Mr. Westphal: What would be the proportion of protein in alfalfa compared with red clover?

Prof. Moore: Red clover has a little over two-thirds as much protein as alfalfa but where you get three times as much alfalfa as clover, you can see the difference in favor of the yield of alfalfa, but red clover is a wonderful plant and we do not want to go back on it.

The President: We will have to close this discussion. We have had a very good address by the professor and now we will take up the next lesson by H. A. Chaplin, of Plymouth, Wisconsin.

PREPARING STARTERS AND RIPENING THE MILK.

H. A. Chaplin, Plymouth, Wis.

Mr. President, Ladies and Gentlemen:

The subject assigned to me—that of preparation of starter and ripening of milk is one of the most important points in cheese making. Before stating how we prepare the starter, I wish to carry you back to the time I first made cheese in '78 and '79 and to the process in practice then and several years thereafter. We knew nothing of starters. The milk was taken in the morning, being heated at the same time as quickly as possible to 84° or 86° according as to whether we were using prepared rennet or rennet extract. The milk was therefor set by or before 8 o'clock in the morning and heated to 98 or 100° by or before 10 o'clock. Then we waited for acid. If the milk came in in the proper condition, i.e. with the proper degree of ripeness, it worked right along—we gained acid in the right time, and finished cheese making much as we do to-day. If the milk arrived too sweet we waited for acid from 2 to 4 or sometimes even 6 hours from the time of heating to the drawing of the whey. In that case we thought there was something wrong with the milk and complained to the farmers, they took better care of it, cooled it a little more, and the milk came in sweeter than ever. And where the curd laid so long in the whey, it became whey soaked, and it was impossible to make as fine a quality of cheese from it. I do not mean to
say that we did not make as fine cheese in those days, because I think we did, but it was harder work—required more skill and much more patience.

About this time we began to ripen the milk in the vat, using Harris test, and later Monrad, and still later Marschall to determine the degree of ripeness, to hasten the process of ripening we find some of the boys using whey starter—putting in sour whey to ripen the milk. Of course this had the desired effect in hurrying the work, but almost invariably made a poor quality of cheese, because all the taints and poor qualities of each day were carried along to the next, and added to those of that day—the starter becoming worse from day to day.

To overcome this a whole milk starter was used which worked better, and was taken up, and advertised, and taught as a great cure-all ills that milk was heir to; but I firmly believe that in the first few years that starters were used, more cheese were spoiled by use of poor starters, or excessive use of good ones, than were helped by them, but I am glad to say that the tendency of the present time is toward placing starters where they belong—not as a cure-all, but for the purpose of making a better and more uniform quality of cheese. I want to caution the boys against excessive use of starters—a starter is not for the purpose of hurrying up the work so that the boys can get through earlier, go to the ball-game, or to see somebody-else’s sister. We never use more than $\frac{1}{2}$ of 1% of starter during the spring and summer, and not more than $\frac{3}{4}$ of 1% during the late fall, except it be where the milk is known or expected to be tainted.

In preparing starters we used to take the milk from the vat, and this was improved upon by taking out the milk from some farmer considered to have good milk, and carrying that from day to day by addition of a little sour milk of starter. This practice is used by some of the makers today, and with good success during most of the year, but there are certain times when the milk of the best farmer may be badly tainted, and still while cold at the intake the maker not be able to detect it. Then the starter will be very bad, and either have to be destroyed and leave the maker without a starter, or be liable to spoil the whole milk in the vat. Therefore most of us are using a pasteurized starter. We prepare
the starteline by using commercial lactic ferment, prepared according to directions (we use Hansen's, because it is handled at our dealer's, although I have tried other lactic ferments, and found them equally good).

In preparing the milk for the starter, we take the milk from some farmer whose milk is not over-ripe, and appears clean and good. We do not take it from the vat for the reason that it might be slightly over-ripe, and not stand heating properly. The milk is then placed in the pasteurizing tank, and kept there in cool water until we have time and plenty of steam to use, when the steam is turned on, and the milk heated to from 170 to 180 degrees F., held at that temperature about ½ an hour. As our factory is piped with cold water, to cool it we have only to turn a valve, let the cold water run in on one side, warm water overflowing on the other side into the drain, or if necessary (as is generally the case) to the whey tank. We cool the milk as quickly as possible to from 65 to 70 degrees according to the season and the weather. Sometimes in hot weather it is necessary, in order to keep it at the right temperature, to leave the cold water running slightly all night. Then at from 2 to 6 o'clock, according to the season of the year and the condition of the weather, the starteline is incorporated with the starter, at such a time as we have found by experience that the starter will be in the best condition in the morning when ready for use, i.e. neither too sour nor too sweet. I like it best thick, but not so thick but that it will stir up smoothly at about the consistency of good, thick cream. Not all of you can do it in the same way, because not all factories are equipped with steam and running water, but the same effect can be produced with a little more labor, even where it is necessary to heat the can of milk for the starter in a boiler on a stove, and cool it in a wash tub, and will be better than any starter prepared without pasteurization.

We are very particular in saving the starteline from day to day. Our starteline is kept in a 2 qt. can with a tight cover, so that it can not be contaminated by the air, and even then the top is always poured into one can and the bottom into the next, out of which second can the starteline for the next day is taken, and the starteline is taken from the bottom of
this second can, and immediately placed in the ice-box, and
even then the starter will sometimes go off, probably caused
by becoming too sour or by some accident. Upon the slight-
est sign of the starter's not being perfect we prepare another
starteline from fresh lactic ferment, but don't destroy the old
starteline immediately, because we have found the lactic fer-
ment not always to be relied on.

We mix the starter with the milk running into the vat at
such a time between the first and last milk going into the vat
as will in our judgment bring the whole milk in the vat near-
est to the proper degree of ripeness by the time we are ready
to set the milk. As soon as the milk is heated to 86 degrees
we test it to see how ripe it is. If it works as we have figured
it, it will show from 16 to 18 points on the acidimeter, ac-
ccording to the season of the year and the purity of the milk.
If it does not, the milk is left to stand, (being stirred mean-
while until it will. To determine the degree of ripeness we
want, we bring it to the point where it will be ready to place
the curd on the rack in from 13 1/2 to 2 hours from the time of
setting the milk, with an acidimeter test of from 14 to 16 points.
This is the key to the ripening of the milk. Not all can use
the same degree of ripeness because not all milk works alike,
but this is the point which in our judgment works best with
us.

You will notice that we leave a good many things to our
judgment. There is no fast and solid rule in cheese-making.
If there were there would be no need of dairy schools and
expert cheese-makers. We could hire anybody, give him a
set of printed rules and a watch, and expect him to make
good cheese. Instead of that, we must study our milk and
starteline, and know the effects of different pasturage on milk.
And again I want to caution you against the use of too much
starter—time is always with us. If the milk is not ripe
enough, we can always wait for it, but if it is too ripe, it is
hard work to make a uniform cheese out of the milk. We are
making cheese for the American people, and they are a very
particular people—they will eat a good many kinds of cheese,
but they draw the line at sours,
DISCUSSION.

Mr. Kasper: At what time do you add your starter to the milk?

Mr. Chaplin: It depends on the time of year. If I think it is necessary I put it in the first thing in the morning. If I find it has been working the best that way, I wait until the milk is mostly in the vat. I always put it in so it will be at the right degree of ripeness when I get ready to use it.

Member: When do you add starteline to the pasteurized milk?

Mr. Chaplin: At two to six o'clock in the afternoon, but during the greater portion of the year at 2 o'clock.

Mr. J. W. Moore: Is it advisable for a cheesemaker to let the testing of his vat for acidity go until his milk is heated to 86 degrees? It seems to me if a maker has any trouble, or if he is suspicious of his milk being over-ripe he can find that out in time to use a starter, and the starter should be used before the milk is heated, but if he does not test the ripeness until he gets his milk heated that is nearly the time he is ready to start cheese making.

Mr. Chaplin: As a rule we do not have trouble with our milk. If we are suspicious of it we test our milk for acidity.

Mr. Hackert: How long do you carry your starter?

Mr. Chaplin: I have carried some starters for some time, and I have found starters I could not carry one week.

Member: Do you generally take your starter out of some patron's morning milk?

Mr. Chaplin: I do not think that is necessary; I simply have milk that is sweet.

Mr. Aderhold: How many years have you used starter?

Mr. Chaplin: About eight years, nearly half the time I have been making cheese.

Mr. Aderhold: You made the statement that when you first began to use starter a great deal of trouble was caused by using too much starter and using poor starter. Don't you think where they use the raw milk starter, as I think most of the boys do today, that they more often use a poor starter than a good one.

8—Ch.
Mr. Chaplin: No I think some of them in our county, where the milk generally comes in good, can make a pretty fair starter without pasteurization.

Mr. Aderhold: They can but it is generally not as good as they like to have it.

Mr. Chaplin: Not as good as a pasteurized starter but that does not obviate the fact that most of them use too much starter.

Mr. Aderhold: In traveling from one factory to another, I find that where raw milk starter is used, in nine cases out of ten, at least the day I was at the factory, the starter was not just as the maker wanted to have it. Sometimes it was not starter, sometimes the whey was standing on it, sometimes it was tainted, and I have found it that way nine times out of ten in my travels throughout the state from factory to factory. There may be some cheesemakers that get it pretty nearly the same every time but the starter should determine to a considerable extent, at least, the flavor of the cheese and I do not think we ought to take any chances on making it from something we do not know anything about and have no control over. I believe of a cheesemaker wants to be an ordinary "dump" he can show it as good as in any other way by using raw milk starter but anybody that wants to make something excellent is not going to be dealing with a starter over which he has no control and that he knows nothing about how it is going to come out.

Mr. Chaplin: I am not as strong as Mr. Aderhold on the point he makes regarding the raw milk starter. I think the greatest trouble is that once in a while a raw milk starter will spoil a batch of cheese, and that once in a while will more than pay for the extra work of pasteurizing.

Mr. Dassow: Don't you think it better to use less starter and put it in early in the morning rather than wait until later in the day and put in more?

Mr. Chaplin: Yes, where you are fairly sure of your milk. Where it has been working right along as you want it to. I should put in my starter early in the morning and use as small a quantity as possible.

Mr. J. W. Moore: I believe it was said by some one yesterday that it was not important to select the milk from which
starter was made. Lots of us do not pasteurize this starter as we should, and we call everything sterile. Why not select the best milk, then if we do not pasteurize thoroughly we will have something better?

Mr. Chaplin: Time comes into consideration there. You may not have the best milk in the factory coming in until after our vats are washed and ready to receive the starter next day. I admit we should select starter from fairly good milk. If your milk is not bad I think pasteurization will kill all the germs in it.

Prof Moore: You admit the milk should be selected?

Mr. Chaplin: Yes from selected milk.

The President: The next subject to be discussed is Setting, Cutting and Cooking of the Vat by Mr. P. E. Crans- ton, of Sabin, Wis. I understand Mr. Cranston is not present so we will discuss the subject and I will call on Mr. H. J. Noyes to open the discussion.

SETTING, CUTTING AND COOKING OF THE VAT.

Discussion led by H. J. Noyes, Muscoda, Wis.

Mr. Chairman, Gentlemen of the Convention:

This is quite an important topic but I do not think it should require a great deal of time to bring out all that is necessary in regard to the matter.

The cutting of the vat should be done at the proper time, as soon as the curd becomes firm enough, you can tell this by inserting the finger at an angle of 45 degrees to see if it will break clearly. I think it should be cut as soon as it will break nicely. In cutting your knives should be sharp. It should be cut as straight and swiftly as you can and not wobble your knife too much to break the curd. I would cut with a horizontal knife first, then a perpendicular, then across, and continue cutting until you have the right size granule. If the milk is pretty ripe I would cut finer, but if it is working normal I would cut coarser.