and supper this evening and also dinner tomorrow. You are all invited to go there and get your dinners.

We have arranged for a smoker in this room this evening. Now, there are no charges for this smoker. Come up here and enjoy yourselves and visit. We will have some refreshments about 8:30 and we will enjoy our smoker until 9:30. Last night quite a number of the boys went to the Elks Club and had a good time. The hospitality of the Elks has never been excelled and they are going to arrange for a sort of entertainment at 9:30 for us.

Mr. Strozinsky: Our next speaker on the program is William White, Dairy Division, U. S. Department of Agriculture, Washington, D. C. I now take great pleasure in introducing Mr. White.

Mr. White: Members of the Wisconsin Butter Makers' Association,

Ladies and Gentlemen:

My trip to Wisconsin on this occasion is to me in the nature of a home coming. Ten years ago I was a Wisconsin butter maker, called Wisconsin my home and was a member of its butter makers' association. During my residence in Wisconsin I acquired a life partner so that I have been in a way tied to Wisconsin ever since even though I have been absent from the state. I am mentioning this because I do not want you to look upon me as a stranger coming into your midst, but rather as one who has been absent and has returned to partake of your annual festivities. The subject which your secretary asked me to discuss today is one that is far from new so I won't be able to present any new or startling facts.

THE USE OF ICE BY WISCONSIN CREAMERY PATRONS

William White, Dairy Division, Washington, D. C.

In order to eliminate a discussion of the subject of quality of milk and cream delivered to creameries and the desirability of having the patrons keep their product in first-class condition, I will assume that the cooling of milk and cream on the farm is an
important factor in the manufacture of good butter, and is a practice that every creameryman urges his patrons to adopt and to follow faithfully.

It is a commonly accepted fact that the best way to cool milk and cream is by using cold water—the colder the better. I wish to call to your attention the desirability of having ice on the dairy farm so that ice water may be used for cooling purposes and will undertake to show why ice is needed for effective cooling and that the use of ice does not entail any great amount of labor or expense.

The cooling tank is a part of the dairy equipment on many farms and can be credited with doing much toward keeping the milk and cream in good condition. Unfortunately, the cooling tank is subject to considerable abuse and has certain limitations. If sufficient water is used or if the water flows continuously through the cooling tank milk and cream can be cooled to about the same temperature as the water, which on most Wisconsin farms, I believe, is about 50° F.
Let us consider what happens when a can of warm milk or cream is placed in a tank of cold water. The cold water, of course, cools the milk or cream but in doing so it absorbs heat until, finally, the temperature of both the water and the milk or cream are the same. If a 10-gallon can of milk or cream at a temperature of 85° F. is placed in a covered wooden tank containing 30 gallons of water at 50° F. the final temperature of both milk and water, under average summer conditions will be about 60 F. If water is pumped until a fresh 30 gallons of water has replaced the first lot the temperature of this water will rise to 53° in cooling the can of milk to that temperature. Six times as much water as cream is used to cool the cream to within 3° F. of the water, and unless the milk and water are stirred frequently this temperature will not be reached in less than 3 hours. When the water flows continuously so that it does not remain in the tank long enough to absorb all the heat it can, a much larger quantity of water is used to effect the same cooling. By having water flow continuously, however, the cream will ultimately—that is, after about 3 hours,—be cooled to the same temperature as the water and have no opportunity to become warm. I believe relatively few Wisconsin farms can be arranged to have water flow continuously through a cooling tank and in many cases the quantity of water used for cooling purposes is limited to the quantity that the stock drink. In warm weather when water stands in the cooling tank for several hours during the day or through the night it absorbs heat from the atmosphere and frequently reaches a temperature of 60 or 70° F. before it is replaced by a fresh supply.

This great rise in temperature can be prevented by pumping fresh water every hour or so but it requires someone’s time and attention to do this. If a wind mill is depended upon there are many days when there is no power. If a gas engine is used some one must take the time to start and stop it. If the water must be pumped by hand there is still less likelihood that frequent changes will be made, especially when the well is deep. On many farms where all the cooling water flows to the stock tank, in order to avoid having it overflow the quantity of water used is not sufficient for effective cooling. So our observations have been that on most farms the temperature of the water and, therefore, of the cream, rises during warm weather to 60° or 70° F., that is, the cooling tank is not as effective as it might be, and, as a
result, cream held in cooling tanks often becomes sour in 48 hours or less.

Cream may however, readily be cooled to a temperature below 50° F. and kept below 50° F. if the effectiveness of the cream cooling tank is increased by the use of ice.

Dairymen in certain parts of New England are delivering practically all their cream sweet, although it is often held on the farm from one to four days in summer and from one to seven days in winter. After it reaches the creamery it is pasteurized and shipped a distance of from 50 to 300 miles, where it is sold in the form of sweet cream. These results are accomplished by the liberal use of ice.

It is true, of course, that these New Englanders are required to deliver their cream sweet or it will not be accepted. If Wisconsin creamery patrons were required to deliver their cream sweet they would soon find a way to do it. The whole-milk creamery can not accept sour milk because of the difficulty of running it through the separator; the cheese factory, condensary and market-milk plant can not use sour milk and must refuse it. In such cases it is easy to show the dairymen what he is losing by not caring for his product. We have a record of one creamery that last year rejected $2,600 worth of sour milk and cream. This represents a very considerable loss to the farmers of that one community. Unfortunately, sour cream can be accepted by the creamery and made into butter and very few creameries insist that cream be delivered sweet. The losses suffered by the creamery patrons because of sour and under-grade cream can not readily be determined but our observations indicate that they are very large. It is for the purpose of reducing these losses and of improving the quality of the butter manufactured, that I urge the use of ice.

I have already mentioned the difficulties of maintaining cold water in the cooling tank, the time and attention that one must give to it. I wish you would compare this with the labor involved in the use of ice and believe you will decide that the man who honestly tries to keep his cream cold can do so with less mental and physical effort if he uses ice and if he pumps fresh water into the cooling tank often enough to keep the cream at a temperature of not more than 4° F. above the temperature of the well water. And he will accomplish more by his efforts because he will keep his cream several degrees colder.
The use of ice, of course, involves climbing into the ice house every day during the summer and digging out a cake of ice. But that is all there is to it. With a good sized cake of ice floating in the cooling tank—the quantity of ice can be determined by experience,—a man can place his can of cream in, put down the cover and go to his day’s work in the field or to his night’s rest, knowing that his cream will require no further thought or attention.

The kind of cooling tank and its location are important factors in the cooling of cream and any dairymen who is sufficiently interested to put up ice should see that he has a cooling tank that will conserve the cold so that it will not be dissipated in the atmosphere but will perform its intended function of keeping the cream cold.

On about 80 per cent of the farms that produce market milk in the United States some kind of tank is used for cooling milk. A survey of many thousand dairies showed that about 20 per cent of the cooling tanks were of metal, 25 per cent of wood, and 30 per cent of concrete, the remainder being of miscellaneous materials. Very few tanks in use are insulated, and in very few cases is provision made to minimize the loss of cooling due to radiation. Where running water or plenty of ice are available it may be unnecessary to insulate the tank. Usually, however, the saving of ice and the greater cooling effect obtained by means of insulation justify the additional expense.

The relative loss of cooling effect in different kinds of tanks expressed in pounds of ice melted is shown in the following table.

<table>
<thead>
<tr>
<th>Type of Tank</th>
<th>Tanks without covers exposed to sun</th>
<th>Tanks covered exposed to sun</th>
<th>Tanks without covers in milk house</th>
<th>Tanks covered in milk house</th>
</tr>
</thead>
<tbody>
<tr>
<td>Galvanized-iron tank</td>
<td>168</td>
<td>111</td>
<td>107</td>
<td>84</td>
</tr>
<tr>
<td>Plain concrete tank</td>
<td>137</td>
<td>88</td>
<td>80</td>
<td>61</td>
</tr>
<tr>
<td>Wooden tank</td>
<td>107</td>
<td>38</td>
<td>50</td>
<td>30.5</td>
</tr>
<tr>
<td>Cork-insulated wooden tank</td>
<td>80</td>
<td>12</td>
<td>30</td>
<td>7.6</td>
</tr>
</tbody>
</table>

Size of tank—60x30x25 inches.

The economy of an insulated tank and the importance of covering and shelter are very evident. The galvanized-iron
tank, without cover and exposed to the sun, showed a loss of 168 pounds of ice compared with only 7.6 pounds for the cork insulated wooden tank properly covered and placed in the milk house. These figures show that whether ice is used or not the cooling tank will keep the cream colder, (1) if it is equipped with a cover (2) if it is situated in the milk house away from the sun and hot wind and (3) if the tank is insulated.

The insulation of cooling tanks is especially important and should be given more attention. If it is desired to insulate a tank at the lowest possible cost, six inches of dry excelsior, shavings or sawdust tightly packed on the sides, bottom and cover will answer the purpose very well if kept dry.

A more desirable tank though can be made of concrete, insulated with 2 inches of cork or other good insulating material. The total thickness of the walls should be 8 inches, divided into an outside wall of 2 inches, then 2 inches of good insulation and the inside wall 4 inches thick. The concrete mix should consist of 1 part Portland cement, 2 parts clean, sharp sand, and 4 parts broken stone or gravel. For the purpose of waterproofing, hydrated lime equal to 10 per cent by weight of the cement should be added to the mixture. The insulation used should be coated with and set in hot asphalt which should be allowed to become thoroughly dry before the inner walls of the tank are put up. The inside walls should be very carefully troweled so as to insure a smooth surface without projecting particles. The insulated tank is the ideal place to keep cream during the winter as the cream can be kept just above the freezing point by running just enough water in the tank to prevent freezing.

Having considered the necessity of using ice and the way to use it, let us now turn our attention to matters bearing directly on obtaining and storing it.

The cost of ice on the farm varies between wide limits because of the difference in local conditions. Ice can be cut at a cost of two to four cents a cake weighing 220 pounds, which is at the rate of 18 to 36c a ton. To this the cost of hauling and packing must be added which makes the cost when packed in the ice house about $2 a ton, or more than this if there is a long haul. This is what ice costs if men and teams are hired to do the work, and from one point of view this is the proper way to consider the cost. From another point of view ice is a free gift that one
may have by going out and getting it. The time for harvesting ice is the time when there is the least work to do on the farm, the time when horses are standing in the barn getting soft from lack of exercise. Many farmers who put up ice, therefore, consider the only cost to be the ice house and sawdust or other packing material. No matter how we look at it it is a cheap crop. On farms where there is no body of water nearby from which ice can be obtained it is often possible to form an artificial pond by building a dam and thus have the ice produced right at home. The quantity of ice needed for cooling a given amount of cream on the farm varies with the season of the year, the size and construction of the tank and its location.

An investigation conducted several years ago showed that, on a large number of farms using ice effectively, an average of 1.16 pounds of ice were used for each pound of cream produced.

In an examination of more than 100 farmers' ice houses the shrinkage was found to vary from 20 to 50 per cent with an average of 27 per cent.

If cows on an average produce about 3,500 pounds of 3.7% milk in a year—which would yield 431 pounds of 30% cream—it requires, according to the above figures 431 times 1.16 pounds, or approximately 500 pounds of ice to cool the cream produced by one cow and hold it cold and sweet until delivered to the creamery. In order to allow for waste and to have ice for household use it is best to allow 1,000 pounds of ice per cow. On this basis a 20-cow dairy will require 10 tons of ice. These figures are for cooling cream; if whole milk is cooled 2½ to 3 times this quantity of ice will be needed.

It is not advisable to put up less than 10 tons of ice because, when the quantity of ice is so small the percentage of meltage is very great. Ten tons is not too much for one farm even with less than 20 cows. When available ice can be used for keeping perishable foods during warm weather; it is sometimes a very desirable thing to have in case of sickness and may be a factor in solving the farm labor problem. The dairy interests have posted widespread the slogan "Eat a plate of ice cream every day." Why not try it on the hired man? A plate of ice cream for dinner would send him back to his work whistling; a can of iced tea or iced buttermilk in the hay field would keep him in good humor and a piece of ice cold watermelon or cantaloupe in the evening would send him to bed happy.

4—B
For 10 tons of ice about 500 cubic feet of space is necessary. As the amount of meltage is to a certain extent proportional to the exposed surface, it is best to have the ice house about cubical in shape. Ten tons of ice occupies a space 8 feet x 8 feet x 8 feet. In constructing an ice house, in addition to this space, at least one foot should be allowed for insulating material on all sides and at the bottom of the ice also about four feet on top to allow space to work in when packing and also for ventilation as well as insulation. Consequently a ten ton ice house should be built 10 feet square and 10 feet high, that is from the floor to the eaves.

The location of the ice house is a matter of no little importance. It should be close to the dairy house in order to minimize the labor transferring the ice to the cooling tank and when possible should be so placed that it is not exposed to the warm winds or direct rays of the sun in the middle of the day.

In determining the kind of ice house to build it is advisable to consider the ease of obtaining ice, or its cheapness. Where the cost of ice is high it is advisable to spend enough money in building and insulating the ice house to protect the ice as much as possible from melting. But where the cost of ice is small a man is justified in building a cheaper storage which will result in a greater loss of ice from meltage. In selecting the type of ice house most suitable for his requirements the dairyman should, therefore, consider both the cost of construction and the cost of ice.

Some farmers store their ice in roughly constructed bins but aside from the fact that the meltage is likely to amount to 30 or 50 per cent these are unsightly and can not be recommended for Wisconsin where the dairy farms are noted for their fine buildings. From a business standpoint the more costly the ice the better the ice house should be provided. The saving in the melting of ice offsets the cost of repairs and depreciation on the building and interest on the money invested.

It is the insulation of the ice house that enables the building to perform its function of preventing the outside heat from passing into the interior and melting the ice.

There is no material known that will entirely prevent the passage of heat, there are, however, materials which offer a high resistance and are termed nonconductors or insulators. The best insulators appear to be those that contain the greatest amount of entrapped air confined in the smallest possible spaces.
Formerly it was the practice in constructing a building for the storage of ice or for cold storage purposes to provide a series of air spaces, some of which were as much as 12 inches wide; the supposition being that they were dead air spaces. As a matter of fact, however, as the air in contact with the warmer surface falls while that in contact with the warmer surface rises, it produces a circulation tending to equalize the temperature of the sides of the air space. The term dead air space is, therefore, a misnomer. Air circulation is valuable, however, between the insulation on top of the ice and the roof of the ice house in order to break up the heat radiation through the roof.

To the average individual when insulation for ice is mentioned sawdust is the one material thought of. This, of course, is the material most widely used for packing ice and usually is the cheapest obtainable. A foot of sawdust on all sides of the ice preserves it fairly well. More efficient insulation is provided by constructing a double wall filled with 12 inches of dry mill shavings. Still more efficient insulation, though of course more expensive, is provided by four inches of cork. When insulated walls are used an insulated ceiling is also provided and no sawdust or other material is put directly on the ice, which adds greatly to the ease of removing it. When the door is opened the ice is ready to be removed without having to shovel a quantity of sawdust off of it. An insulated floor or a foot of sawdust should always be provided in the ice house so the ice will not come in contact with the ground which is a good conductor of cold and, therefore, causes a large meltage. Provision should be made for thorough drainage because an accumulation of moisture under the ice causes it to melt rapidly. If the soil is porous no artificial drainage is necessary but in a clay soil it is desirable to excavate a foot or two and fill in with cinders or gravel and to have a ditch across the middle, also filled with cinders or gravel. The floor, of course, should drain to the ditch and the ditch should be led out with sufficient fall to carry away the water.

This cut shows the simplest type of ice house and the type that is usually advisable to recommend. I wish to call your attention to the provisions for drainage at the bottom and ventilation at the top.

The other cut illustrates the combined ice house and milk room, the ice house in this case being well insulated. The meltage in the ice house drains into the cooling tank, instead of be-
ing lost as in the simpler type. The advantages of a combined ice house and milk room are so obvious and I believe will appeal to the progressive Wisconsin dairyman who is not already equipped with similar facilities.

"Ice Houses and the Use of Ice on the Dairy Farm" is the subject of a Dairy Division publication, known as Farmers' Bulletin No. 623, which gives further information on this subject. The cooling of milk and cream on the farm, the building and use of cooling tanks, the use of surface coolers and keeping milk and cream cold during shipment are discussed in Farmers' Bulletin No. 976. Both these publications may be obtained free upon request from the Dairy Division at Washington. There is also available for free distribution a small leaflet suitable to be enclosed with the patrons' checks. One is entitled "Turn Cold Into Gold;" the front page of the other reads as follows: "Harvest a crop in midwinter. No seed or fertilizer needed. Ice. Do you have it on your farm?" I thank you.

CHAIRMAN: Gentlemen the secretary instructed me to announce that this is the hour for the sale of the butter and I think it will be well to get right after that now.

MR. WEIGLE: Mr. Chairman I have just a little matter to be brought before this convention before we adjourn. I would like to talk to you about the Hoard Memorial Committee. This is a committee organized for the purpose of erecting a monument in memorial to this great man W. D. Hoard. We want to build a bronze statue placed on the grounds of the University. We have our site and everything picked out. This monument will cost about from thirty to fifty thousand dollars. It needs no words of mine to tell you of the wonderful work of this great man. He was the first man to take up the fight for purer products. I have here a subscription blank. I am going to ask you to contribute one dollar to this fund. It is not very much and I am sure you will all be willing to give that. It is simply for the purpose of providing a memorial to this wonderful man who is the father of modern dairying and I am sure that every butter maker and man interested in dairying will give their little mite towards this memorial.

MR. STROZINSKY: I appreciate very highly what our commissioner said and I think that a memorial of that kind placed to his credit would be very fitting.

It is getting late and the sale of the butter will now be on, and
the convention will be adjourned for this morning until two o'clock sharp this afternoon.

Mr. C. J. Dodge, the Superintendent of the Butter Exhibit, acted as auctioneer and sold the butter to Mr. McCarthy of Chicago for 42 cents a pound.

WEDNESDAY AFTERNOON SESSION

Meeting called to order by Chairman Strozinsky.
Meeting opened with vocal solo by Mr. Barrett.

CHAIRMAN: Our first speaker this afternoon is R. C. Hastings, Marshfield, The Branding of Whey Butter, which it seems to me is a very important subject.

R. C. HASTINGS: Mr. Chairman, Butter Makers, Ladies and Gentlemen:

As your chairman has stated this is one of the vital questions it appears to me on this program. I am not going to take a great deal of your time for I think we can possibly accomplish more thorough discussion. Some of you may have ideas that I have not and those of you who were at the Wisconsin Cheese Makers' Convention heard my paper at that time and there will be some points in that that I omitted and some in this that I did not bring forth at that time. The first time I remember this subject being discussed was here in this very room in 1916. At that time I was back in the audience and had nothing to say when they brought up the question and the resolution was passed here in regard to the branding of whey butter. At that time it did appear to me that whey cream was not of a suitable character to make extras but since that time I have changed my mind, I think a good many of us have found that out. There is no reason, in my belief, that we should brand it.

THE BRANDING OF WHEY BUTTER

By R. C. HASTINGS.

The first time that I recall this subject being discussed was at our Butter Makers' Convention held in this city in 1916. At that time it was not discussed at any great length, but at that meeting a resolution was passed in favor of a law requiring