substance of that curd. You get what is known as two different kinds of cheese in the same kettle. One is the sound, the healthy curd particles from which during the process of manufacturing the whey expels, it shrinks and it firms up; while the other stays in a mushy long stringy shape, yet they are distributed throughout the entire mass, but by a thorough examination and taking out a handful at random you will find that some are nice, firm and dry and others soft.

When the mass is finally done it is firm enough. You will find that when the entire mass settles in that kettle a sound curd being heavier than a thick curd, the sound will drop right down through the others to the bottom of the kettle, while gradually comes along that lighter curd and it comes down and you all know that the last thing that you do you give it a thorough motion a last motion to give it a more uniform distribution, so that you get the development of the eyes and holes equally distributed in the cheese. Now gradually the sound curd goes to the bottom. The curd which is lighter, from which the action of the rennet was insufficient in which there is contained this milky substance which is not precipitated from the curd, which will gradually settle. The last thing which is done if the masses are so bad, it will settle uniformly over the top surface which is characteristic of a stinker. Now if the troubles are of minor importance in that same mass one group will settle here in a cluster form, and the others will settle there. Those are what we call the pockets.

Now the treatment I would suggest and you may rest assured when you increase the percentage of lactic acid or ripeness of your home made rennet to at least 47 to 48 ripeness, that would mean that you would carry your rennet at least three days, or in other words thirty-six hours, you will find that a great deal of this trouble that has cost thousands, in fact hundreds of thousands of dollars loss in that section of that state in the year 1919 could be overcome by this simple little remedy.

THE NEED FOR THEORETICAL KNOWLEDGE IN THE MANUFACTURE OF SWISS CHEESE

By Fred Marty, Monroe, Wis.

MR. PRESIDENT: As a past field worker for fifteen years in the capacity of Inspector and Instructor of the Wisconsin Dairy and Food Commission, and other state dairy organizations, I have long noticed the need of more technical knowledge and application of same in the manufacture of Swiss cheese.

The first move towards a branch Dairy School was made by myself a year ago before the Southern Wisconsin Cheese Makers' and Dairymen's Association, with the result that the Dairy University of Wisconsin has now completed arrangements with the above mentioned Association to carry on a one week's course for the special benefit of the Swiss cheese makers of that district. I have chosen this topic before this Association in the belief that any move that is made of importance in the Dairy industry of Wisconsin should be brought before this, the Mother Association, for its moral approval and support.

The branch of foreign cheese is materially different than American cheese, in that it is a sweet curd cheese, in which lies the difficult art of
controlling the different fermentations without a controller, whereas, in
the manufacture of American cheese you have the acid and rennet tests
with a pure lactic acid culture as your controller. With the ever new ideas
of increased milk production by the use of silage, etc., the introduction
of milking machines, and its usual subsequent failure of proper instructions
and caution that should go with the appliance of each new kind of feed
and feeding, the proper and only successful way of applying the milking
machine to assure a healthy condition of the cow's udder, the necessity of
cleanliness of the milking machine and a harmless solution in which the
teatcups and tubes are kept between milking. In my opinion there are in
use many such solutions that are detrimental to the manufacture of cheese.
When applied to the cow without being rinsed out in pure water, in my
opinion, there can remain sufficient solution in the tubes to neutralize the
calcium salts in the milk, which eliminates the curdling element in milk.
In the manufacture of Swiss cheese we are dealing with milk that must
be free from any abnormal fermentation due to the fact that a starter for
its control can not be used unless so applied by an operator who is ex-
perienced in technical knowledge of milk and its products.

SEPARATE DAIRY SCHOOL FOR SWISS CHEESE MAKERS

A separate dairy school should be inaugurated for the benefit of Swiss
cheese makers, and entirely different methods than those that are now
practiced in the dairy schools for American cheese should be installed.
The eligible student to this institution for the manufacture of Swiss
cheese should have at least three full years of practical experience as a
helper, as my experience as an instructor of the foreign cheese department
at the Dairy School of the University of Wisconsin for years showed me
that the student without sufficient practical knowledge of making cheese was
slow and in many cases unable to properly understand the meaning and
application of theoretical knowledge in the manufacture of cheese. Es-
pecially was this the case of a Swiss cheese maker student who was not
sufficient master of the English language to get full benefit of the lectures
given by the different professors. Besides, if a student of limited practical
experience who did not meet with the different mechanical faults and vari-
ous other troubles that are experienced in daily practice, and therefore did
not understand the meaning of theoretical appliances to remedy the trouble.

DELAY IS COSTLY

It is an acknowledged fact that the cheese maker is becoming a more im-
portant factor to a community of milk producers whose financial success
depends entirely upon his knowledge and skill as a cheese maker.
The high prices of the land, and dairy herds of today makes this fact
all the more important. Every year that has elapsed has sacrificed the
cost of construction and maintenance of a separate Dairy School for the
Swiss cheese industry of Wisconsin, and I am safe in saying that the year
1919 stands out alone with a loss of hundreds of thousands of dollars in
the Swiss cheese section of this State, due to the absence of a Dairy School
for Swiss cheese.

APPEAL FOR INSTITUTION

I appeal to you members of this Association who have the Swiss cheese
industry of our state at heart to assist the Southern Wisconsin Cheese
Makers’ and Dairymen’s Association to bring about an educational institution for the manufacture of Swiss cheese, an industry that made Wisconsin famous; without it we will never reap in full measure the fruit of our labor. But we will each year retract the mistakes of the past, and instead of progressing, we will each year gradually decline in efficiency.

A school of teaching in the manufacture of Swiss cheese would continuously introduce new life and up-to-date methods to the beginner, as well as to the older cheese maker.

"Since there is no branch of manufacture where theory is so closely related to practice as in the manufacture of cheese, it would teach them the composition of milk, its different ingredients, and their intended purpose.

"They would learn why milk coagulates when rennet is added, they would learn the kind and per cent of acidity the rennet should contain for the milk on hand; they would learn how to prevent the manufacture of "cracked cheese;" "Glass Swiss cheese" as well as Swiss cheese that set too many eyes or holes. They would learn the reason of the epidemic that was so common this last season of a cheese containing "stink spots" as well as many other reasons of mechanical faults in the manufacture of Swiss cheese. An educational institution would soon turn out enough students to constantly supply our entire Swiss cheese district which would soon introduce a more skillful method of manufacture.

Besides, it would acquaint them in the proper handling of the various milk tests, which they so far have entirely ignored, because they are unknown to them. All of this would lead to a more uniform quality of Swiss cheese.

Therefore knowing that the members of this Association practically represent every county in the state, you will be in a position some day to lend us your helping hand, as this matter will no doubt some day shape itself into a branch Swiss cheese dairy course by the Dairy University of Wisconsin, who in turn will appear before the Legislature of Wisconsin for financial aid, and we ask you to help us through your Assemblyman."

**Faults Seen in Foreign Cheese**

I want to say that the exhibit is a credit to the state of Wisconsin, especially so what is on exhibit in the line of Swiss cheese. We have one of the most ideal Swiss cheese on exhibition that has perhaps been in a convention hall of the Wisconsin Cheese Makers’ Association, and I would ask the management for the good of all here to have that cheese on exhibition in this hall. Let them see what a real shape of a Swiss cheese looks like and have them cut it so that they can get an idea of the workmanship and holes.

The brick cheese was excellent. To give you an idea what an amount of work it is to judge a cheese. No doubt judges are always open to criticism, and I want to tell you it was a hair-split proposition to decide on first, second and third. The least little fault had to be taken into consideration and the cheeses changed positions several times. We had twelve to fourteen cheese exhibits here, brick cheese. Some would have won out in workmanship in spite of the poor raw materials. Those of you will remember this in future exhibits. There is cheese here that is so beautiful in appearance, the workmanship so excellent that it hurt me when I had to turn that cheese down for the simple reason that by closer examination you could find that there were millions of tiny holes in that cheese. Now, you should not send a cheese with the expectation of getting
anything more than a complimentary score on a cheese when it has pinholes. The man who makes those cheeses that are such top-notchers is well capable of making a prize winning cheese but he falls down by the fact that the cheese has fine little pin holes. There were abnormal conditions in the milk. Consequently we cannot place a cheese with pin holes as a prize winner so it had to take the next best score. We had twelve of them and we shaded them down to six. Then they went down to three and finally one, two, three. Everything was taken into consideration and we did the best we could.

On the limburger cheese we did not have quite as good an exhibit. There is considerable limburger on exhibition in which the workmanship is very crude, very poor, although the prize winners were excellent. Numbers one, two and three were excellent, but any below that the workmanship was crude.

There was some brick cheese on exhibition here that contained over 44% of moisture. The score on that cheese was 90. There were three scores of 92, 91 and 90 that averaged over 42% of moisture. Mr. Aderholt made the moisture test on the lowest and highest, and he found that the average score of prize winning cheese was 38 and a fraction for moisture.

Pres. Reed: Mr. Aderholt has those figures and is going to present them in a few words on the moisture test.

Mr. Marty: So if there is any question that you brick cheese makers would like to ask I am glad to answer any of them in regard to Swiss, block, or Limburger cheese. If there is anything that you would like to ask, out with it. You students over there take part in this discussion.

Member: I would like to know how long Limburger should be cured in the cellar and at what temperature?

Answer: Limburger cheese in earlier days was supposed to be completely cured in the factory. And they used to hold this quite long, but today Limburger is made somewhat different. Limburger cheese should be on the shelf for four weeks before it is packed. Limburger cheese should be packed in a moist condition to prevent mold. Instead of laying around in boxes and deteriorating in quality and burning up the parchment paper, manila and tinfoil with excessive heating, by having it in common cheese cellars, do not pack a Limburger cheese unless you expect to haul it right away. Pack it in a moist shape and put in cold storage to finish the curing process. Four weeks is about the period it should be held. The temperature of the curing room should be about 70 Fahrenheit in the spring and fall. In the summer time if you are successful enough that you can get it down a little bit lower all the better for your curing. But in the spring and fall I would recommend that you have the heat 70 and a little better. Your cheese works up better, gets a better color and gets the same appearance and natural color as that of a summer made cheese when the surrounding temperature was in sympathy with the cheese. Working in spring and fall you have extreme cold you will get the pinkish color on the outside of the Limburger cheese which is detrimental to that cheese but if you will increase the temperature a little you will get better results.

Question: What per cent of acid do you suggest in brick cheese?

Answer: The original intent and purpose of a brick cheese was that milk must be fresh from the cow and made into cheese from milk ripeness 18 to 19 in acidity. If your milk is in fine shape, good sweet condition, stay away from a starter, but in a season of drought in summer, we find gassy disturbances in a sweet curd with the result that there are many makers that think they cannot go over that particular season without mak-
ing a spongy open brick cheese. The market for brick cheese got used to it and took it for granted. They would say we are getting into the hot season, and brick cheese always opens up during the hot season. That should not be the case. During that period introduce one-quarter, and if not sufficient, one-half per cent starter and overcome that little gassy disturbance. It will mean that you make a closer brick cheese. It would increase your yield for the period of the last part of July, August and September. For one-fourth of your year you can increase materially your yield of the brick cheese. The same thing is true of the manufacture of limburger.

QUESTION: How long ought brick cheese to be on the shelf before packing?

ANSWER: Brick cheese the same as limburger cheese used to be finished, cured and dried and everything else at the factory in by gone days. Every nationality has a peculiarity in its demand for cheese. Some want sharp cheese, some mild cheese; in other words some want old cheese and some want new cheese. The biggest demand for brick cheese for some reason has been drifting to a medium cured brick cheese. They want fresh cheese, a cheese without any smeary surface on it, you will find that that cheese will require a period of at least three weeks curing at the factory. Now, it sounds long to many of you because I know as well as you men that you are sending in brick cheese two weeks old and perhaps younger. What I want to say is this, that any brick cheese with a heavy smeary surface on it is objected to by most of the trade. They do not want it. They want brick cheese which has a thin rind but if you get a brick cheese with an old rind they do not like it. They all know the cheese cured on the shelf (the old style of smearing cheese) gets sort of dark appearing in the center—I hate to say it but there is in the market brick cheese only five days old. You ought to give this cheese two or three smearings which would mean a period of two or three weeks. I have a brick cheese here, the third prize winner, which is in ideal shape. It will take from coast to coast in any market; better than the one that took first premium, but not quite so good in workmanship. Now I would like to ask Mr. Gottlieb Schubiger, how old is this cheese?

ANSWER: I made it the second day of November last year.

MR. MARTY: You see age does not hurt it very much.

QUESTION: Don't you think that silage feed is injurious?

ANSWER: You take any abnormal feed for instance silage or any food that is abnormal—that is developing into abnormal acids or fermentation that it will naturally act improperly upon the animal. I am a big fighter against silage feed for our state, and in spite of my efforts it is coming into our state. When that silage comes from a clear wheat field and is fed right it is not injurious to a cow but we usually find that some men have a nice cornfield and the next man has not such a nice field, and then we have a man that has a poor field. Here comes the important question. One will cut when the corn should be cut, but they used to have only one corn shredding machine in a certain community and it would start in with Mr. Jones, but by the time they got to Mr. Green they had frost—when that was put into the silo they did not have as good a feed as Jones. I am not against such methods but I am preaching precaution, so in regard to improper feed, what will silage do to a cow in the way of green silage over which frost has come? When you go into the silo the tears will come into your eyes. It will put the cow out of commission. It takes them off their feed. It almost eats the inside out of them. Can you expect good
milk from a cow in that shape? You must feed your cows with caution and care.

**QUESTION:** I would like to ask what do you ask the cheese makers to do in order to get a uniformity of weight and size of brick?

**ANSWER:** Well, it is a very good question, and it is one that a little more emphasis should be put onto. We find that every cheese maker takes it upon himself to make his own size brick cheese. In other words, I have noticed that some have nothing but straight molds, that is for three brick cheese. Some day they get a little too much—well they just slap it in and make a six and a half to seven pound brick cheese, and I can call them young block cheese. The next day they have not quite enough to put one mold away, yet not quite enough to fill that mold—well, the result is they use that mold and make it a three and one-half or four pound brick. Now, why not have an individual mold, get it down to one mold and get a uniform cake of brick cheese?

Here is a perfect size brick cheese. I wonder how much it weighs?

**ANSWER:** About six pounds—no, five and one-half pounds.

Mr. Marty: That is what the maker says. Five and one-half pounds—that is some better than six pounds.

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**“FAULTS SEEN IN THE CONVENTION CHEESE”**

By Mr. Wm. Hubert, Sheboygan

**LADIES AND GENTLEMEN:** The first cheese that I am going to show you took second premium. The only thing that barred it from taking the first was a defect on account of the bandage. That cheese was tied for first score, and the making put it down one-quarter of a point and it gets only second prize.

This cheese scored 99 and one-quarter. The moisture test is 35.9 while the moisture test for the first cheese in class 1 is 34.1. In class 2 which is young Americans and longhorns I think that tested 33.6.

This cheese here was frozen when it reached the convention. It was frozen solid. You see how it acted. That man was naturally scared down. It was the fault of the express company. He sent two cheeses—the longhorn came later and was frozen solid.

This cheese was paraffined too young. It had 36 and a fraction of moisture. It has the rind rot which I think was caused from having been paraffined too young.

**QUESTION:** Is the rind rot on both sides of the cheese? I think that many makers have the tendency of putting cheese on the shelf without turning it over and then there is the one side rind rot, because it is not turned on the shelf. Too many cheese makers forget to turn the cheese on the shelf daily.

**Mr. Hubert:** Here is one of faulty appearance besides being poor cheese inside. Here is a cheese that tested the highest but one for moisture, one of the highest being 42.9. Here is another cheese with much moisture. Here is one that has 40.7 moisture. We have had very few that went over forty. That cheese that had 42.9 moisture scored 80. This cheese here had a score of 77. It has a nail hole here with the moisture running out of it. It is pin holey also. Here is a piece of the cheese that had a high