me by electing me president of this Association. I appreciate these gifts very much, because it proves to me conclusively the good fellowship that exists between your Ex-President and yourselves; this is the feature that pleases me the most and I shall always wear this watch as long as I live and if my son lives to wear it after me, I hope he will wear it with the respect due to the Wisconsin Cheesemakers.

I learned not long ago a little verse which I cannot help quoting to you now, it runs something like this:

When we come into this world from the Lord knows where,
We travel through the world with sorrows and care
When we leave the world it is for the Lord knows where,
But if we are good fellows here, we will be good fellows there.

Convention adjourned till 2 P. M.

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AFTERNOON SESSION.

Friday, Jan. 9, 1903.

President Dickson in the Chair.

SWISS CHEESE MAKING; METHODS OF MANUFACTURING.

Fred Marty, Madison, Wis.

Mr. President, Ladies and Gentlemen:

To many of you the manufacture of Swiss cheese may not be known. But you will find on the map showing the location and distribution of creameries and cheese factories in Wisconsin, a cluster of red dots, which is called Green county and is the home of the manufacture of Swiss cheese, where many of your cheesemakers are struggling with the difficulties of Swiss cheese making. So that you will see we are doing our share towards the cheese industry of the state. To you it may ap-
pear that our small number that has so far been taking part in your convention, that we probably have not any difficulties to contend with; but I can assure you we have them too, the same as your Cheddar cheesemakers and I think it would be a great benefit to us if we would come here and bring up different ideas, as an ideal Swiss cheese has many details, and is made very defective under different temperatures, in the curing process. Therefore we could bring up many important points for discussion.

I think I am safe to say that it requires skill and good judgment, yes years of practical experience to be a successful Swiss cheesemaker—I mean to say under our present conditions as we have no guide to go by, as you Cheddar cheesemakers have.

I will try and explain to you in a few words the manufacture of Swiss cheese. It may not be known to all of you that a Swiss cheese is a sweet curd cheese; the temperature of the milk when set varies from 90 to 96 degrees F. When the milk has become curdled it is cut now mostly with the wire harp; sufficient time is given for the whey to expel from the curd before cooking. The heat is applied gradually. The time required to cook should not be less than 25 to 30 minutes. The time varies from 40 to 45 minutes; also the time after the cooking for firming varies greatly. After the curd is sufficiently firmcd it is then left to settle. I just want to state that our curd is not left to mat; but is under a continual stirring from time of cutting. The curd is then dipped from the whey all in one body no matter if the cheese weighs 50 or 200 lbs. and put to press in one lump where the cheese is turned every two hours during the day and is kept under continuous pressure for 24 hours. From the press the cheese is put into a tank containing brine strong enough to float it and remains there until sufficient salt has been absorbed—from 2 to 3 days, depending on the size of the cheese. The cheese is then placed on the shelf to cure, under continuous dry salting. The cheese is taken from the shelf every other day, turned, washed and salted, for at least two months before our cheese are put on the market. So you will see that the Swiss is a cheese of long
process and careful attention must be paid during the curing process. Swiss cheese is classed in three grades; a No. 1 greatly depends on the eyes or holes; they must be equally distributed throughout the body of the cheese; if the eyes are not many and glossy it indicates good flavor and texture. Glæssler and Gasy cheese are classed as No. 2, and Nissler (a pinholey) cheese, to No. 3. Strange to say a great deal of our No. 2 cheese, called Glæssler's, is a cheese with a pasty texture, the body containing seams running throughout the cheese and when cut will break along these seams, the flavor being good,—somewhat of a sweet taste. This is made out of the very best or sweetest milk, yet it is beyond the control of our best cheesemakers to prevent this condition although we can prevent its action some; but don't know when we are treating the curd just right, and generally becomes known to us after a number of cheese are made. Now for instance in the fall of the year when we receive the milk in very sweet condition, as a rule we set the milk immediately after receiving at the factory. If the temperature of the milk is not raised it will cause the rennet to act slow upon the milk, and the whey will not expel from the curd and if not sufficient time is given before the cooking, you cannot get a good cook on the curd, which will make a pasty textured cheese. In the first place the milk was not ripe enough, or did not contain sufficient acid to produce the proper fermentation necessary to develop the eyes or holes in the cheese. Therefore I think we should have some method to go by—I mean a way to ripen the milk. This would, in my opinion, help us a great deal in the difficulties which we have in the curing process. Now in regard to over-ripe milk, which we occasionally get in mid summer to which too large an amount of rennet is often added; and as the rennet we use is home made, it is not of a uniform strength and very often too strong or too old a rennet is used. Some cheesemakers use three jars of rennet which will make the rennet used about 3½ hours old, instead of using two jars 21 hours old. This may be very often the cause of our cheese not being uniform. I mean to say we could help
this a great deal if we could test the strength of the rennet and then add a sufficient amount of rennet according to the ripeness of the milk. An experienced cheesemaker may control this some by good judgment, but take a beginner who has not yet learned these details and he is often troubled by cheese with the eyes not equally distributed and often with too many holes or not enough.

The origin of such cheese can be traced back to the too early setting of the milk or the use of old rennet. We have but little control, over this as the temperature in our curing rooms varies from 65 to 75 degrees. We cannot check its action very much by heavy salting as such cheese do not absorb much salt. So under these conditions fermentation will set in very rapidly and too many eyes will develop.

With reference to this point of ripening or maturing milk, I can say that I have had good results in previous years, in the fall of the year, by taking the first milk I received at the factory and heated it up to the setting point and kept at that temperature until all the milk was in. Now, I did not hurry the setting of the milk and as I have a steam kettle I could hold the milk at just the desired temperature. This I think caused the milk to ripen some and my cheese turned out better than when set too sweet. In regard to determining the fermentation or maturing I think the application of the rennet test would aid us in making a more uniform cheese and if we can ever determine the point to which our milk should be ripened, a commercial rennet extract can be used.

In conclusion I will say that this particular point of getting ways and means to control the ripeness of the milk and strength of the rennet at the time of setting the milk will aid us greatly.

The application of scientific tests along these lines has in the manufacture of Cheddar cheese worked wonders, and I am at a loss to see why the results would not be the same in our branch of cheese manufacturing. Let us try it!
Mr. Michels: I would like to know if you do not have facilities at hand at the Dairy School to find out what degree of ripeness your milk ought to have.

Mr. Marty: Well, we have, we tried all those experiments in the winter time, but we have no good results so far whatever, as our milk in the first place contained too much acid for Swiss cheese making and we cannot carry on experiments during the winter. I think it should be done during the summer season and we would keep track of the ripeness of our milk and see how our cheese worked according to the degree of ripeness, I think it would only take one summer’s work in order to get at the correct point of ripening the milk.

Mr. Waterstreet: Do you use a starter in Swiss cheese making?

Mr. Marty: Well, we may call it a starter, and we may not call it a starter, I think, the cheese that I made so far, that I used a starter or culture. But I do not think Swiss cheesemakers know that they are using a starter. They tell me that Swiss cheese cannot be made with rennet extract, and I would like to ask any experienced cheesemaker in this line of work why we cannot use a commercial rennet extract—if they want a home made rennet I should call that a starter—in order to ripen our milk. But in answering your question, I would say that the rennet we use is certainly a starter, but, as I stated in my paper, that is all the way from 21 to 34 hours old, and as far as my knowledge goes, I should call that a starter that we add to the milk.

Mr. Waterstreet: Do you never have any acid on the curd when you draw the whey from it?

Mr. Marty: No, our milk being so sweet, and the high temperature which we give our cheese curds, there being no acid developed in the curds. At a temperature of 130 there is no acid developed in the curd,—am I right on that point?

Prof. Dean: Very little at that temperature.
Mr. Waterstreet: Supposing you get in overripe milk, what would you do then?

Mr. Marty: We have no control whatever, that is beyond our control. The only way we have to work our cheese with overripe milk is to hurry the process along and get the cheese out of the whey just as soon as possible; we have nothing to check its action whatever.

A Member: What liquid do you use to set your rennet?

Mr. Marty: The way I set my rennet, I may say that I use two-thirds whey and one-third water, that is the way I set my rennet. I like to hold the rennet at as low a temperature as possible in order not to get it too strong. I should like to hold it at a temperature of 70 degrees.

Mr. Aderhold: Do you add salt to that?

Mr. Marty: I add a little salt.

Mr. De Haan: I would like to ask if they use a curd mill for that cheese.

Mr. Marty: No, we do not. The curd is, as I stated, continually stirred in the kettle, we do not leave our curd to mat at all until the curd is settled in the whey. When the curd is settled, we dip our curd from the whey, instead of the whey from the curd, we dip the curd out of the kettle in one body, and take it right to the press.

A Member: I would like to ask how heavy a pressure he would consider about the right pressure for a Swiss cheese.

Mr. Marty: I should call that a very difficult question, and I believe I will leave it to you. I was brought up among the cheese factories in Green county. With the presses we have there, there are large beams running across the cheese room, and I never figured that pressure, but I would say that it was a very heavy press, and I can say that I used half of that pressure in my cheese making. I use a very small pressure on a Swiss cheese. If the cheese is in good condition, and the milk has been normal, the curd has worked all right, the whey will expel from the curd with a very light pressure. If the curd is gasy, the heavier the pressure the more whey you can get out of
curd. I could not tell you the right weight, as I have never figured out the pressure.

The President called the attention of the members to the fact that when a member of the association exhibited cheese and received the first premium therefor, that the cheese, according to the by-laws of the Association, then becomes the property of the organization. He stated that this provision of the by-laws had been violated by one of the exhibitors and expressed the hope that it would not occur again.

HOW TO PAY FOR MILK AT CHEESE FACTORIES.

H. Anderson, Sheboygan Falls, Wis.

When we buy milk for cheese one of the first questions to consider should be how to pay for the raw material, to do justice to all patrons. This question can therefore be said to belong to the primary in cheese making.

In a general way it can be said that the milk should be paid for according to the commercial value of the finished product obtained from milk of different qualities.

The condition of the milk taken in, is to a certain extent influencing the quality as well as the quantity of cheese. A low testing milk in good condition is worth more per 100 pounds than milk of a higher test in poor condition. Yet, in the following I am going to omit this phase of the question and consider only the fat and casein, the two solids in milk, which together with water make up the bulk of the cheese.

The amount of casein in milk is running very constant, and I am not far from the truth when I make the statement that it is present in the same per cent. in 3 per cent. fat milk as in 4 per cent. milk, which I shall prove later on.

At the same time, the per cent. of fat varies very much, say from 2 per cent. to 7 per cent., and it is in consequence of these facts that we can figure out the yield when we know the per cent. of fat. We must, therefore, first of all, find out the amount