uring that way the skimmilk returned 63c a hundred. The butter fat in the milk averaged at that time, if I remember correctly, $1.50 per 100 pounds of milk. That made the whole milk worth in cash to me $2.13 per hundred pounds. Do you wonder that I say no milk shipper or condensory would pay me what my milk is worth even in raising nothing better than grade heifer calves? The skimmilk is worth over $3.00 a hundred when fed to pure bred calves.

Take it in pig feeding: It is well established that 100 pounds of skimmilk will make five pounds of growth when fed alone to pigs weighing from 75 to 150 pounds. Multiply this growth by the price of pork and you have the minimum value of the skimmilk. Feed it in conjunction with corn meal and you add 20% to its value or cash return, all as a result of the combination. These are well settled principles of feeding. Yet, how few farmers really and truly know and practice them. That knowledge is mighty important for the welfare and future stability of the creamery. Yet, how many creameries in Wisconsin have ever entered upon a campaign to drive that knowledge home to their patrons so it would stick? As I see the situation the creameries have not done what they should to enlighten their patrons in these things, and they are bound to suffer because of a lack of knowledge among their own people. It is astounding what educational influence a creamery buttermaker possesses in a community of farmers if he is a man big enough for the place. In your efforts to promote the future welfare of the creamery don’t leave this view of the case out of your calculation.

(Applause.)

THE CHAIRMAN: If there are no questions we will go on with our next paper.

THE HANDLING OF STARTERS IN A SMALL CREAMERY.

By Mr. B. A. Hass.

The subject assigned me “The Handling of Starters in a Small Creamery” is by all means one well worth considering because, as a rule, conditions are not nearly as satisfactory there for carrying this work on successfully, as they are in a large factory, at least
during the cold season, and for this reason I consider it more important to discuss the problem of the small creamery than that of the large one.

During the summer months or as long as the small creamery receives milk or cream every day and churns every day, conditions are practically alike and also favorable in both factories, everything works well, but as soon it turns cold and the milk or cream supply drops off, the small factory will receive milk or cream every other day only, or as a rule three times a week, and in a good many cases only twice a week. As soon as these changes are made, the method of handling the starter must be changed also, if satisfactory results are expected.

While it is evident that conditions are just about as favorable in the summer months or during the warm season as they could be, due to the fact that the room temperature is just about that required for successful starter making, conditions are just as unfavorable during the winter months, or during the cold season. Taking
these two facts into consideration, it can be readily seen it is unnecessary to spend any time discussing conditions during the warm season, and for this reason will devote all my time to discussing conditions during the cold season.

Although any amount of small creameries are having all kinds of trouble in the way of getting their starter ripe, or uniform in acidity from time to time or of a good quality, or even going as far as not using any starter at all, I believe that a little extra effort and good judgment on the part of the buttermaker would result in overcoming such conditions in every case to a great extent at least.

Suppose a factory receives milk or cream, or both on Monday, Wednesday and Friday only and churns the cream on the days following, the starter milk whether whole milk or skim is used, should be pasteurized on the day it is received and pasteurized on the following day. I might mention that in order to economize, (which should be borne in mind at all times,) the pasteurizing of the starter milk should be done while the engine is being run and steam used for other purposes, unless separate power is used expressly for the starter can and that steam had to be kept up for something else at all times, which, I believe, is very seldom the case in a small factory.

After heating the starter milk the first day it should be cooled to 50 degree F. or lower, in order to check the bacterial growth as much as possible. The following day, (which is, as a rule, the day for churning,) the milk should again be heated and cooled and should be done during the churning process, in order to avoid running the engine extra for the starter can, as stated before. This time the milk should only be cooled to the temperature at which the starter is to be ripened, and as soon as it gets to this point, the mother starter should be added immediately, because the starter milk or culture media is never so free from undesirable bacteria as it is immediately after completing pasteurization. By adding the mother starter immediately, the lactic acid bacteria in the sample added will multiply very rapidly and give the undesirable ones very little chance; first, because the temperature is such that is most favorable for the rapid development of the lactic bacteria and a detriment to the development of the undesirable ones, and second,
because the lactic bacteria get such a good start and thereby overcome the others, which makes the first part of the ripening process the most important part. By so doing the most important part of the ripening process is over by the time the room gets cold again, or at least too cold for successful starter making. This has been my experience, and I believe the experience of every one else who has worked in a cold factory, and this, as a rule, pertains to small factories built years ago.

I have followed this system of inoculating the starter milk for the last two years and am very strongly in favor of it. The starter may be pretty cold the next morning, but if it is coagulated, (which it should be,) the temperature is such that there is very little danger of overripening, in case it cannot be added to the cream at once, which might be the case if the cream was to be pasteurized first, and not necessarily either, because by making systematic observations, the amount of mother starter added can be so regulated, that the acidity of the starter is almost always uniform on the following morning.

There is no secret involved in the making of a first class starter. All that is necessary is to carefully observe the following three factors, which apply to any creamery, large or small. The factors are: "Cleanliness," "Proper Temperature," and "Avoiding Overripening" which apply to the handling of the large starter as well as to that of the mother starter.

The first factor, "Cleanliness," applies to the milk as well as to all utensils used from the time the milk is drawn until the starter is ready to be added to the cream. No milk should be used for a starter which has not been produced under the most sanitary conditions. By using milk not produced under sanitary conditions the buttermaker is handicapped at the very start, and it is immaterial how skillful he is, or what methods he applies. It is simply impossible for him or any one else, to make a first class starter from second class milk. Furthermore, it is an undisputed fact that a good starter will improve the quality of any cream that is not absolutely free from taint. It is also a well known fact that a poor starter is worse than none, because it is apt to develop a flavor in the cream that is worse than that of the cream itself. If this is the
case, it is evident that, unless one can produce a good starter, he is better off not to use any and thereby save the extra cost of the starter milk as well as the extra labor involved in the making of the starter. Although this may sound discouraging, it is, however, true. Any one who is troubled with a poor starter, is, I believe, in most cases, responsible for it himself, and might just as well have a good starter if he only makes an effort.

In regard to the second factor, "Proper Temperature," it is important that the milk be cooled immediately after it is drawn, as well as the proper temperatures applied during the process of making the starter at the creamery. Every manufacturer of pure culture starters furnishes complete instructions as to the proper methods to be used in order to obtain the best results from that particular culture. By comparing those instructions somewhat with conditions in the factory, a careful observer will be able to get good and uniform results without much trouble.

The third factor, "Avoiding Overripening," is also very important, because an overripe starter produces curdy, sour and high acid flavors, and renders the bacteria less active, and if separated a few times, kills the bacteria and therefore renders the starter useless and even harmful.

Since conditions in no two creameries seem to be exactly alike, it is impossible to lay down a rule that will give perfectly satisfactory results in every case. In order to meet the various conditions successfully, every operator must judge by the conditions as they exist in his particular factory, and then apply such methods as may best suit his case.

Now in regard to the propagation of starters, no one should make the mistake of taking the small amount of starter, (which is to represent the mother starter,) from the starter can after the starter has coagulated. If taken from the starter can at all, it should be done immediately after the milk has been inoculated. If the inside of the starter can is not well tinned all around and the inside of the faucet is not enameled, it is best not to use this method at all.

By saving the mother starter from the large starter after it has coagulated, or even a number of hours previous, one is apt to
spoil a good starter in a very short time, because, if for any reason
the large starter should be off-flavored in the morning, there would
be no good starter on hand to fall back on in order to produce a
good starter for the next batch of cream. To grow a new mother
starter would require too much time in order to inoculate the next
batch of starter milk with it, and would also be an unnecessary ex-
 pense as long as it would have been possible to keep the first one in
good condition longer.

Conditions for growing a large quantity of starter are gener-
ally not as satisfactory as they can be made for a small amount,
which can be set in the most suitable place in the factory. The best
and safest way to carry on a mother starter is to carry a number of
samples entirely independent from the large starter. At the time of
inoculating the large starter, the best one of the small samples
should be selected and used to inoculate both, the milk in the starter
can as well as for propagating the milk for the next mother starter.
After the best sample of mother starter has been selected, it should
be set aside, and the other samples emptied out. The utensils should
be thoroughly washed, rinsed and sterilized and then partly filled
with the fresh pasteurized milk in the starter can. Next a small
portion of the selected mother starter should be added with some
convenient, sterilized utensil, like a spoon or a pipette, and the
quantity added should be varied somewhat, so that if one should get
overripe and another not quite ripe enough, the third might be just
as desired, and should therefore be set aside and used for the next
propogation. After the samples of milk for the mother starter
have been inoculated and well shaken up, the necessary amount of
mother starter should then be added to the milk in the starter can
and well mixed, taking for granted that the temperature had al-
ready been adjusted.

The utensils used for carrying on the mother starter should
be either glass ware or first class enameled ware. While there is
nothing quite as sanitary as glassware, this is to be preferred. If
enameled ware is used, care must be taken that the enamel does not
chip off, because this will render it insanitary and therefore harm-
ful.

In order to get the very best results from the mother starter,
it should immediately after being inoculated be placed somewhere where the air and the surroundings are perfectly clean, and where it is possible to maintain a pretty even, as well as the desired temperature. To accomplish this, various methods may be used with good results. One method that is practiced a good deal, is to use a tight double walled box arranged so that a small lamp may be set inside with which to regulate the temperature. Any one can make such a box, and they can also be bought from creamery supply houses. A thermometer should be kept right in the box among the samples of mother starter so that the exact temperature may be seen at a glance at any moment.

Although the method just described is a very good one, it, however, is not the best.

It has occurred to me and I firmly believe that any creamery would be well repaid by arranging a separate room in which to do their testing, keep their cream testing scales, moisture scales, test bottles, in fact everything in this line, and also the mother starter, and an office desk. We all know that all these things need a dry clean place, as well as a place where there is no danger of ruining or breaking them while doing the regular work in the creamery. A small stove, or a radiator could be set up in such a room and conditions made very agreeable, and this, I believe, would go a long way towards keeping the buttermaker interested in the details of his profession, and I believe it is safe to say that these little details, in a large measure at least, constitute either the success or failure of any creamery.

In a room of this kind the buttermaker can make out his daily report, attend to his correspondence, look after the mother starter at any moment without any inconvenience whatever, in fact, he can almost do his whole afternoon’s work there. It is evident that in order to get the most accurate results in weighing out cream samples while testing for fat, or weighing out butter samples while testing for moisture, it is absolutely necessary to do this work somewhere where there is no draft and where the desired temperature is easily obtainable. If this is the case then there is no question but what a small room like the one in question would be just the thing to have. Furthermore, the consequences are that many a
buttermaker would spend a good portion of his time in this little room, and do it with pleasure, for the benefit of both the creamery and himself, which he would otherwise spend in loafing around, simply because he finds his creamery just as comfortable a place as any other. The fact that a room like this need not be very large would make it a very easy matter to keep it warm or about 70° F. That temperature feels most comfortable while doing such work as outlined and it is at the same time the most desirable temperature for developing a good starter.

I thank you. (Applause.)

Mrs. J. G. Moore, Madison: As a member of this Association I would like to suggest that the speakers mount the rostrum. We can hear much better than when they stand on the floor.

**DISCUSSION.**

The Chairman: This is a very good subject we have on here, and I find there are buttermakers in the state who are not using starters. We want to get a good discussion on that starter. If you don’t understand it, here is the place to find out.

Mr. Thomas Corneliuson, Washington, D. C.: I would like to have him explain how he gets good starter milk.

Mr. Hass: We probably had to pay a better price than for other milk. If anybody is getting the whole milk at his factory, I think he will have no trouble in getting good milk by paying a little better price. I know I found it that way. I had to pay a little higher price last summer.

Mr. W. J. Ennisson, La Crosse: I would like to ask Mr. Hass the acidity of the milk he uses. What acid has the starter?

Mr. Hass: Milk that does not contain over .15 of 1% of acid can be used to good advantage, and it is easy to use such milk. I found that a starter with an acidity of six or seven per cent gives the best satisfaction. I don’t like it over 7%. I would sooner have the milk under ripe than over ripe.

Member: How often do you prepare new mother starter?

Mr. Hass: As soon as the old one is off. I have a standing order with the laboratory of four, sometimes of five samples a
month. Sometimes we would not use that many, but to be on the safe side I think it better to have them come along and pay for an extra starter than to run the risk of being without one for three or four days.

MEMBER: That is when you use liquids?
MR. HASS: I have only used liquids.
MEMBER: Did you ever try holding it longer than a week?
MR. HASS: Yes, I have had it ten days, almost two weeks, and then there are times when it would be off in two days. Sometimes they get off in a very short time. Supposing I would have to be absent for something from home and conditions would be such that it would get over ripe, it might be off. Then again I might be successful to hold it ten days, even two weeks.

MEMBER: I would like to state before the convention that we made a starter the first day of December, 1910, and we carried it until the 1st of May without making a new one. At that time I could not see but that it was just as good as it was when it was four days old. I don’t think if a man has proper milk he has to change it every week. There is no reason why he could not keep it indefinitely. About twelve years ago I carried a starter for eighteen months, that was prepared with Hanson’s culture. I think any of the good cultures would do the same thing.

MR. HASS: Mr. Chairman, four years ago when I took a dairy course at the University we carried forward a number of samples, I think eight in all. We carried them from the time that the school started until it finished, that was a period of three months. There used to be as many as forty different samples, I believe, and from them we selected the best out of the whole bunch, and at the end of three months we still had a good starter.

MEMBER: I would like to ask Mr. Hass what he used as a receptacle for holding the starter.

MR. HASS: I would much rather use the ordinary milk bottle, and the glass stoppered bottle would be better. The ordinary milk bottle that you use for city trade is very sanitary and it isn’t so apt to break.

MR. A. D. MCCREADY, Marshall: I have been using quart milk bottles with a common drinking glass inverted over the top.
Mr. H. E. Griffin, Mt. Horeb: I use these Thermos bottles for that purpose and they hold the temperature. No matter what the temperature of the room is it don’t change over two degrees. They are expensive, but they are the thing for holding starter.

Member: Mr. President, I would like to ask these gentlemen if they would use a starter if they got 5,000 pounds of cream that has about five per cent of acid when you get it.

Voice: You want a stopper.

Prof. C. E. Lee, Madison: It is true when the cream has all the acid in it that it needs the adding of starter is not necessary. However, a starter will improve your butter, even if your cream is acid. Use about one gallon of good starter to three gallons of cream.

Chairman: I agree with Prof. Lee on that. I found that by using a starter, no matter how acid the cream was, it improved the butter.

Member: I try to keep my acid down to fifty and I believe I can get better results.

Prof. Lee: I don’t think you should add your starter and try to ripen it any further. I believe you should cool it right down.

Mr. Griffin: I have had considerable of that acid cream to contend with, and I have simply dumped the starter in it and cooled it down to fifty or forty-eight and I believe I get better results.

Mr. C. M. Sanford, Amherst Junction: Mr. President, if you had a thin cream, with one gallon of starter to three gallons of cream you would not get very good results.

The Chairman: Couldn’t you get your patrons in some way to deliver a heavier cream than that.

Secretary Benkendorf: I would like to ask you if you had experience with skim milk powder. A good many people are using that and I would like to ask about it.

Mr. Guy Speirs, Eau Claire: We have tried it. We have better results with condensed cream.

Mr. Credicott: I think there are a lot of buttermakers that do not realize the benefit the starter will do the butter. I have seen a lot of butter that is flat in flavor that would come under the head
of extra and would easily go in with the grade of extra if a little starter was used, and that would mean three cents a pound more. I don't know of anything that will affect the selling value of the butter more than the addition of a good live starter, even though the cream might have had acid when it was churned. It will give it a rich flavor that you cannot get in any other way.

The Chairman: Anything more along this line? If not we will take up the next subject. The Pasteurization of Cream for Buttermaking, by Mr. Martin H. Meyer.

PASTEURIZATION OF CREAM FOR BUTTERMAKING.

Martin H. Meyer, Madison, Wisconsin.

Martin H. Meyer, Madison: Mr. President, Members of Wisconsin Buttermakers' Association, Ladies and Gentlemen: The last speaker has told you how the quality of your butter is increased by using a starter. I shall attempt to tell you a few little things regarding how pasteurization might help you. I shall tell you a few things I have found from my experience, and I shall also attempt to give you the impressions as I have received them, from what others found not only in Wisconsin, but outside of Wisconsin.

Pasteurization is believed to be profitable by some, and again we find that others believe it is not profitable. As I am a firm believer in the pasteurization of cream, I come here as an exponent of the process of pasteurization.

In handling this subject, we must view the pasteurization of cream not only from the standpoint of practical application, but must also take into consideration the sanitary aspect as it may appear to the manufacturer and the consumer of butter.

I shall present to you some facts, impressions and sentiments as seen through the practical public eye, combined with my own practical work and the impressions it left upon me.

Since various conditions affecting the dairy industry may give cause to the pasteurization of cream, I have divided my discussion into two parts, one part dealing with the sanitary side, and the other part with the practical side of pasteurization.