near St. Louis to a Farmers' Institute, and gave them this same talk, and nearly the whole neighborhood there adopted this system, although many of them had their machinery. I got a letter from the secretary of that association lately, and he says, "This winter, 1897, is the only winter that we could see that we got a good, fair profit, and that when everything was at the lowest." He said the only men in the neighborhood that were complaining of hard times were those that had followed out the old system.

Many here seem to think this system only work where you can feed outdoors. It is just as applicable to the stable. Have a tight open floor to feed on. Once a day with a barley fork push the refuse out the door onto the fodder truck or a double rope and take it where you please or have a cutting machine on the feeding floor and the refuse can be run through it in a few moments and used for bedding.

CARE OF MILK.

L. E. SCOTT, Neenah, Wis.

Not long since, when visiting an establishment where a certain article is manufactured, I noticed that each man was engaged in making only one of a number of component parts. Day after day he had worked, turning out piece after piece of the same part or pattern, until he had grown very deft in the manufacture of this particular piece, if indeed he had not himself become a veritable machine. Others were engaged in putting these several pieces together, and the thing was complete and became an article of commerce. The thought occurred to me that should one unskilled or careless workman produce a defective piece, the whole thing would be condemned, and if sold at all, it would be at a reduced price, quite likely below the cost of production.

Skilled Labor Necessary.

Now, the manufacture of our grasses, clovers, and grains, into dairy products, constitutes the greatest manufacturing industry upon the face of the earth today, and according to the same natural laws that govern other manufactures, the lack of knowledge on the part of a single patron of a cheese factory or creamery, or any carelessness in the production or care of his milk, will not only affect the quality and price of the output of his factory, but it will tend to lower the reputation of the state or country abroad, when this product is sold in a foreign market.

A couple of years ago the Hon. S. A. Cook in order to ascertain the effect of "filled cheese" upon the reputation of our state and country purchased a uniform lot of full cream cheese and caused a portion of the same to be shipped to Canada, where it was branded "Canadian cheese" and reshipped to Liverpool, England. The remaining portion was shipped direct from Wisconsin and being sold upon the Liverpool market brought two cents per pound less than did those of the same make which were sold under the "Nom de Canadian." Of course the farmers were not to blame for this particular state of affairs, but the illustration will suffice to show how much depends upon a reputation, and a reputation can only be gained and maintained by honest and enduring effort.

Our department of agriculture is doing all within its power to gain a foothold in the British market for America's surplus butter, but notwithstanding our cheaper lands and the cheapest dairy food crop that the world has ever known, little Denmark without these natural advantages, sells thirty pounds of butter in England for every pound imported there from the United States. We find, too, that some of the other small countries of continental Europe are also strong competitors.

Early Training.

Without any attempt at solving a problem so complex, I desire to call your attention to one important fact. Realizing that the foundation of their success lies in the production of good milk and the care of it, the peasantry who have the care and control of these matters, are being taught at governmental expense, along these lines and at an age when such teaching will produce the most marked effect viz., during their school days. Hon. A. C. True, Director of the Office of Experiment Stations, U. S. Department of Agriculture, in visiting one of the public schools of Belgium, says that while present, instruction was being given to a class of boys and girls of twelve years of age upon the composition, care, and uses of milk. Samples of milk and cream were at hand, with which illustrative experiments were tried, and Mr. True says that, young as they were, these scholars proved that they possessed a practical knowledge of the subject. And this is not an exceptional instance. On the contrary the essential elements of dairying and other lines of agriculture are being taught in every rural school in Belgium today.

In Wisconsin our agricultural press, our State Dairymen's Association, and our Farmers' Institutes have all done much toward improving our dairy products, but there still remains very much to be done. The field is indeed large, and the laborers are comparatively few. But whatever may be done, let us not neglect the instruction of the masses, for it matters not how skillful a cheese maker or creamery man may be, he cannot be expected to make a fancy article from defective milk.

Good Milk.

To produce good milk it is first essential that we have good, healthy cows, and with our privilege of selection and knowledge of breeding and feeding, and rearing the heifer, there would seem but little excuse for failing in this requirement. Everything should be provided that will tend to keep the cows in the most perfect state of health and thrift, and the highest degree of comfort and contentment. Wholesome feed, proper amount of exercise, pure water in sufficient quantities, fresh air, clean, light and well ventilated stables, and the general care of the cow, all have their effect upon the quality of the milk.

We should avoid feeding those feeds that will impart a taint to the milk. We should never give our cows damaged food of any kind, and while such foods as turnips and cabbage may possibly be fed in limited quantities ten hours or more previous to milking, without material damage to the milk, yet there are other feeds that may be fed just as profitably and without incurring any risk.

Bacteria in Milk.

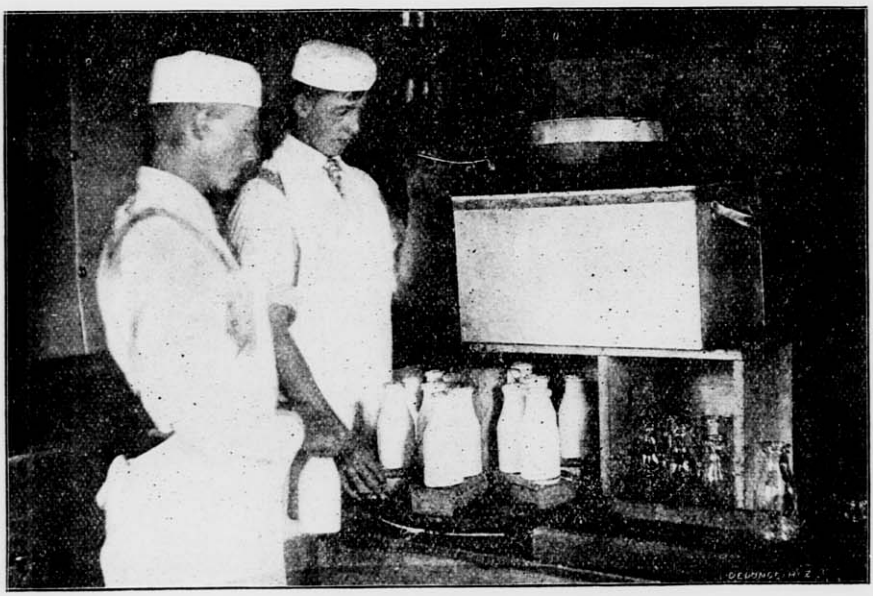
But there are other taints than those resulting from the feed which are more troublesome. I refer to those of the germ origin. These are minute organisms which we call bacteria, numerous in variety, and they cause a correspondingly large variety of undesirable flavors, and also the souring of milk in all its various forms. While the milk in the udder of a healthy cow is probably free from these troublesome germs, every particle of dirt or detached hair that finds its way into the milk pail, carries with it numbers of them.

Cleanliness.

It is necessary then, to thoroughly clean the udders and under parts of the cow previous to milking. In our practice each milker is provided with a good horse brush which is used vigorously and the teats stroked with the bare hand, before the open pail is placed under the udder. It is necessary also, to see that the milk pails, cans, and all utensils are thoroughly cleansed. It is not enough to give them a rinse and a promise, but after a good washing, using an effective grease eradicator like sal-soda, washing powder, or soap, they should be thoroughly scalded in boiling water. In summer time, at least, subject them to the purifying rays of the sun.

Aeration.

In purchasing new tinware always see that there are no deep seams. If there are, have the tinner resolder them flush with the surface. If reasonable precautions, as regards cleanliness, are observed, the bacteria which the milk contains when brought from the stable, will not of themselves cause serious trouble; but at a temperature ranging from 65 to 100 degrees Fahr. they will multiply and develop with surprising rapidity. It is essential, then, that we cool the milk at once after milking, to a temperature below 50 degrees, when bacterial growth is checked only to be renewed when the milk is again warmed. As these bacteria are really a low order of plant life, any temperature that is best adapted to the growth of the plants of the field, will produce the most rapid souring of milk and the production of bad flavors. Contrary to the popular notion that thunder or a humid condition of the atmosphere will cause milk to sour, it has been proven that it is a question of cleanliness and temperature only. Milk, in all cases, should be removed at once from the stable to



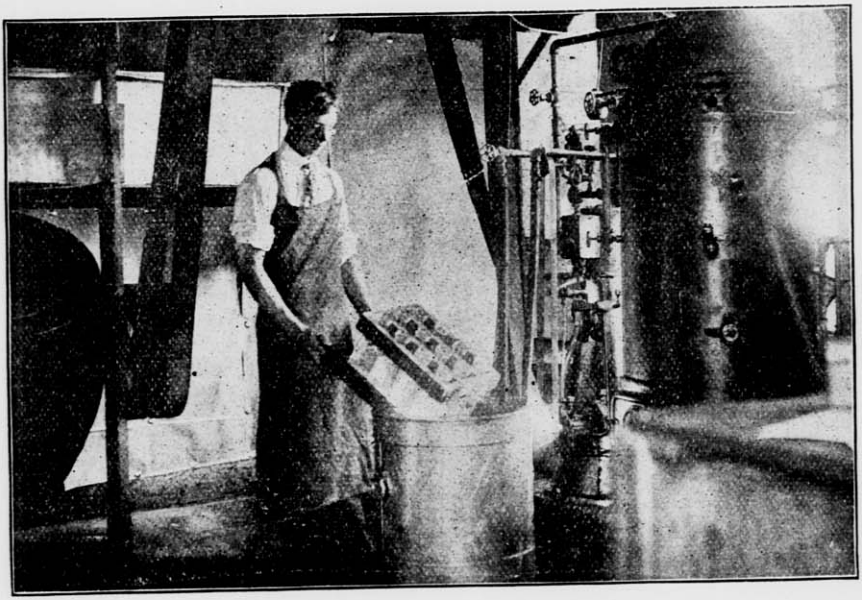
FILLING BOTTLES AT ELMHURST DAIRY.

a place free from contaminating odors. Night's milk intended for the factory should be run through an aerator, cooled, and stored in an open can set in a tank of cold water. Morning's milk if hauled any considerable distance should be treated in precisely the same way, but may be taken warm for a short distance, if done immediately after milking. It should never be turned in with the night's milk unless it is first cooled to the same temperature.

If butter is made upon the farm, the milk should be set at once without aerating, for the reason that to aerate is to cool it and not nearly all the cream can be raised by the gravity process if the milk has once been allowed to cool. If a separator is used there is no better time to separate than when first drawn from the cow, and the cream can be aerated and stored in cold water until time to ripen. Milk or cream cools more slowly than water and if stored in large cans before being perfectly cool, it should be stirred occasionally or decomposition may commence in the center before it is cooled through.

Care of Bottles.

As our own milk is sold in the city by the quart, a brief description of our methods may be of interest to those who are engaged in that branch of dairying. Quart and pint bottles are filled with milk as soon as drawn, and stored over night in a tank of ice water. The bottles being small the cooling is very rapid. In the morning the bottles are sealed with caps made of wood pulp, which are used but once, and the milk marketed. When returned the bottles are all washed, however clean they may appear to be. A small percentage are returned by careless customers without ever being rinsed. These are first brushed out in tepid water, when this is changed and



SCALDING BOTTLES AT ELMHURST DAIRY.

a tank of clean water is provided, containing sal-soda and a sufficient amount of soap to make a good suds and placed under a revolving brush. A steam jet with a convenient valve enables the operator to keep the water at as high a temperature as can be borne by the hand.

After a thorough washing the bottles are locked in cases containing a dozen, and plunged into a tank of clean water kept boiling by another steam jet. Each case is left in this boiling water until the next case is washed, when it is taken out, inverted, and slipped into a frame to drain. When wanted for use the bottles are always found to be clean and thoroughly sterilized.

Our morning's milk is separated, the cream stored in Cooley cans in a tank of ice water, and finally marketed in bottles the same as the milk. A portion of the skim milk is made into cottage cheese, cream added, and marketed in pails.

We use coupon tickets, and as they are used but once there is no danger of carrying germs of disease from one house to another, as has sometimes been done by the use of the old-fashioned ticket.

DISCUSSION.

Mr. Goodrich—Do you know the cause of bitter milk, and how to prevent it?

Mr. Scott—It might be caused by one of the forms of bacteria. There are flavors that come from the feed and others from the air, and they may enter the milk from one source or another, and as they multiply and develop under high temperature, they may and do produce these bad flavors.

Mr. Goodrich—Years ago I had bitter milk and I found it was from bitter weeds. My cows were kept in an oak opening where the feed got short.

Mr. Edwards—Do you get all the cream from the milk when you scald it?

Mr. Scott—If the milk has been cooled once you cannot recover all the cream by the old-fashioned or gravity process. You can get it by the use of the separator.

Mr. Kellogg—How many minutes after milk is freshly drawn will it take on odors, standing in a filthy place?

Mr. Scott—It will not take on odors while it is cooling, but after it has become cool it will.

Mr. Kellogg—How long will it take to cool?

Mr. Scott—To be on the safe side, I would remove it from the stable as soon as the pail is full.

Mr. Convey—Where they have aerated milk in the stable they have found that it does take on bad odors.

The Chairman—As I understand it, it takes on the bad odors of the barn as it cools.

Mr. Convey—Unquestionably it does. That has been tested and found to be true, particularly where they have aerated in the barn.

Mr. Hughes—Would you recommend aerating milk to increase its keeping qualities?

Mr. Scott—It is simply a question of rapid cooling; if you can cool it as quickly without aerating, it will keep just as well. You can, however, remove more or less animal odors by aerating.

Question—Which is the better of the two, aerating or pasteurizing?

Mr. Scott—I prefer aerating. Of course, pasteurized milk will keep longer than milk simply aerated, but I have never seen pasteurized milk but what the flavor has been more or less affected.

Question—Would you recommend aerating or separating in the barn?

Mr. Scott—My practice is to separate in an outside building, but I know that some of the best dairymen in the state have their separators in the stable, without any perceptibly bad results.

Mr. Convey—A few years ago a question was asked in an Institute as to the best method of getting a cor-

rect test of butter fat. I suggested that they aerate the milk in order to prevent the rising of the butter fat and in order to have a more perfect sample. A year later we visited that same place, and they made the statement that aeration had not only a tendency to give a better test at the factory, but it also tended to improve the quality of the product to a remarkable extent.

A Member—I have seen some persons who did not wash their separators after using them in the evening until after using them in the morning again. How is that?

Mr. Scott—That might answer for making butter, but in my business I am obliged to wash immediately after using, each time.

Mr. Convey—Is the gentleman quite sure that it might answer for making butter?

Mr. Scott—I know good butter makers who wash only once a day, but they fill the bowl with cold water and let it stand till morning.

Mr. Convey—They would be better butter makers if they washed every time they used the separator.

The Chairman—When I bought my separator, it was told me as an inducement, that we did not have to wash it twice a day, but I would strongly recommend washing it every time it is used

Mr. Scott—While a guest at a certain hotel in this state, I overheard the landlord chiding a servant for a little dust remaining on the stairs. I noticed upon the wall, in another part of the building where the servants could daily read it, this placard—"Cleanliness is my hobby," a most excellent motto for every dairyman who would succeed.

The Chair appointed the following committee on resolutions: L. E. Scott, H. C. Taylor, and George C. Hill.

TUBERCULOSIS.

PROF. H. L. RUSSELL, Madison, Wis.

The subject of my talk today is, "What shall we do with tuberculosis stock?"

It is hardly necessary for me to go into any lengthy discussion as to what tuberculosis is, how it is produced, and the conditions under which it is disseminated, and the inter-relation which exists between the animal and the human form of the disease. It is a contagious or infectious disease; it is produced by a certain specific germ which is called the bacillus of tuberculosis. This organism is taken into the system and is there able to develop in the living animal or human body and produce the disease.

Perhaps the first question to consider is the amount of tuberculosis which exists in this state. It is difficult to secure satisfactory evidence on this point for the reason that tuberculosis is an extremely insidious and slow-developing disease; it is impossible for us to determine its presence until the disease has gotten a firm foothold in the animal or human body, and, therefore, there are many cases of incipient tuberculosis that pass without being recognized.

Tuberculin Test.

A very valuable means of recognizing it has been introduced within six or eight years and is known as the tuberculin test. This test was discovered by Prof. Koch, one of the lead-