MORNING SESSION, FRIDAY, FEB. 5.

CURING AND BOXING OF CHEESE.

Adolph Schoenman, Plane, Wis.

Before I read my paper, I wish to make a few remarks on the position that I am going to take, and the reason I take the position. You have all been here and heard Mr. Hoard make that one remark to which I call your attention, and that is, that the drift of the sentiment seems to be in favor of a cheese somewhat more moist and more buttery—a somewhat softer cheese than we have had heretofore, both in Canada and the United States. Any figures that I may give you I do not wish you to take as any boast that I am going to make of any work I have done. I want you in each instance to give the curing-room that I had to work with at least fifty percent of the credit.

As the principal feature of curing cheese is the curing-room and its construction, and as that appears as a separate topic on our program, I shall leave this important feature to be discussed under its proper heading. However, as the manner in which cheese is manufactured is so closely connected, and has such immediate relations with the curing of the same, I hope you will pardon me for somewhat digressing, at times, from the immediate subject assigned to me.

In starting out on the troubled sea of cheese-making at this day and age, when the market demands of a first-class cheese are so extremely critical, it becomes absolutely necessary, in order to meet the demands, to have at our command first-class curing facilities.

The object of this paper shall be an endeavor to show to this convention of cheesemakers, from actual experience and observations extending over many years, that the advantage derived from a first-class curing room is a very significant feature in the production of fancy and full cream cheese, and the curing facilities must be forced upon the cheese manufacturers, before they will be able to produce the cheese really wanted by the consumers of the same.

In starting out at the spring of the year, the cheesemaker should have in mind these three main features:

1st. A maximum weight of cheese from the constituents of the milk received.

2d. A first-class quality of cheese at all hazards.

3d. Caution—But not to obtain any weight at the expense of quality. I might add: But everlastingly endeavor to unite moisture with your other constituents of the cheese so as to both improve the quality and increase the quantity.

The cheesemaker should further bear in mind that the weight of the cheese is made up mainly of the following constituents in nearly equal parts, viz., casein, butter-fat, and water, the water costing nothing. Knowing this, he should bend all his energies toward the problem of how to incorporate and retain a maximum amount of moisture with the other constituents of the cheese, and at the same time improve the quality, and thoughtfully study this question, and it will soon dawn upon his thoughtful mind that it is the hot, dry curing room that forces him to cook and salt high, making a cheese stiff, dry, and corky, and in figuring of the amount of moisture and quality that is lacking in his cheese, he will perhaps become utterly disgusted with hot, dry curing rooms, and will become one of our number to advocate better curing rooms.

I think I can safely say that at this stage of the cheese industry in the state of Wisconsin the most imperative demand of any one thing to improve the quality and increase the quantity, per hundred weight of milk, of our cheese, is: to have an entire revolution in cheese-curing facilities.

There was a time, not many years ago, when the general impression was among makers that if cheese were only real firm, the firmer the better, it was all right, and thus was acquired the false notion of high cooking and high salting.

Cheese-buyers now tell us that such cheese, often termed “stiff,” is not considered a fancy cheese and cannot be used at top quotations. The term “stiff” is no doubt derived from the fact that in drawing the finger across the rind, the feeling is very hard or stiff—no elasticity or velvety feeling. The plug, when drawn, is tough and dry as a chip. I do not believe that our makers are alto-
gether to blame for drifting into the habit of making such a cheese. The fact of the matter is, they are compelled to make a cheese to suit the wants of a hot, dry curing room, and are forced to disregard the wants of the cheese-consuming public, of this or any other country. The cheese that we all want, and are craving for, is a cheese which has an elastic touch, a velvety feeling, with a rich, nutty flavor, melting under the tongue, and with a desire for more of the same kind lingering in the thoughts of the consumer.

But be it remembered that a cheese of this quality cannot be made short of a curing room where the temperature and moisture can be controlled at the pleasure of the cheesemaker.

The question then is, shall we continue in the same old rut making cheese to agree with the wants of second-class curing rooms, and disregard the wants of the consumer, or shall we revolutionize our curing facilities and cater to the wants of our customers? A temperature of from 60 to 65 degrees Fahrenheit, with a moisture, as shown by the hygrometer, of from 70 to 80 per cent, is what we must have. A proper amount of moisture put into the cheese and retained there during the process of curing, I believe, is the key to fancy cheese-making.

In regard to the length of time a cheese should be kept in the curing room under the eye of the cheesemaker, according to Dr. Russell’s “Rise and Fall of Bacteria in Cheddar Cheese,” as given in the thirteenth annual report of the Wisconsin Experimental Station, and also as advocated by our best cheesemakers, cheese should be held in the curing room at least thirty days, with one possible exception, of which I wish to caution you all.

There is a time in the spring when the demand for cheese is sure to come, and it is during that critical period when unprincipled makers and salesmen do our cheese industry much harm by scrambling to rush their cheese upon the market, often almost from the hoop, and thus burden our markets with a lot of undesirable goods, thereby glutting the avenues of our cheese trade.

I appeal to every cheesemaker within the hearing of my voice not to allow himself to ruthlessly disregard all principles of cheese curing during that critical period, but to stand firm by at least reasonable rules laid down for making and curing a quick curing cheese, and not overstep their bounds.

I will give what I consider safe rules for quick curing cheese: 4½ oz. Hansen’s standard rennet per 1,000 lbs. milk; 1¾ lbs. good dairy salt; temperature in curing room, 65 to 70 degrees F.; moisture, 70 to 90%; cheese to be held on shelves at least from 12 to 20 days.

My proofs of what I advocate here today are pretty strong; as the saying goes, “the proof of the pudding is in the eating of it.” Under proof No. 1, I will give the comparative figures of two factories located about one mile apart, quality and condition of milk delivered to the same as nearly equal as two factories possibly could be, in proof of which I cite you our present cheese instructor Baer, who visited both factories twice during the season of 1896.

In factory No. 1 the cheese were cured in a temperature of 60 to 70 degrees F.; moisture 70 to 90%. In factory No. 2 the cheese were cured in an ordinary, well-made curing room, kept as cool as the weather would permit, and without regard to moisture.

The table on page 42 contains figures showing weights of cheese per cwt. of milk, and the prices received in each factory, as per secretary’s report—in this instance the same person being secretary of both factories:

Proof No. 2 I believe is fully as convincing. I saved cheese from nearly every month of the season, eight in number, kept them in my cellar curing room, and on shelves at least 60 days, after which they were boxed, and on Jan. 14, 1897, shipped them to Chicago to be judged by two experts. The average score of those cheeses was far beyond my expectations. The flavor was marked perfect on every cheese by both persons scoring them; color was marked perfect on all cheeses but one, on both score-cards; texture was marked perfect on four cheese, on both score-cards; on the other four cheeses texture was marked 28 for three cheeses and 29 for one cheese, by one of the judges. The other score-card giving 29 on texture for the four poorer cheese, 30 being perfect. Stating further, they say: “In our judgment they are as fine a lot of samples as we have ever seen, considering their age, and we can hardly see where they can be improved upon.”

While being employed as instructor in dairying for the state of Washington, I made a lot of cheeses during the last two weeks before the close of the term.
### Factory No. 1.

<table>
<thead>
<tr>
<th>MONTH</th>
<th>lbs. cheese per 100 lbs. milk.</th>
<th>Price sold.</th>
<th>Rec'd per 100 lbs. milk.</th>
</tr>
</thead>
<tbody>
<tr>
<td>May</td>
<td>9.62</td>
<td>7.00c</td>
<td>$6.644</td>
</tr>
<tr>
<td>June</td>
<td>9.00</td>
<td>7.10c</td>
<td>6.30</td>
</tr>
<tr>
<td>July</td>
<td>8.85</td>
<td>6.5</td>
<td>5.752</td>
</tr>
<tr>
<td>August</td>
<td>9.05</td>
<td>7.34</td>
<td>6.643</td>
</tr>
<tr>
<td>September</td>
<td>9.95</td>
<td>8.41</td>
<td>8.988</td>
</tr>
<tr>
<td>October</td>
<td>10.5</td>
<td>8.75</td>
<td>9.188</td>
</tr>
<tr>
<td>November</td>
<td>10.75</td>
<td>8.5</td>
<td>9.188</td>
</tr>
</tbody>
</table>

### Factory No. 2.

<table>
<thead>
<tr>
<th>MONTH</th>
<th>lbs. cheese per 100 lbs. milk.</th>
<th>Price sold.</th>
<th>Rec'd per 100 lbs. milk.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8.3</td>
<td>6.75c</td>
<td>$6.549</td>
</tr>
<tr>
<td></td>
<td>8.4</td>
<td>6.58</td>
<td>6.527</td>
</tr>
<tr>
<td></td>
<td>8.4</td>
<td>6.12</td>
<td>6.510</td>
</tr>
<tr>
<td></td>
<td>8.55</td>
<td>7.1</td>
<td>6.253</td>
</tr>
<tr>
<td></td>
<td>8.58</td>
<td>8.16</td>
<td>8.245</td>
</tr>
<tr>
<td></td>
<td>8.5</td>
<td>8.5</td>
<td>9.010</td>
</tr>
<tr>
<td></td>
<td>10.6</td>
<td>8.02</td>
<td>8.501</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Milk received factory over No. 1</th>
<th>No. 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>128,500</td>
<td>890.00</td>
</tr>
<tr>
<td>190,000</td>
<td>146.87</td>
</tr>
<tr>
<td>184,000</td>
<td>112.60</td>
</tr>
<tr>
<td>228,000</td>
<td>78.20</td>
</tr>
<tr>
<td>215,000</td>
<td>69.80</td>
</tr>
<tr>
<td>180,000</td>
<td>32.04</td>
</tr>
<tr>
<td>183,000</td>
<td>57.33</td>
</tr>
</tbody>
</table>

| Gain | $587.84 |

Our curing room was a basement curing room, with abundance of moisture and perfect temperature. Accordingly I made a cheese with a fair amount of moisture, with instructions to Mr. Spillman to cure according to directions for at least 40 days. Sometime in June I received a letter from Prof. Spillman stating that the cheese sold like hot cakes for 14 and 15 cents per pound.

I cannot remember the exact figures, and further he said that he could sell tons and tons of the same kind at the same price, if he only had them. This letter came to me without asking about the cheese, so then I wrote him a letter and asked him whether the cheeses were really fine, and this is the second letter I got from him regarding the cheese.

In regard to boxing cheese, the maker should always order the best boxes obtainable at any price, and one-half inch larger than the cheese; for example, a 14½ inch cheese needs a 15 inch box, and when hooping for the curd, it should be weighed, which will enable the maker to get the size of the cheese in height, so as to exactly fit the box, and thus avoid a large amount of waste and labor in cutting down boxes.

I have often wondered how little business sense many cheesemakers show by making cheese by guess, and then, when boxing day comes, work half the night cutting down boxes to fit a miscellaneous lot of cheeses weighing all the way from 58 to 65 lbs. Their unbusiness-like way of doing business crops out in three different directions: 1st. Waste in boxes. 2d. Extra work in cutting them down. 3d. Last but not least, a lot of cheeses not very desirable by fancy cheese dealers. Oh! How simple and easy and business-like it would be to weigh the curd and get a lot of cheeses uniform in size, calculated to fill the box exactly to one-eighth inch above the top of the box. If this is not done, all boxes should be cut down one-eighth inch below the top of the cheese, to prevent the top rind of the cheese from drying out; and checking open, while under transit.

Cheddar cheese should have double scale boards both on top and bottom, while twin cheese should have double top and bottom and three in center.

Experiments made at our Experiment Station have proven that cheese cure best in the open air, that is, open on the shelves, with free access to the pure air. Makers should therefore avoid boxing cheese until cured and ready to ship.

Patrons ordered to haul cheese should be instructed to appear early in the morning with a clean double box on wagon, filled with clean straw or hay, and an abundance of blankets to cover the cheese while under transit to the station.

In concluding this paper I would like to impress one more very important idea upon the boys, and that is that a genuine feminine cleanliness and order should reign in their curing room, as well as in all other rooms under their care, with an abundance of ventilation so arranged as to avoid direct drafts across the cheese. Pure, wholesome air is as necessary in curing cheese as in curing the sick when under the doctor's care and commands.
MR. POWELL.—Gentlemen, you have heard Mr. Schoenman’s paper. Now, be loaded. You can get lots of information out of him, if you will only put him lots of questions. Let us hear from somebody who wants information from him. He is on the stand now.

MR. ADERHOLD.—Mr. Schoenman, do you know what was the difference in the shrinkage in weight of those cheeses in the two factories?

MR. SCHOENMAN.—No, sir. I do not.

MR. FAVILLE.—Mr. Schoenman has given us a heap of information in his paper, and I believe has more of it back. So I hope the boys will fire into him. I am very glad of one thing—while I am on my feet, I want to say this—I am very glad of the strong emphasis that he puts on the curing room. My experience corroborates his experience fully. I have said many times, and years ago, that the best manufactured cheese could be totally ruined by a bad curing room, and I still believe it, and I am very glad to hear the young man corroborate my statement and belief that that is so. I used to be in the business—used to make cheese first, and then for a number of years was a cheese dealer. I knew almost every curing room in southern Wisconsin, and central, too—what was then northern. That was ten or fifteen years ago, and there was not a good curing room in the whole circuit. I do not know what there is now, but I have reason to believe that they are not all good yet. I am very glad to hear this point emphasized.

I noticed one other thing in the paper—that the temperature he gives for the curing does not quite agree with our Experiment Station in Madison. I am glad to hear that, because I have had a good many controversies with the fellows up there. Their temperature is too low, especially for the first few days, when the cheese is green. It wants a higher temperature than it does later on. A temperature that would be right for a cheese 30 days old would ruin it in the first ten days. I have lost dollars and dollars in learning that, too. You have often heard that one swallow does not make a summer, and one experiment does not settle a thing, and I have in my experience lost good money by curing cheese at too low a temperature.

MR. MONRAD.—Before we start this discussion, let us get an understanding of what you mean when you say that the demand is for a soft, rich cheese. Soft— I will lay stress on that word. Does that cheese that Gov. Hoard showed us from Canada yesterday come within your judgment of the demand that you are standing for? Let us get an idea of what you mean.

MR. SCHOENMAN.—I would say in regard to that that the cheese I have in mind, if they were as I advocate, would be somewhat more moist than the cheese we had yesterday. You see, the gain is very large when you come to figure in a large factory. If a man can gain half a pound in weight, it is just as well as to gain half a pound in price, if you can do it without losing quality.

Q. I would ask the gentleman how he ventilated his curing room.

MR. SCHOENMAN.—I do not claim that I have a perfect curing room. The ventilation was not perfect. I do not claim it was, but I had good results. The cellar was just a common cellar, and there was a small window on each side of the cellar, and there was a door from the outside. That was the only ventilation I had. I would open those up at night, and be careful not to have any draught on the cheese. In very hot days I would close it up.

MR. ADERHOLD.—How deep was the floor of your basement below the ground?

MR. SCHOENMAN.—I should judge about seven feet, and about one and a half foot above the ground. There was a solid wall. It was just an ordinary house cellar, with cement floor.

MR. MONRAD.—How were the walls built?

MR. SCHOENMAN.—Wall of solid masonry—not perfectly smooth like this plaster. It was cemented on the bottom, but not on the side.

MR. ADERHOLD.—Were you ever troubled with the cheese moulding?

MR. SCHOENMAN.—No, not what I considered bad mold. I had some white mold on the cheese, but I am not afraid of white mold, if I do not get the green or black mold.

MR. MASON.—We have so many bad curing rooms in the state, I should like to hear a discussion of curing rooms that are bad. My factory is pretty well secured against heat, unless it should be warmer than it was last year. I pro-
pose in this factory to place two tubes of water in the curing room, one on each side, and a ventilator in the center of the curing room, and have a draught come in over this water and go up through the ventilator in the center of the building. I do not know whether I am right, but that is an idea I had.

MR. POWELL.—In regard to the construction of curing rooms, our next paper will cover that.

MR. ADAMS.—Will not direct air on the cheese, Mr. Schoenman, check it?

MR. Schoenman.—You want to avoid direct draught.

Q. I would like to ask Mr. Schoenman how he can have the cheese uniform from day to day when his milk is apt to vary in quality, and also the amount of rennet to use in a fast curing cheese. He omitted to say how many seconds he would ripen his milk in that time?

MR. Schoenman.—Of course, I was not on for making cheese, but I think I can give you the information. I cannot give you any set rules, because the action is too close, but I would say in this connection, the maker will have an abundance of common-sense. When he makes cheese, he will have to some skill. I do not mean to give you a set rule. I only give you this in a very general way. I have heard of cheesemakers using 5 or 6 pounds of rennet to the cheese. I think it is a waste of money. I would never do it. When you are making a quick curing cheese, you want to ripen your milk down a little closer than when you make a keeper.

MR. Baer.—Would the temperature of the curing room depend a good deal on the kind of cheese you are making? When you are making a soft cheese, or when you had milk that was working fast—that was almost acid—do you not think a higher temperature for the first ten days would be better?

MR. Schoenman.—I will tell you, there is one thing that I did this summer, and I like it very much; that is, I had two curing rooms. I had my regular curing room and this cellar curing room. I was perfectly willing to keep my cheese at a high temperature for a few days. When it gets 6 or 8 days old, you must have a cooler temperature. In regard to the firm cheese or soft cheese, I want to caution the boys a little on this soft cheese business—not to attempt it unless they have a good curing room. We must have those curing facilities first, and then we can make those cheeses that the people want.

MR. Adenheim.—What was the temperature of your curing room in the basement?

MR. Schoenman.—From 60 to 70. Hardly ever above 70.

MR. Adenheim.—Would you then have to keep those cheeses in the other curing room?

MR. Schoenman.—Yes, really for room, I had to do it. It just suited me all right. I think it ought to be done.

MR. Adenheim.—It is merely theory with you, is it not? You have not taken some of the same vats of cheese and cured parts of them in one curing room and put the other in the basement, the first thing—you have not tried that, have you?

MR. Schoenman.—No, I have not. Have you?

MR. Adenheim.—I have not. When I had to use the basement I used to put them down there first thing.

MR. Schoenman.—I should say the other curing room is not a poor curing room. Unless is gets very hot I can cure cheese there all summer, and in the spring of the year, and in the fall, I cure them in my regular curing room, and to keep the moisture I sprinkle the walls and the floor. I think that moisture has a good deal to do with cheese making.

MR. Johnson.—Can you keep 90 per cent of moisture in your cheese and keep them from molding? Some buyers will not take cheese that has molded, and there are others that object to it. I keep between 70 and 80 per cent. moisture in my room, and the cheese would mold on me in spite of all I could do. I had it pretty well ventilated, too.

MR. Schoenman.—Well, that may differ in different curing rooms. I think a cellar curing room would do better, on account of the cold air coming through there at all times during the hot day. Hot air coming in may produce a different effect than it would in a cool cellar. I had no trouble. I had 70 to 90. I would always watch the moisture between those figures. I had white mold on my cheese, but I did not mind that. I do not think it is dangerous.
MR. CARSWELL.—In regard to the remark of Mr. Schoenman about cold air coming directly into a warm room, that air will expand, and if it is in a room holding a large amount of moisture, the immediate contraction of the atmosphere when it enters a cold room precipitates a small amount of moisture on the outside of the cheese, giving a damp surface. It is not through a damp atmosphere; it is water on the cheese in minute particles, and if you put your hands about the greased surfaces, in extreme cases, it will feel damp. But there are few such cases where I have had mold.

MR. MONRAD.—When the outside temperature was 90 or 95, could you keep your temperature down to 70? That must have been an exceedingly good cellar.

MR. SCHOEENMAN.—Well, I will say that it might have been two or three days in the very hottest weather that it perhaps went 72. I do not think it ever went 76.

MR. MONRAD.—How did you manage your ventilation?

MR. SCHOEENMAN.—I kept it closed in the hottest days, and open in the evening.

MR. AUSTIN.—How is the factory situated—on high or low ground?

MR. SCHOEENMAN.—I told Mr. Aderhold that the cellar was about 7 feet below the ground. It is on high land, clayey soil.

MR. FAVILLE.—It is not the butter that is in the cheese that keeps it soft, but it is the water that you keep it with. The best cheese that we can get today is about 37 per cent. water—37 out of a hundred, or 35. And you must cure the cheese to keep that water in it, and manufacture it so that it keeps there. Butter will not keep the cheese soft. They say if it is hard it is skimmed, but it is not certain at all. It is the water, and in order to keep water in you have to cure it at rather a low temperature. They speak about taking cheese into the drying room. Well, drying the cheese and curing it are two different things entirely. One is the evaporation of moisture, and the other is the action of the rennet—or the bacteria. We do not have rennet any more. It is bacteria. It is giving them a chance to work. That is the difference. And those bacteria want to be placed at a temperature where they can work. They work all the better in a damp atmosphere. They may dry up if it is too dry. Give them the proper conditions, and they will make us a good cheese—if you will start it right.

MR. ADERHOLD.—I would like to ask Mr. Schoenman how much salt he would use in this moist cheese of his, and whether it would not be possible to increase the yield of cheese, and still have a good quality by giving it still more moisture and using more salt so that the cheese will be fair keepers?

MR. SCHOEENMAN.—We used about 2½ pounds of salt. I never made any experiments in that direction, but my opinion is that it would perhaps work all right. It would make a better keeper.

MR. FAVILLE.—Referring to that paper of yours, how is it you sent cheese of each month's make to Chicago?

MR. SCHOEENMAN.—I picked them out.

MR. FAVILLE.—Was the score-card on that cheese for a perfect cheese or a perfect cheese of that date? Was the score-card perfect for the six months' old cheese?

MR. SCHOEENMAN.—I told them the age of the cheese, and at the end they said: "For the age of the cheese they are perfect."

MR. FAVILLE.—I did not know whether it was a perfect cheese as we would score it now, for a September or October cheese, or one that had been made earlier, whether a June cheese would be as toothsome today as an October cheese. That is what I wanted to know.

MR. MONRAD.—I am shocked at Uncle Faville. Here is my old friend, Uncle Faville, wanting to get these men into substituting water for fat. I am shocked! To say that we should cheat the public and make them believe that they get a rich cheese by putting in more water. Well, gentlemen, this is no joke. I want to enter a warning, and a serious warning, against the tendency as shown by this gentleman's paper—against this tendency, as he shows by his figures, of gain in yield. As surely as we have been going too far in making big yields of butter by increasing the percentage of water, just as surely we are running into danger if we try to increase the moisture too much in our cheese. That was what I wanted to bring up—the difference between Mr. Schoenman's, or rather the American, idea of cheese and that of our friends across the boundary, as exem-
plied by the cheese shown you yesterday. When in Denmark I learned to make skim cheese. I learned that trick of putting in water instead of fat. That is one of the secrets of making good skim-milk cheese—to fool the public by putting in more water. It is water plus fat, the two things combined, that gives good quality. Now, there is really a danger. It is one thing to keep your moisture in the cheese right and another thing to get it watery. I had a sample of a very good cheese, but there was too much water in it, and I think the flavor suffered by it. I want to enter a serious warning against going too far in that way.

MR. FAVILLE.—Put all the butter in it that you can, and you can reinforce it, but if you allow the water to get out, your cheese will be hard.

MR. MASON.—I want to ask Mr. Schoenman if there is really any danger of getting too much moisture in the cheese in the common run of curing rooms that we have in this state.

MR. SCHOENMAN.—There is a serious danger if a person makes a somewhat soft cheese; unless he first changes his curing room, he is in a very bad position, and may get left.

MR. FAVILLE.—In what way?

MR. SCHOENMAN.—Because those moist cheeses and somewhat softer will not stand the heat.

MR. SPOONER.—There was something there I did not understand. The way I understand that paper, it took less milk to make a pound of cheese in Mr. Schoenman’s factory in June than it did in October.

MR. SCHOENMAN.—That is per 100 pounds. We figure per hundreds of milk. It was 9 in June, and that given in October about 10% per 100 pounds.

MR. ADERHOLD.—I would ask the gentleman what he thinks of the common cheese box. Is it as strong as it ought to be?

MR. SCHOENMAN.—I think not. I think that all the cheese boxes, or nearly all, are not strong enough. You can tell that by going down to Chicago on South Water street.

MR. POWELL.—Mr. Schoenman says that where the makers did not weigh their curd and get their cheese of uniform size, they spent half the night cutting down the boxes. They do not do it. I had a little experience last summer in Milwaukee, and nine boxes out of ten came into Milwaukee without the boxes cut down, and it is the same in Chicago. I have seen cheese come in where the box was two inches larger than the cheese, and half of those boxes were broken so they had to be replaced with new boxes. If a man does not cut down his cheese boxes, he has no kick coming if the buyer charges him up with new boxes, because if the cheese is not one-eighth of an inch higher than the box, the whole weight of the cheese on top is on the box, while it should rest on the cheese. Where the cheeses are piled 8 or 10 high, the boxes are not strong enough to hold them, and if the cover does not rest on the cheese, they will not hold out, and they will be all broken to pieces. Never let your cheese go out of your factory unless the box is cut down to the cheese. And if a lot of cheese comes in with the boxes all broken to pieces, I have known a man to take half a day to fix them up in shape to sell.

MR. SPOONER.—I think 4½ oz. of rennet to a 1,000 is a good deal.

MR. SCHOENMAN.—I do not think it is too much for a quick curing cheese. In the spring, when you know that the cheese will be eaten in about thirty days, generally in the spring you will know that the cheese which you make will be sold in a short time, and then it will be sufficient.

MR. SPOONER.—Do you think it will ripen any quicker?

MR. SCHOENMAN.—I do.

MR. SPOONER.—Why?

MR. SCHOENMAN.—Because experiments have proven it.

MR. SPOONER.—Did you get any acid in them?

MR. SCHOENMAN.—Yes, sir.

MR. SPOONER.—I do not understand how you cured that cheese with 4 oz. of rennet. How much salt did you use?

MR. SCHOENMAN.—I use as low as 1¼ pounds early in the spring.

MR. SPOONER.—You say that cheese was ready to ship in from 12 to 20 days?

MR. SCHOENMAN.—Yes, sir. Pretty fast work, but not near as fast as some.

MR. SPOONER.—Was it the quantity of the salt that made it cure so quick?

MR. SCHOENMAN.—Yes, sir, partly.
MR. ADERHOLD.—Do you not think the salt had a great deal more to do with it than the rennet?
MR. SCHOFENMAN.—I do, but I think the rennet has something to do with it.
MR. ADERHOLD.—I think ¼ pound of salt has more effect on the curing part than an ounce of rennet.
MR. SCHOFENMAN.—I do, too. I think that would be about the rate.
MR. SPOONER.—I do not believe from my experience that a large quantity of rennet has anything to do with the curing of cheese.

HOW TO CONSTRUCT A CURING ROOM TO MAINTAIN EQUAL TEMPERATURES.

Prof. F. H. King, Madison, Wis.

In 1889, I was requested to read a paper upon this subject before this same organization, and in that paper I stated by way of introduction that to discuss the subject assigned to me in explicit terms there were several questions which must first receive definite answers, for they have extremely fundamental bearings on the construction of the curing room.

1. At what mean temperature should a curing room be held, and how great departures from this mean temperature are admissible?
2. Is sunlight an essential factor in the curing of cheese or may this agent be wholly or largely excluded?
3. Can the curing of cheese go forward properly in a still air or must good ventilation be provided?
4. Is it important that the air in a curing room should be held at a certain degree of humidity or moisture, and if so, what is the right degree?
5. Are there stages or times in the curing of cheese when the temperature, light and moisture should be maintained steadily at some higher or lower degree than is required at another stage?

It appears that there are, even now, no very definite answers which can be set down for these questions and hence I am again forced to assume conditions.

As practical experience seems to point to a moderately dry air at 65° F. for the beginning stage of curing for cheddar cheese; and to a warm moist air at 60° F. for the finishing requirements I will confine this discussion to these two phases of the problem.

How may we construct two curing rooms, one whose temperature may be held at 65° F. and humidity at 60; and the other whose temperature shall be 60° and whose humidity shall be 70°?

To understand the essential features of this problem it is important to know the meteorological conditions which must surround our curing rooms. The following table gives some of these:

<table>
<thead>
<tr>
<th>Month</th>
<th>Mean Temp.</th>
<th>Mean Rel. Humidity</th>
<th>Dew Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>May</td>
<td>57</td>
<td>74</td>
<td>49</td>
</tr>
<tr>
<td>June</td>
<td>67</td>
<td>83</td>
<td>61</td>
</tr>
<tr>
<td>July</td>
<td>76</td>
<td>77</td>
<td>69</td>
</tr>
<tr>
<td>August</td>
<td>69</td>
<td>81</td>
<td>63</td>
</tr>
<tr>
<td>September</td>
<td>61</td>
<td>83</td>
<td>56</td>
</tr>
</tbody>
</table>

These figures are more strictly applicable to Madison than to other parts of the state, but they are approximately true for a large part of Wisconsin and will answer the purpose of this paper.

It will be seen that during the months of May and September the natural air conditions are about what seem to be desired for cheddar cheese, but for June, July and August the temperatures are too high.

Now since the mean temperatures of the air are too high it is evident that in order to secure a temperature of 60 to 65 degrees for the curing room some method of cooling the air must be adopted during the three summer months at least.