INSTRUCTION AND INSPECTION OF CHEESE FACTORIES.

By T. J. Fleming, Watertown, Wis.

When the secretary wrote me relative to taking part in this the eighteenth annual meeting of the Wisconsin State Dairymen's Association, he requested me to give a synopsis of my observation and experience among the factories and creameries of the state, which came within my scope of observation during the past summer. But having been actively engaged in institute work since I received that notice, I have not given the subject very extensive thought.

Now, as it has been in the interest of the cheese factory that I have labored mostly, I shall confine my remarks upon the industry from a cheese standpoint. I hold that the continued success of cheese making in Wisconsin is maintainable even in the face of evidently increasing production. If this statement can be borne out by existing or attainable facts, we have a grand incentive to continued perseverance and increased application to business.

The main object is this: Manufacture one quality only of the various kinds of practical manufacture, and place it before consumers in that state of ripeness or maturity best calculated to please the taste, supply the nutrition and be easy of digestion. My friends, how nearly have we been complying with these requisites?

The cheese product of our state is being manufactured during the summer months, and even then catering toward the centralization of production upon May, June and July, these months in which the milk produced, owing to its large yield, has not that maximum or even average percentage of butter fat: that solid of the milk which enters so largely into the composition of good cheese, and the absence of which renders the product dry, hard, non-buttery, difficult of digestion and not calculated to invite consumption. And with this somewhat natural defect, what are the artificial or mechanical defects with which we combine it? The temperature of curing rooms should range from
60 to 75°. The variation is frequently from 55 to 90°. Cheese which has been wonderfully and fearfully made from raw material, having the colors of the rainbow and one more, and the odors of the barn-yard and pig sty, it can be understood how such practices are not likely to produce a favorable revolution in the cheese industry of our state or country. Couple with this the lamentable fact, that we have, figuratively speaking, as many different kinds of cheese as we have cheese makers, then follow this product, so diversified in its manufacture, through the cold storage and avenues on its way to the consumer, and you will readily understand why at times the cheese market has been full. If we were to hold in our mind the fact, deduced from reliable statistics, that every package of your cheese upon the market lessens the actual consumption by three times the weight of that poor article, we would at once begin to devise ways and means by which that poor article could be supplanted by the good which has invited consumption in the past, and will continue to invite in the future.

Now it is with the hope of directing the attention of the dairymen of Wisconsin toward the accomplishment of this, that I crave the indulgence of this intelligent audience for a few moments. The manner or system of conducting factories in Wisconsin is so diversified in its operations that I have not given it space in this brief paper. Will say, however, that the old time honored "pound for ten" system—yet demanded in some dairy districts of our state—must be relegated to the past. It simply invites, no, compels the cheese maker to leave therein substances foreign to good flavor and necessary keeping qualities of the cheese. And further, upon this line, will say for the sole purpose of bringing out a discussion, that I am a strong and earnest advocate of the co-operative system, and hope to live to see every factory in the state run upon that system.

Now, in order to produce this one or uniform article of cheese, we must have a uniform quality of milk, that is to say, milk containing approximately 4 per cent. of butter fat, and freed from natural impurities of the animal by the

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absolutely necessary process of aeration, which is perfect only when the milk is freshly drawn and at its normal temperature. Neglect of thorough dipping or aerating at this particular time is certain to undo a great deal of good, previously done, by good feed and kind treatment.

Then be particular that this milk does not come in contact with any foreign or decomposed matter. The rapid cooling of milk intended for the cheese factory is most objectionable for two reasons: First, it holds through condensation or closing of the pores the natural and accidental impurities in the milk. And second, it facilitated most perfectly the creaming, which should be avoided for cheese making.

Therefore, I recommend as the sure way, that you milk your cows with all respect to cleanliness, and with dry hands. Strain that milk immediately through a tin strainer into the delivery can — far removed from the odors of the barn or adjacent compost heaps.

When the cows have been milked, and the milk thus treated, take a long-handle dipper with a capacity not less than a gallon, and dip from the bottom of can and pour and re-pour for not less than five minutes, then the can is ready to be placed in water.

While all this is strongly advised, and I believe absolutely necessary, it also behooves the cheese-maker to exercise watchfulness, at the weigh can. For it has been my observation that our successful cheese-makers accomplish one-half the difficult work of good cheese-making at the weigh can.

How shall the milk be treated when in the vat?

This is a broad question. Heat and stir gradually while the milk is being delivered; this tends to retard creaming and facilitate ripening. Raise to temperature of 86° Fahr., and if properly ripened add sufficient rennet extract to coagulate for cutting within twenty or thirty minutes. Dilute this extract to one or two gallons, and keep the whole mass agitating gently from five to eight minutes. Cut with the horizontal knife when the curd cleans the finger thoroughly. Wait until the whey partly covers the
curd and then cut with the perpendicular knife, being careful that you draw it so as to leave the curd as nearly cubical as possible. This is a critical time, brother cheese-makers, and the curd should be manipulated as carefully as possible. Hand stir for fifteen minutes before a rise in temperature is noticeable. Keep the curd constantly agitated while heating, and as continuously thereafter as possible.

I advise the stirring of the curd for the reason that we can keep it in its granular form. After this heating has taken place and the proper stirring I would recommend all cheese makers to run off sufficient whey, to leave the removing of the balance within their control, run the whey down just sufficient to cover your curd. I am a strong advocate for the use of the rack in the vat, and the curd mill. I believe it is the best possible way for removing whey from the curd, and this is the objectionable quality we find in our cheese. Place the curd upon the rack and spread it not thicker than five inches, and be particular at this point that you don’t put your curd mill on until the acid is developed fully, or you will have a worse mess than if you didn’t use it, because it will run together and hold the whey in its meshes. I have been asked by many of the cheese makers present to give a rough description of the system we have been teaching in this state, commonly known as the Canadian system. That system demands the curd mill, calls for the matting of the curd. The curd is ready to develop this acid in a dry condition. Cut the curd in pieces about eight inches in width and about half the length of the vat. Turn as frequently as is consistent with preventing it from tearing apart, turn and place one layer upon the other, turn and return when the whey begins to gather between the layers of the curd. So continue, being careful to hold the temperature of your curd to at least 92° while the development of the acid is taking place. When the acid is safely developed we run it through this curd mill for the purpose of re-disintergating the curd and bringing it back to its original shape.

Mr. Fish—There are months when we get the least cheese yield at the vat, but nevertheless I believe the trouble is in
the management of the milk by the cheese maker, it is not in the milk itself in the first place. I hold that the matter can be kept under the control by regulating the temperature and just as good a yield can be got out of June and July milk as out of March.

Mr. Fleming—Providing it has got the necessary solid ingredients therein.

Mr. Fish—But according to Dr. Babcock yesterday the least butter fat is found in the milk in the month of March, and we know that the othersols in the milk do not change, and if properly managed there should be the least yield at the press. Now, my remark is this, that milk after it comes from the cow should be cooled to a temperature at which it will not sour too much, and that the fact that the months of June and July give poor yields of cheese is due to the fact that we don’t keep the milk under proper temperature. I say that if the milk is properly aired and quickly reduced in temperature, provided it is properly aerated, it will not sour prematurely, the quicker you put the cheese under control of the maker, instead of under control of the atmosphere the better yield you have.

Mr. Favill—I want you to quit slandering cows. The cows of this country do not give milk that needs to be aerated. Themilk itself will catch all the floating microbes, tens of millions that are waiting for the chance, but it ain’t the cow’s fault.

Mr. Fleming—I must take issue with my friend, Mr. Favill. I say that in my opinion, observation and experience that we have not got cows in the state of Wisconsin, which under the treatment that we give them, furnish for us milk, which in its original and normal condition is fit for good cheese making.

Mr. Favill—Then we should get better cows.

Mr. Fleming—that is a most essential point connected with cheese making in Wisconsin. I believe that all milk as it is first drawn from the cow has in it what is commonly and well known as an animal odor. You can detect it in all freshly drawn milk. Now, I take it that is just foreign substance that we must remove, and I claim that can only
be removed by the process of aerating and that when the milk is at its normal temperature, it is only then that the pores of the milk are open and it will give off these impurities. If you take and cool down the milk quickly and have neglected this very essential requisite what have you done? What is the cooling of milk? It is the condensing of it, the closing up of its pores, and in doing so it holds these foreign ingredients in its meshes, these animal impurities, which no future handling can remove. You cheese makers know that you can not detect these impurities when the milk comes to your factory at a temperature of about 60 degrees, but when it is heated up it is free and it gives off these impurities so the cheese maker knows that by heating up to 98 degrees he will get a terrible stench sometimes when there have been no signs of it before, and it is because the milk must be up to its normal temperature before it is free to give off its impurities. I don’t want to be understood as saying that cooling the milk is not necessary, but I tell you we are doing too much of this cooling, but if you will aerate it first and then reduce the temperature, it will be all right. If you will take a long dipper having the capacity of half a gallon and go down to the bottom and bring up the impurities and pour and repour, for five minutes, then you can put your can of milk into a tub of water and it is all right.

Mr. Favill — I don’t deny but that the milker can get lots of impurities from the milk, but I insist that the milk that comes from a healthy normal cow is as pure as it can ever be made. I am talking about the cow that has good water to drink and good food to eat and that cow will give pure milk.

Mr. Gilbert — This gentleman is right about the cooling of milk. You can take the best of milk and cool it without aeration, and nine times out of ten you will get a floating curd.

Mr. Hiram Smith — A few years ago I was running a factory of my own and the milk went into a vat, about a thousand pounds, and as good milk in as good condition as any milk ordinarily treated. The cows drank pure water
and they were fed bran every day and pasture supplemented with soiling food, and I had floating curds for several days and I went to work and divided up and put so many patrons’ milk in one vat and so many in another, but I couldn’t find the floating curd. Then I tried my own milk, but found floating curd worse yet. I had supposed that cooling did the whole thing but when we tried aerating first and then cooling, we had no more trouble.

Mr. Fleming — You can take the most perfect milk, Jersey milk, and produce floating curds. One of the most essential things to be considered in avoiding floating curds is the water. My observation has led me to believe that farmers and dairymen are culpably negligent in this respect. Water enters largely into the composition of blood. It is from blood that milk is directly and almost immediately elaborated. So closely allied are the milk which courses through the mammary glands of the animal and the blood, that if you were to take blindfolded, a glass of this blood and a glass of fresh drawn milk you could not detect the difference by the taste. Now, water is found in the milk to about 87 per cent., I am sorry to say sometimes more. Now, you can see what bearing this has upon the fact that in so many pastures we see stagnant pools or streams that run in the spring and then get dammed up. Don’t let your cows have that water. Another thing, dairy cows should have free access to salt; you will find that a cow will go just as regularly daily to the salt lick as to the water tank. Prof. Robertson, of Canada, made an experiment at the station at Guelph with two cows as nearly alike as he could possibly get, he was trying to find out the effect of salt upon the milk flow. They had been upon a daily salt ration, he changed one of them to a weekly salt ration, all other things being equal. At the expiration of one week’s time, he found that there was a difference of 14½ per cent in the milk yield. Not satisfied with this he took the animals in inverse order and proved the same thing. I bring up this, hoping that you will find therein a sufficient inducement to you to hereafter supply your cows with a daily ration of salt. There was another effect of this experiment and it was this:
He took the milk from these two cows and brought it to a low temperature where the development of acid would come through the ordinary process of fermentation, and he found that the milk taken from the cow that received salt but once a week showed symptoms of acidity twenty hours earlier than the other. Perhaps that will account for the experiences some of us have had in delivering milk to the factory that soured so very quickly. I drop these suggestions, not asking you to take my word for it. I only ask you to give them a fair and impartial trial.

Mr. Monrad—It seems to me that really each of the gentlemen is right, only we want to get at the right foundation of this question. Mr. Favill says that a healthy cow given pure water and pure food will produce pure milk that does not need any aeration. Mr. Fish says that besides the aeration it is necessary to cool the milk. Mr. Fleming says that in making cheese at the factory under our present conditions that the aeration shall be No. 1 and the cooling No. 2. Now, what we call animal odor, that which gets into the milk, I am sure gets into it after the milk comes from the cow.

Mr. Fleming—And I am sure you are wrong.

Mr. Monrad—Keep my premises in mind, we say pure food and a healthy cow. There is of course a great deal in this matter of passing through the blood and from the blood to the milk, but I tell you that recent investigation has proved that the greatest part of these outside impurities passed into the urine and not into the milk, but that the dirt in the stable, and the floating bacteria that fill your stable drop into your milk and of course increase in a very short time. Now, in making cheese, I take it we want to develop the right kind of acid. There are several kinds that can be developed, but we want only one kind, and I claim that Mr. Fish is better able to develop the right kind of acid if the farmer will deliver milk from pure, well-fed and healthy cows, milk that has been aerated and cooled down. Both of these are good things, but you can do it at the same time. It is done in England. You Wisconsin people all know what a beer cooler is, and they in England use something
like that. The milk is poured right from the milk bucket into a larger can and trickles over this cooler, and that is all the aeration it gets, and with pure milk that is all that is necessary, not to make the cheese, but to preserve the cheese, to bring the milk in the right condition so that Mr. Fish gets it in his factory in a condition to develop the right kind of acid. We are getting nearer and nearer to the right kind of acid in butter and cheese making. I believe if Mr. Fleming and the instructors of Wisconsin would make this experiment of cooling the milk down as I say and developing the acid by heat or as my friend Boyd does by the starter, you would get a more uniform and reliable result than by long, slow aeration in the air. There is a slight danger I think in preaching that cooling is not necessary during the hot months. Preach aeration, but don’t give up the cooling.

Mr. Gilbert—The beer cooler is the most perfect aeration that I know of.

A Member—Last summer I was called upon to take charge of a factory where the cheese maker had urged the subject of cooling the milk and cleanliness upon the patrons, and they were provided with Cooly cans, and most of them with artesian wells, but up to the latter part of July the cheese from that factory was a failure and the maker had to leave. When I took charge of it I talked to them on the subject of aeration and I told them that while I thought it might be the most proper method in the world to put milk into a Cooly can for butter making; that I thought it was not a safe way to treat for cheese making. I started to aerate and cooled it to some extent, and the cheese has been all right since. I want to say to Mr. Monrad that of course we would not think of aerating milk in the atmosphere of Chicago, but in the pure, healthy atmosphere of Wisconsin I don’t think it would catch any bacteria or anything very detrimental to the milk.