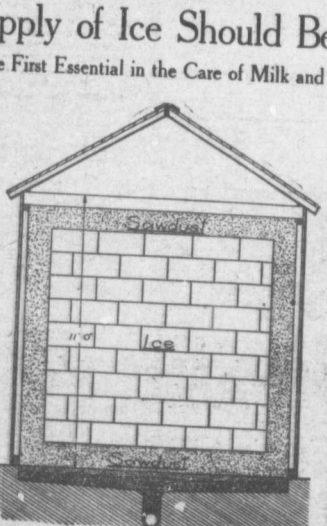
For practical purposes it is usual to consider 10 lbs. of ice as having the same cooling value as 130 lbs. of cold well water. That is to say, 10 lbs. of ice and 100 lbs. of cold well water have the same effect in cooling warm milk as 200 lbs. of cold water. The amount of ice that should be stored on any particular farm to meet all requirements will of course depend upon many different factors, chief among these being the accessibility and cheapness of the supply, whether milk or cream is to be cooled, the temperature of the well water in which the ice will be used, the amount desired for household purposes, and the manner in which the ice is stored.

From actual tests made by the United States Department of Agriculture, under dairy farm conditions where various styles of cooling tanks were used, it was found that 1.16 lbs. of ice were required per lb. of cream, in order to deliver same in a sweet condition from one to four days old. A cow yielding 3,500 lbs. of milk containing 3.7 per cent. fat, will produce about 431.00 lbs. of 30 per cent. cream. This multiplied by 1.16 gives 500 lbs., which is the amount of ice required per cow, when ice is kept floating in the water in which the can of cream is placed. If milk is cooled it will require from two and a half to three times as much ice as when cream is cooled. From 20 to 50 per cent. shrinkage takes place in the storage, depending upon the style of ice house used and how well the packing is done. Choosing the maximum shrinkage, one should figure on storing 1,000 lbs. of ice per cow when cream only is cooled, and 2,500 to 3,000 lbs. per cow when milk is cooled. For household purposes, 50 lbs. per day for four months is the minimum that should be stored, which would amount to approximately three tons.

Equipment.

The tools necessary for cutting a small lot of ice are: one saw, two pairs of tongs, two ice hooks, a pointed bar, and a number of planks to assist in getting the ice out of the water. If there is a crust of snow over the ice, this can be loosened to good advantage with an ordinary disc harrow. The size of block cut should not be larger than two men can handle easily. Blocks 22 x 22 inches in size are often cut, but they may be too heavy for hand work if the ice is much thicker than 18 inches. Blocks this size will weigh about 290 lbs. each, requiring seven to make a ton.

A straight edge and a right angle should be used in marking out the field. It is important to have straight sawing done, so that the cakes will fit closely together in packing. However, when sawing out the first strip, it should be cut slightly narrow at the top. This being pushed down out of the way will facilitate making a start.



Section of a practical ice house. The one illustrated is 12 feet square and will hold 20 tons of ice. A 10 foot house would hold 10 tons.

Many styles of ice storages are in use. The best ice house is the one which best meets local conditions. Among the conditions to be considered are the amount of money which one should invest, the desire to make the farm buildings harmonize, the existence of structures already on the place which may be utilized, the cost and accessibility of insulating material, and the first cost of the ice. The main essentials in the proper storage of ice are: good drainage from the melting ice, to have it well insulated and provision made for good ventilation over the ice and around the outside of the house, in case the storage is partly or wholly above ground.

Many people store ice in caves, pits or old wells. These may well be used if no other storage is available. However, they entail much labor in putting the ice in and hauling it up again. If the soil is naturally porus, no artificial drainage need be provided, nor will it be necessary to place boards around the sides, if the soil is not inclined to cave. Much less shrinkage would occur if sawdust, chaff or cut straw were packed all around the ice and poles placed on the bottom to keep the ice out of water which might accumulate. A deep post hole in the bottom will assist admirably in drainage.

Making Ice in Storage.

If an abundant supply of water is handy, the pit or well may be filled gradually, and a solid mass of ice obtained. Water should be added to a depth of a few inches at a time, and allowed to freeze solid. In this case, building paper should be laid at intervals of a foot or so, in order that the ice may be taken out in layers. Some advise sprinkling the sides of the pit with water, and allowing it to freeze before filling is begun. A pit eight feet square and eight feet deep will hold about 12 tons of ice, allowing a depth of one foot at the top for insulating material. Some form of roof should be built over the pit. It may be only a rough structure built of poles, which are covered with earth and sod. If the roof is built of lumber, siding should be nailed on both sides of the rafters. The space between the boards should be filled with mill shavings or some other good insulating material.

Where there is no available place at present in which to store ice, I think rather than do without ice next summer, farmers should stack it. Select a well-drained site and place poles on the ground to further provide for drainage, and insulate well all around the stack with sawdust, straw, prairie hay or flax straw. This method is often used by ice companies when their storages have been filled.

The Ice House.

Those who decide to build an ice house next summer should choose between two general types. First, there is the cheap style with a single ply of boards nailed to posts or studding, to form the sides. It should have a tight roof and proper drainage provided for. Drainage is obtained in a non-porous soil by excavating to a depth of eight to 10 inches. The floor should slope slightly toward the centre. Here a trench is dug, 12 to 18 inches deep. This excavation is filled with broken stones, finished off with a few inches of cinders. A board or two is left off the gables, and a space left open under the eaves to provide for good circulation of air over the ice.

The house should be of such a size that the ice when packed forms a cube, since in this way the minimum surface is exposed. With this style of house, it is necessary to provide for a thickness of 18 inches of sawdust under the ice, one foot all around and two feet over the top. With this amount of insulation, a house 10 x 10 x 10 feet will hold 10 tons, or about 100 cubic feet per ton, including the packing material. If it is desired to store 20 tons, a house 12 x 12 x 13 feet would be the most economical size, allowing about 86 cubic feet per ton of ice, including the packing material. Chaff, cut straw, flax straw, or prairie hay may be used, but these require about twice as much space to equal sawdust in insulating value. Some method must be used to dry the sawdust after it has been used. A good plan is to have a lean-to built to the ice house, into which the sawdust is shovelled as the ice is taken out. Never have the sawdust more than two feet deep over the ice. Another plan is to put it into sacks, and set these out in the wind to dry. In this way life sawdust may be used over and over with good results.

Make Air-tight.

When the ice is being packed great care should be taken that no spaces are left between the blocks. They should be placed so that all joints are broken, made to fit as closely together as possible, and the remaining spaces well tamped full of snow and chips of ice. The house should be well banked all around the bottom outside to avoid any possible leakage of air. Air in an ice house should be thought of as a liquid. If there are any openings from the bottom of the ice and spaces between the blocks, the cold air drains off and draws the warm air at the top, causing rapid melting.

The second type is the well built house which requires no insulation around the ice, except that which is built into the walls. Such a house may be built of wood, solid concrete, concrete blocks, hollow tile or clay tile. In each case, proper use in the construction must be made of some one good insulating material, such as sawdust, mill shavings, pressed granulated cork and mineral wool or lith. Shavings

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*An address delivered at the recent Manitoba Dairy Association Convention.