PRESIDENT WHITING: Thank you, Steve. There should be someone here from Shawano County.

MR. KOPITZKE: Mr. Chairman, I think Mr. Redell over here could say something. We have a very nice local and I don’t know how many members we have but the secretary will be here a little later.

PRESIDENT WHITING: Are there any other locals represented here? The next speaker on our program will be Mr. Tebay. Ladies and gentlemen, it is a pleasure to introduce to you at this time Mr. Tebay.

PROPER CARE OF MILK

By Mr. W. C. Tebay

Mr. Whiting, ladies and gentlemen, it certainly is a pleasure to be here today and talk with you on the proper care of milk. It doesn’t matter wherever you travel, Wisconsin is always known as a cheese man’s state. This past summer I was traveling through New York State and there I saw a sign advertising cheese; and strange as it may seem, you hear a lot of people in any store or any place—they want good cheese, and you always hear them ask for your products.

Today I would like to read this talk, inasmuch as we don’t have much time. I don’t want to digress and lose a lot of time.

From the start of cheese making until today, cheese makers have striven to improve the quality of their cheese. Experimental stations, cheese associations and cheese companies have spent years of research to improve the quality of their products. University extension men have spent years educating cheese makers on the latest technique, skill and methods of making cheese.

Cheese factories have purchased the latest and most modern equipment to handle and make cheese, but even with the greatest of skill and latest equipment, no cheese maker can consistently make the highest grade cheese from poor quality raw milk. He must have a good quality raw milk supply.

Cheese makers are realizing the need for improving their milk supply more and more each year. Some factories pasteurize the raw milk supply if it is of poor quality, but still find that they can’t cure all the difficulties in the finished product—cheese. Since pasteurization hasn’t been the “cure-all,” the cheesemaker or field-man has a big problem in improving the raw milk supply.
Since a good milk supply is needed to produce high grade cheese—let's analyze and discuss those things which cause the cheese to be of an inferior quality when made from a poor milk supply. We all know that the milk which comes from the cow's udder (providing the cow is healthy) if it were made immediately into cheese, would make a high grade cheese, assuming, of course, that proper methods were carried out in the factory processes and possibly more starter added than normally to make up for slowness in developing acidity because of few bacteria in the milk. Why? Because the normal bacteria that are in the milk as it comes from the cow's udder allows the cheese to age and develop the flavor and body which the consumer desires. If milk, as it comes from a healthy cow, is of excellent quality and will make a high grade cheese, then, the making of good quality cheese depends upon our keeping the milk supply in very nearly the same condition as it leaves a cow's udder. We know that the wrong type of bacteria getting into the milk supply causes the cheese to develop off-flavors, poor body, gassy cheese and sometimes decomposes the cheese, making it unfit for consumption.

Bacteria or germs are micro-organisms; they need three things to grow...food, moisture and temperature. Cheese factories work with millions of bacteria every day. We add millions to our milk in the starter and actually grow bacteria when we set the milk. They are not worried about the desirable bacteria...It's the undesirable ones that have to be kept out of the raw milk supply and finished cheese. Every cheese maker has had the experience probably with his starter becoming contaminated with undesirable bacteria and knows how it affected the finished cheese. The same thing is true with a contaminated milk supply.

By analyzing how and where undesirable bacteria get into the milk supply, I believe we can find the answer to improving our milk. I don't think it matters in making cheese whether the milk has thousands, or even millions, of bacteria in it as long as the milk isn't too ripe and the bacteria aren't of the wrong kind.

Mastitis Or Garget

In the first place we have the beginning of poor quality raw milk with cows having mastitis or garget. Mastitis or garget means a feverish udder. We usually think of it as inflammation of the udder. In bad cases we have cows giving stringy or flaky milk. It can be detected in bad cases by using a strip cup. When a strip cup is used, mastitis is detected by stringy or flaky portions not passing through a fine wire screen or a cloth when a few streams of milk are milked onto them. Sometimes, to detect cows having
mastitis, the cheese maker or field man will use blotters that have Brown Thymol Blue on each corner. A stream or two of milk from a quarter is milked on a corner of the blotter—one corner for each quarter. The dark green discoloration of the Brown Thymol Blue indicates mastitis trouble.

How does milk from mastitis or gargety cows affect cheese—and is it a serious problem? From some universities’ experiments we learn that mastitis may be a very serious problem; while from other university experiments we find that it isn’t as great a problem at some factories.

Professor W. V. Price in his article, “Relation of Mastitis to Cheesemaking,” reprinted in the November 10, 1934 issue of the “National Butter & Cheese Journal” reported mastitis or garget milk slowed coagulation of milk and had a very decided affect on the flavor of the aged cheese, along with quite a reduction in the yield from cheese, depending on the percentage of garget milk in the vat.

From the Wisconsin circular in 1935, by Mr. F. D. Hadley, we learn: “The presence of a small amount of garget milk in a vat does not appear to injure the flavor or quality of the cheese, although it may reduce the yield.”

Mastitis is a problem we must consider in the production of high quality milk. It can cause off-flavors and reduce the yield of cheese.

We usually find that mastitis develops as a result of a bruise or the cow having chilled her udder, or the organisms which cause mastitis being spread from an infected cow on the milker’s hands to another cow. Since mastitis can be spread through the herd, the farmer should not milk any cow that has mastitis until after milking the uninfected ones in the herd. He should withhold this milk from the cheese factory.

Mastitis is sometimes an economic problem for the cheese plant and the producer. The cheese plant has a reduction in yield while the farmer finds that many cows that have mastitis will not produce as much milk as they formerly did. Sometimes these cows, after having a bad case of mastitis, will never produce enough milk to repay the milk producer for his labor and expense of keeping the cow.

We should start educating the milk producers on the dangers of mastitis and work with them to eliminate it from their herds. At the present time with combined herd milk being mixed, we are not
affected tremendously with it causing low yield of cheese or with it causing off-flavors.

Need For Keeping Sediment Out Of Milk

We find that sediment or dirt getting into milk adds quite a lot of undesirable bacteria, which injures the quality of the cheese.

An article in the Dairy Produce Magazine (June 15, 1938 issue) by H. Macy and W. B. Combs, gave the following cause for gassy cheese: "Gassy cheese may be attributed to the quality of milk used in the manufacture of cheese. It is a well-known fact that dirty milk produced during the spring of the year may be linked directly with this defect in cheese. The organisms responsible for gas in cheese are those that are frequently carried into milk with dirt. It is extremely difficult to produce clean milk on the average farm during a wet season. This past spring has been a wet one and without question the milk supply in certain sections has been badly contaminated. Such milk may not always be detectable because of the method used in straining milk. It may be difficult, too, to detect this type of milk by flavor, though as a general rule it would be expected that a keen judge of milk could detect such milk. The fermentation test can be used in locating such milk and the producer responsible for it. When located, such milk should be refused or the condition remedied."

Professor J. L. Sammis of the University of Wisconsin, in an article in the National Butter & Cheese Journal of June 25, 1936 reported that the bitter flavor in cheese can be caused by milk that has been contaminated with dirt or sediment on the farm.

Sediment, then, is a serious problem in the production of high quality milk, for it can cause bitter and gassy cheese.

It seems that the majority of the sediment that gets into milk comes from the producers not cleaning up the cows. Sometimes sediment will get into milk in the milkhouse or wherever the producer is storing or cooling the milk, if he doesn't protect it against dust. Sometimes sediment will go into the milk while milking or straining in the barn from the producer not having tight ceilings. The sediment or dust getting into the milk is not causing the gassy or off-flavor cheese, but it is the bacteria in the sediment or dust that causes the trouble.

There are a few things to observe on the farms where a lot of sediment can be prevented from getting into the milk supply. Any swamps or swampy ground in the cow lot or entrance to the barn should be well drained to prevent the cow's udders from getting
dirty. If you get the producers to clip the cows every month or so, you can keep the hair short and not as much sediment will stick to the cow's flanks or udders. The barns must be kept clean and especially the bedding for the cows should be kept clean. You should see that the milk is stored in such a manner that dust cannot get into the milk can.

Many plants take a sediment test of their producers' milk in order to assist in eliminating sediment from their raw milk supplies. A sediment test has a great deal of advantage, but sometimes in the cheese industry it helps us very little in that the producer tries to strain the milk better and removes the visible sediment, but the undesirable bacteria which were in the sediment have dissolved and we still have gassy cheese. It is better if we get the producer to actually clean up his cows than to try to take the sediment out with straining.

If you care to check on the producers who are giving you trouble with dirty milk and getting a lot of sediment into the milk, it is better if you use the fermentation test.

Need For Proper Cooling Of Milk

Bacteria need three things to grow. Food, moisture and temperature—milk is a perfect food for bacteria and has approximately 87% water... which is plenty of moisture; so we have only one means of controlling bacteria growth, and that is by cooling. If the milk could be cooled to approximately 39°, practically all of the bacterial growth would stop. The producers should be educated to cool their milk to 60°. If the milk is cooled to 60°, the bacterial growth is not large enough in 16 hours to cause us much trouble. Night's milk from producers generally isn't over 16 hours old.

In many sections of the country they have been able to correct the lack of cooling the milk by producers very easily. In other sections where they have relatively warm weather all the year around, and where they have a very limited supply of water to cool the milk, cooling is a big problem. Personally, I feel that any dairy plant or cheese plant can eliminate a lot of this trouble of over-ripe milk if they will get every producer, where it is possible, to pipe the water from springs to a cooling tank. In this way the farmer has a flowing cold water supply, and all he needs to do is set the milk in the vat and the water will cool it. Another thing about having spring water piped into the cooling tank is that the cooling tank will not freeze the year around; so the producer cools his milk in the cooling tank the year around. It prevents a lot of winter air cooling.
If any of your milk producers are pumping water by hand into a tank for cooling milk, I would advocate your trying to get them, if possible and convenient, to put in some mechanical means of pumping the water for cooling the milk. From my experience with milk producers in pumping water for cooling of the milk, and having had some experience with pumping water for the cooling myself, there is a desire to stop pumping water before a sufficient amount has been pumped to cool the milk sufficiently.

A stirring rod will assist in cooling the milk more quickly, but if the producer doesn't clean it, he's better off without one.

The way many plants check whether a producer is cooling his milk properly is with a thermometer on the receiving platform.

**Need For Proper Utensils**

On the dairy farms we are likely to find many unsatisfactory utensils, which is a great problem to any cheese factory. The factory should insist that the producer use good heavily tinned pails, cans and strainers that do not have any broken seams, or rust spots on the surfaces which the milk touches. Rust is porous, and when milk soaks into the rust it cannot be removed until the rust is removed, thereby offering a source for contaminating the milk.

If the pails or cans have broken seams, milk will get into those broken seams and sour because we cannot get the brush or any other object into the broken seams to clean them, thereby contaminating our milk supply.

Some producers possibly will try to use a galvanized milk pail. Galvanized pails react with the milk, and as a result the surface can never be kept clean—and will contaminate the milk. Galvanized pails, by all means, should be barred from being used by the milk producer for your own protection in high quality milk.

**Need For Proper Cleaning**

The utensils which the milk producers use offer quite a source of contaminating the milk with undesirable types of bacteria. Macy and Combs' experiments show that utensils are sometimes responsible for gassy cheese. From reports of other universities we find that utensils contaminate the milk supply with bacteria that tends to proteolize or decompose the finished cheese. In many cases, unclean utensils may cause the cheese to develop off-flavors and tastes.

Utensils, then, are a serious source of bacterial contamination, when we consider proper care of milk, if it will cause off-flavors, gassy cheese and sometimes decomposition of the cheese.
On the farm we find that most milk producers do not like to wash farm utensils until after breakfast—or dinner in the evening. If the milk is allowed to dry on the farm utensils you would find it hard to remove. The producer must, immediately after milking, rinse his equipment with cold water, which will remove approximately 90% of the milk and make further washing much easier.

When the producer is ready to wash his equipment, he should take warm water, add a good soapless alkaline cleanser to it, and with a good brush, thoroughly scrub each utensil.

In many cases the producer will be found using some type of soap to clean their dairy utensils. They should use a good soapless alkaline cleanser instead. In milk we have milk fat, and we find soap is made from fat . . . and when soap is used to clean where there is milk fat, it leaves a thin grease-like film on the utensils which harbors bacteria. A soapless cleaner leaves the equipment clean.

After cleaning, the producer should rinse the utensils with warm water and place the utensils on a rack to drain and dry until the next milking period. This is necessary in order to remove the dirty cleaning solution, loose dirt, and milk solids still remaining on the equipment.

**Need For Proper Sterilizing Of Utensils**

The question that is often brought up is whether thorough cleaning and rinsing of the utensils isn’t sufficient protection of milk against undesirable bacteria. Experimental work and plant results prove that efficient cleaning and rinsing of the utensils and other equipment does not afford complete protection against undesirable bacterial contamination—it is only partial protection.

Professor Fay of the Kansas Agricultural Experimental Station conducted experiments to determine the efficiency of cleaning and rinsing dairy equipment. He reported that only 2 to 45% of the organisms were removed.

Professor Prucha at the University of Illinois conducted similar experiments and reports from his tests indicate that only 50 to 70% of the bacteria were removed by cleaning and rinse alone.

From the fact that only 2 to 70% of the bacteria can be removed from the utensils by cleaning, it can be seen that subsequent sterilization is necessary and important to prevent bacterial contamination of the product being handled.
Sterilization of the utensils should be done immediately before each milking. The sterilization may be accomplished by one of two ways. The first method is to submerge the pails, strainers and other milk equipment for a period of two minutes in water above 170°. The second method is to rinse all the milking equipment just before milking in a chlorine sterilizing solution. Professor J. L. Sammis, of the Department of Dairy Husbandry, University of Wisconsin, in his book entitled, "Cheese Making" on page 16 states: "To get a can or other milk utensil really clean inside, it is necessary to see that it is free from bacteria. The hot water available on a farm is seldom sufficient in quantity or temperature to sterilize anything thoroughly. For this reason, and also because the rinse water, even if fresh from the well, may often contain harmful bacteria, it is well to add a good chlorine disinfectant to the final rinse water just before using the utensils."

**Vermont Tests**

W. G. Loveless of the University of Vermont and State Agricultural Experiment Station conducted sterilization experiments on ten farms. Plate counts were taken of milk handled in utensils that were clean and rinsed but not sterilized. The highest count was 553,200, the lowest was 10,100, and the average was 133,200. Then taking the same farms, cleaning and rinsing the utensils in the same way but sterilizing them before the milk was put in the utensils, the highest count was 381,200, the lowest 3,050, and the average 48,000. In other words, the count was reduced about 64% simply by rinsing pails, strainers and cans with a chlorine sterilizing solution just before milking.

Milking machines cause a tremendous amount of trouble in milksheds where they are used. The fault does not lie in the milking machine itself but in the method which the farmer uses in cleaning it. A considerable amount of the cheesemakers time can be profitably spent with the milk producer educating him how to properly clean and sterilize the milking machine. Any State University can give you the best recommendations on how to clean and sterilize them. On Friday morning, Mr. C. H. Wilson, of Chicago, will discuss the "Necessity of Cleaning Milking Machines After Each Operation."

The fermentation test can be used to good advantage in checking producers who are not properly cleaning and sterilizing their utensils.
Need For Stopping Whey From Going Back To The Producers In Regular Milk Cans

We find that in most cheese producing areas, producers desire whey. This makes a very serious problem in the production of high quality milk, since the producers want to haul the whey from the factory in their regular milk cans. The producer doesn't have facilities to properly clean and sterilize the cans afterwards on the farm, and as a result, if the whey becomes contaminated, the milk which he produces on the farm and pours into the can is contaminated with undesirable bacteria.

At many cheese plants, the whey has become contaminated at the plant with yeast or other undesirable bacteria that would cause gassy milk. As a result, their whole raw milk supply would be contaminated. It is very necessary to stop the practice of whey being hauled back in the original milk can.

Need For Washing The Milk Producers' Cans

If the proper care of milk is considered, we must consider the cans that go back from the cheese factory to the producer. The condition in which the milk cans go back to the producers from the cheese factory has a great influence on the quality of milk that is received. We must consider that milk producers as a whole do not have as good a means of cleaning and sterilizing milk cans as is possible at the milk plant where the factory has plenty of hot water and steam to sterilize the cans. A tremendous improvement of raw milk supplies has been reported by experiment stations at plants which have just started to wash producers cans, which shows the need for plant washed milk cans.

I cannot over-emphasize the necessity of proper can washing at the cheese factory. Personally, I have been to plants which were washing the cans and still had high bacteria counts from their producers. I would investigate and find their can washer not operating correctly and fix it. The raw milk supply, bacteria counts, would improve 25 to 50%.

Many cheese plants have found when they washed producers' cans, they were able to get away from a large amount of gassy and off-flavored cheese.

Even if the cans are washed and steamed, they must be dried inside before they are sent back to the producer, or those few undestroyed bacteria in the cans will again multiply in the moisture to a great enough number to lower the quality of the milk.
Cleaning And Sterilizing In The Cheese Plant

Even though a plant is receiving high quality milk from their producers, the plant can be at fault in the production of low grade cheese because they are not properly cleaning and sterilizing their milk and cheese handling equipment. Many times gassy cheese and off-grade cheese has developed because the milk and cheese handling equipment hasn't been thoroughly cleaned and sterilized each day, allowing undesirable bacteria that would grow on the equipment to contaminate the milk.

Summary

To summarize briefly the things that are necessary for the production of High Quality Raw Milk for the making of High Grade Cheese, we find there are seven things we should observe in the proper care of milk:

1. Eliminate mastitis or garget milk from the raw milk supply.
2. Keep sediment out of the raw milk supply.
3. Educate the producers to properly cool their milk.
4. Educate the producers to properly clean their utensils.
5. Educate the producers to properly sterilize their utensils.
6. Send the producer a good clean milk can.
7. Properly clean and sterilize the milk and cheese handling equipment.

PRESIDENT WHITING: Friends, we have some more very distinguished guests in our audience who have come a long ways to attend our convention. We have with us—I think he is the president, I know he was the president of the Missouri Cheese Makers' Association, Mr. James Scott, and his son who is also here, and I would like at this time to call on Mr. Scott from Eldon, Missouri, to say a few words.

(A generous round of applause was accorded Mr. Scott.)

MR. SCOTT: Ladies and gentlemen, I just came up here to hear you boys talk. Mr. Whiting came down to our convention and we enjoyed having him. We have in Missouri about 31 to 32 cheese factoris. Our factories are a little different than yours here. We are quite a ways apart. We average about 150 patrons and I myself, I have about 200 patrons. Our cows run about six to a farm and they are Jerseys. Our average test is about 4.3% for the year. We sell our cheese mostly in Missouri. I sell to St. Louis. We get the best price at the local store. We use rennet from Wisconsin. In fact, I was born in Plymouth. We have to use a little different tactics down there. We have got to be pretty nice about it too or they tell us to jump in the lake. We made a ruling down