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THE DEVELOPMENT OF THE DAIRY INDUSTRY IN MANITOWOC COUNTY

by EDWARD EHLERT

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Manitowoc has always been known as a good place in which to live. The Indians felt that way, even to the point of fighting battles over the right to live in this area. Five tribes of Indians called Manitowoc home in the eighteenth and nineteenth centuries, and all of them felt that the streams, lakes and forests of the county were among the best anywhere.

The Indian, of course, looked to nature for what he needed in the way of food, clothing and shelter. The forest produced game in abundance, and the streams, the fish that he needed. Thus, the times were few when the Indian could not meet his basic needs with ease in the land that we know as Manitowoc County.

When the white settlers came to the county, they looked for qualities which the Indian almost totally ignored in his quest for the good place in which to live. The white settler looked for soil that was fertile, and which had the capability of producing food and forage in abundance. He looked for luxurious forests that could produce timber. He knew that the forests had luxurious growth because the basic ingredients were present in the form of soil nutrients. Having these, one could enjoy the abundant life. As for the streams, he looked upon these as a means of getting his products to market.

History tells us that Milwaukee was the place to which many immigrants went when they came to the mid-west. However, the fertile land around Milwaukee soon was sold, so it was necessary to look elsewhere for a desirable place in which to settle. Manitowoc county was a popular place for settlement in the mid-thirties and after.

The Early Years

The first settlers in Manitowoc county were land speculators and lumbermen. The white population of the county increased slowly from 1935 through 1847, with only about 1300 people having settled here during that period.

Then immigration from Germany, the Scandinavian countries, Ireland, and the Slavic countries began, and each year found hundreds more looking for good land on which to settle. Between 1850 and 1860 the population of the county increased from 3,700 to 23,000.

The settler, of course, knew little about the kind of crops that were best suited to Manitowoc county. Since the latitude was very similar to that of the homeland, he first tried the crops that he was accustomed to growing in Europe. Thus, the successes that were experienced came about pretty much through a process of trial and error.

There were a few like Jacob Lupes, a German immigrant, who settled in the area where the Manitowoc Shipyards is now located. He approached the problem in a more scientific manner by keeping accurate weather and rainfall records. He tried to determine the length of the growing season, the extremes of temperature, and the amount of rainfall in given months and in a season, and on the basis of such evidence accumulated over a period of years, he looked for fruits, vegetables and crops that could adapt themselves to those climatic conditions. His records were so accurate that they were later filed with the U.S. Weather Bureau and the Smithsonian Institute.

Of course, the settlers had to concentrate on land clearing during the early years. To convert the forests into crop land required most of their time and energy. It is not surprising, therefore, that lumbering soon became a major industry in the county. It remained that way until the late years of the century.

As crop land was available, the settler put in crops that would serve as sources of food for himself and for those horses, oxen and other livestock that he might have. Thus, such crops as wheat, rye, potatoes, and vegetables were featured. Cattle were not numerous. Each settler had only enough for his own needs of

milk and other dairy products, and also meat. Such crops as wheat and rye were used as cash crops. Incidentally, barter was used by the settler to secure his basic needs of food and clothing. Money was scarce, and what little he got was used for the payment of taxes, and perhaps to pay on the principal of the loan on real estate that he had acquired.

Caroline Hubbard, in her "History of Manitowoc County," states that 1857 was a year in which Manitowoc County experienced a severe recession . . . history calls it the year of the Panic of 1857. She stated that Manitowoc got its flour from Chicago at \$12.00 per barrel. Two years later enough wheat was raised in Manitowoc county so that flour no longer needed to be imported. The first flour mill had been constructed around that time. She remarked that land could be purchased in 1859 in Manitowoc for \$3.75 per acre.

Manitowoc Exports in 1870

The records of the collector of the port at Manitowoc as published in the Manitowoc Pilot, June 16, 1870 issue, indicate that 243,485 bushels of wheat were exported the previous year, 10,245 barrels of flour, 3,300 bushels of rye, 1,460 packages of butter, 308 cases of eggs, 1,300 dressed hogs, 174 bales of wool, 125,000 feet of lumber, 13,516,000 shingles, 258,750 posts, 28,500 railroad ties, 979,200 lath, 49,000 pickets, 10,000 cords of wood, 2,700 telegraph poles, 459,000 staves, 56 head of cattle, and sundry other items.

These records indicate that forest products were a major item of export. Wheat was the chief farm export. It appears that more flour was ground in the mills of the county than could be sold locally. Dairying was hardly a source of income of any consequence as was seen by the fact that only 1,460 "packages" of butter were handled, and only 56 head of cattle were marketed.

Wheat is King

During the period from 1850 through the 1870's Manitowoc county followed the trend that was common in the rest of Wisconsin in that wheat was a major source of cash income. During those years, 42% of all the wheat produced in the U.S.A. was produced in Ohio, Indiana, Illinois and Wisconsin. The total production of wheat during those years amounted to about 175,000,000 bushels.

Why had the states west of the Appalachian Mountains surpassed Pennsylvania, New York and Virginia in wheat production? Soil was the major factor. Crop statistics indicate that in 1860 the yield of wheat was 44 bushels per farm in New York, 66 bushels in Pennsylvania, 138 bushels in Iowa, 166 bushels in Illinois and 226 bushels in Wisconsin. Why the great variation in yield? Merely because Wisconsin and Illinois had new soil which was rich in nutrients necessary for wheat growing. The soils of New York, Pennsylvania, and Virginia, through long years of wheat growing, had become depleted of nutrients, with yields becoming less and less. For the moment "wheat was king" in Wisconsin, and the acreage in that crop equalled the combined total of corn, oats and hay. A correspondent wrote to the "Prairie Farmer," a leading agricultural paper in that period, and which is still published today, "Wheat is a great crop for exchange purposes. It pays debts, buys groceries, clothing, land, and answers more emphatically the purposes of trade than any other crop."

Wheat's Status Changes

The time came rather soon that wheat was no longer king, as the port statistics of 1880 show. The decline was rapid for several seasons. Basic to the decline was the rapid depletion of soil nutrients needed for the successful growing of wheat. A program of taking nutrients from the soil and doing nothing to restore those nutrients just could not go on indefinitely. Not much was known as yet about crop rotation, and the farming practices then in vogue could have only one result, namely a rapid reduction in yield per acre. Then came the invasion of chinch bugs, and these had the effect of causing an almost total crop failure.

The farmers of the county realized that they must seek other ways of earning a livelihood on the farm, and so again through the process of trial and error they began to find a substitute for wheat. Some turned to such crops as flax, sorghum, etc. Others tried sheep raising.

We see evidence of interest in sheep already in 1870 when 174 bales of wool were exported. These increased in future years. However, sheep raising never seemed to "catch on."

Manitowoc had always been an area where hay grew well. In fact, a land speculator in 1848 advertised the county in one of his brochures sent to Germany as "abounding in clover so luxurious that cattle could be pastured in that crop all summer long, and when fall came there still was enough left to feed them through the winter." Farmers found that hay did grow well here, and since cattle thrived on hay, they felt that perhaps some form of animal husbandry was basic to their prosperity. Thus, dairying was considered as a replacement for wheat in their plans for the future.

Dairy Farming Thought of As "Woman's Work"

In the early years, dairying was regarded as "woman's work." The men in the family concentrated their attention on the hard work of converting the forest land to crop land, and to the planting of those crops which provided cash and sustenance for man and beast. Thus, it was the wife who fed the cows, did the milking, and made the butter and cheese. The fact that caring for cows was thought of as "woman's work" was seen also in the fact that in the city the hired girl was usually given the responsibility of milking the family cow and taking care of feeding the cow, cleaning the barn, etc.

Because churning milk into butter was a far easier process than converting the milk into cheese, most farm families became familiar with the butter making process. Manitowoc county followed the trend of the rest of Wisconsin in the period between 1850 and 1870 when nearly ten times the number of pounds of butter were manufactured on farms than cheese. By 1850 Wisconsin already was producing three and a half million pounds of butter, and only 400,000 pounds of cheese. In 1870 Manitowoc county produced 1,408 cases of butter, with no mention made of exportation of cheese.

Not much was known about dairy farming as a means of gaining a livelihood on the farm. New York and other eastern states had engaged in dairying for more than a hundred years, so leaders in Wisconsin agriculture turned to those states for information as to whether dairy farming was a practical solution for Wisconsin's farm situation.

Most farmers in Wisconsin, and Manitowoc County, in 1880 had what are called "scrub cows." All that the farmer

wanted from the cows he had was milk enough to care for his own needs and meat. Most any kind of cow would meet those needs. With dairying being a specialized kind of farming it was apparent that attention had to be given to cattle breeds.

At first it was felt that perhaps the answer would be in the form of a dual purpose cow; one that would produce meat and at the same time would provide milk in quantity. Some farmers experimented with Shorthorns and Ayrshires; however, these breeds did not seem to be suitable for Manitowoc farmers. The Holstein-Friesen cow soon became an early favorite, although the Jersey and Guernsey cow also had its adherents. These cattle breeds have been predominant in Manitowoc county since.



FROM THE HOARD'S
DAIRYMAN OF
85 years ago...

It is all luck with 9 out of 10 of the cow farmers if they get a good cow. The good ones are sports.

We would never have had the American trotting horse if the horsemen had had such foolish notions of breeding. We would never have had the foxhound with his wonderful power of scent for four-footed animals, nor the pointer or setter dog with his wonderful ability to scent out the track of a bird, if the dog breeders had acted in violation of all true principles of breeding as the cow producers have.

Mongrel notions of breeding produce nothing but low grade mongrel dogs and mongrel cows. Dairy farmers must wake up to the understanding that right in this field is a mighty profitable chance to use their brains to their own better profit. Visit herds of thoroughbred dairy cattle. Talk with the breeders, get their ideas of the true principles of dairy breeding.

W.A. Hoard

The Industrialization of Cheese Making

If Manitowoc county farmers were to go into dairying as a means of gaining a livelihood, the care of cows no longer could be woman's work, and their number, of course, would have to be much greater than the few that commonly composed the "herd" in the

earlier years. It was also necessary that cheese and butter making be done in factories, rather than in the farm home.

Fortunately the industrial revolution had come to the butter and cheese making industry also. Lampard in his book entitled, "The Rise of the Dairy Industry in Wisconsin", called the manufacture of butter and cheese by men trained to do that work "an extension of a skill." Only those able to make a quality product would be engaged in butter and cheese making.

Before 1860 only about 21 small scale factories existed in New York state. However, after that date there was rapid progress in industrialization so that by 1870 there were 1313 such factories in the U.S.A. with 818 of these in the state of New York. Factory production of butter and cheese did not come to Wisconsin until after the Civil war years, with the first cheese factory said to be at Ladoga in Fond du Lac county. This factory was said to have manufactured cheese from the milk of 100 cows. There was no creamery in the state before 1875. The 1870 census of Wisconsin indicated that Wisconsin then had 54 cheese factories, which had 177 employees with only 30 of these being women.

During the period from 1870 to 1880 dairying was "catching on" all over the southern half of Wisconsin. Sheboygan county became one of eight or ten counties that became leaders in cheese manufacturing. In fact, by 1877 Sheboygan county had 62 factories in regular production. The largest factory was at Plymouth which produced 145,000 pounds of cheese from a herd of 450 cows. Most factories, however, were small, and produced cheese from the milk of about 100 cows. Sheboygan county in 1878 shipped out 5,800,000 pounds of cheese, with about 40% of it shipped to Liverpool, England. The balance was shipped to Milwaukee, Chicago, New York and to the southern states.

Since Sheboygan county was the next door neighbor of Manitowoc, this influenced no little the trend and future development of dairying in Manitowoc county. Manitowoc soon followed Sheboygan in being one of the major cheese producing counties in Wisconsin. This seemed to be the answer to the farmer's quest for a new way of gaining a livelihood on the farm at the time when wheat was no longer king.

Advantages and Objections To Cheese Making

Of course, there was something less than a unanimity of opinion on the part

of Manitowoc's farmers that the trend should be to cheese making. They had at least five objections to the industrialization of cheese making; namely (1) The difficulty of transporting milk to cheese factories several miles away over poor roads. (The period from 1870 to 1900 is regarded as the dark age in the state's highway development.) (2) The need for regular hours of milk delivery to the factory under all circumstances of weather. The factory was unwilling to wait for laggards, for acidity of milk would increase to a point where the quality of cheese would be affected. (3) The rigorous standards enforced by cheese makers as to the quality of milk caused some to withdraw from hauling milk to cheese factories. They felt that it was not worthwhile to haul milk there considering the fact that extra care and cleanliness standards had to be given to pails, cans, and other equipment. (4) It was felt that if standards of cleanliness were enforced, there was need for payment of a bonus to those who best met these standards. (5) Cheese makers refused to accept milk that was tainted, or which had been adulterated in some way.

In the early years of cheese making the farmer was paid according to the weight of the milk delivered. There was no differentiation in price, since there was then no known way to measure milk quality. Because weight was the determining factor, some of the unscrupulous ones added water to the milk. Obviously, this was a form of adulteration, which later became illegal. It was difficult to detect and hard to prove.

A by-product of cheese making was whey. Who owned the whey? Was it the farmer or the cheese maker? If the farmer owned it, there was the additional problem of transporting it back to the farm. When the farmer discovered that whey was a good food for pigs, his objection to having to haul whey back to the farm ceased.

There was a bigger problem that needed to be resolved. It had to do with the matter of seasonal production of milk. In the early years cows freshened in the spring of the year when they could be fed on pasture land. They continued to produce milk through the summer months, and by late fall became dry. During the winter months the only care required for cows was regular feeding of some kind of forage. The quality of the forage often was very poor only enough, and of a kind to keep the animal

alive. The cheese maker, of course, hoped that his trade would not be seasonal, and that farmers would bring milk to the factory through twelve months of a year.

One of the factors which induced people to go into cheese making was that the investment in equipment was comparatively small. Equipment needed for a dairy of 30 cows could be purchased for \$125 or so. This would include the following articles of equipment:

- One 120 gallon vat
- Two cheese hoops
- Two cheese press screws
- One curd knife
- One dipper
- Two thermometers
- One rubber mop.

For a factory having milk from about 400 cows an investment of about \$800 was required for equipment, and about the same amount for a building, or perhaps a little more. The cheese maker was paid by the number of pounds of cheese that he made. Usually the cost of making cheese was from one and a half to two cents per pound of cheese manufactured.

With the emergence of dairying as a way of life on the farm, other problems needed to be resolved. The following were among these problems:

- a. There was need for a new type of barn, and other buildings.
- b. There was need for a better way of paying for milk other than by weight alone.
- c. Increasing milk production by means of better feeding practices.
- d. Cattle diseases became factors of great importance.
- e. The problem of marketing of dairy products.

Factors Associated With Wisconsin's Becoming a Dairy State

Two factors of great importance in the emergence of Wisconsin as a dairy state were: (1) the study and research assistance given by the College of Agriculture at the University of Wisconsin, and (2) the publication of farm papers such as "Hoard's Dairyman" and "The Wisconsin Agriculturalist". Some of the inventions and discoveries of the College of Agriculture will be described later in this monograph. While we shall say little more about the contributions made by the farm newspapers, it should not be thought that their contributions were of minimal importance. The editors of these papers were looked upon as national leaders in agriculture and dairying, and through

their papers they encouraged farmers to put into practice the scientific developments found practical and worthwhile. These newspapers contributed mightily to Wisconsin's progress in becoming a great dairy state.

It was in the early years of the twentieth century that the University of Wisconsin set up what was called an "experimental farm" in which every phase of the total farm operation was studied and researched. The influence of the work done by the College of Agriculture cannot be estimated in terms of monetary worth. In fact, it is extremely doubtful that Wisconsin would have become the great dairy state that it became without the outstanding work done by the College of Agriculture and the experimental farms.

One of the first problems to be studied was that of the proper housing for dairy cows, and the proper storage of foodstuffs. It was discovered early that cattle had to be kept indoors during the winter months, that there had to be good ventilation in the barn as well as good lighting, and that attention needed to be given to cleanliness of the barn. It was discovered also that facilities for the storage of hay were needed. It was found, too, that corn was a good supplement to hay. In the early days the dry corn stalks were cut up with feed cutters and fed to cows. However, these food materials were not very palatable to cows, and much in the way of food nutrients had been lost in the drying process. Converting the corn into silage seemed to be the most desirable way of solving this problem.

Silos as such were more or less unknown; however, efforts had been made to store corn in pits and underground storage places. The College of Agriculture decided that silos were the most practical solutions to storage of corn in Wisconsin. The development of the structure of farm buildings and silos is an interesting story. The design of buildings varies in different localities, e.g. some felt that an octagon shaped barn was the most desirable. Others felt that the rectangular shaped barn with two floors was the answer. As for silos, their differences were largely in the matter of materials out of which they were made. Some used field stone. . . it was the cheapest way to build a silo, for materials were free to the farmer, and only the labor of building it was needed. Others built stave silos, still others cement silos in various forms, etc. Today there are steel silos. The development of the complex of buildings suitable for a dairy

farm is a story so voluminous that it is impossible in a monograph of limited length to describe it fully. Suffice it to say that the College of Agriculture led the way in suggesting desirable forms of farm building architecture.

Feeding Practices are Studied

As for the feeding of cattle, the College of Agriculture called for a scientific approach to this matter. Milk production was governed by the food nutrients in the forage and feeds consumed by the cow. It was discovered early that cows with the capacity to yield a large quantity of milk could not produce unless fed in adequate amounts, and in kinds of food that were rich in nutrients. It was discovered that there was a direct relationship between milk production and quantity of food nutrients consumed. It was determined scientifically what were the number of proteins and carbohydrates in specific kinds of forage, grains, and dairy feeds. On the basis of pounds of milk produced by the cow, it was then determined scientifically what were the daily needs of the animal in food. The College discovered that the cow needed a certain amount of "roughage" . . . that is, foods such as hay and silage, and in addition, certain grains and dairy foods in which there were high concentrates of proteins. The College told the farmer that a cow could not be expected to produce milk if it was fed on a mere subsistence level. Through farm institutes, the farm newspapers, and bulletins published by the College of Agriculture the message of improved feeding practices was disseminated. As a result the production of dairy herds increased substantially.

The next message brought to the farmer was that farmers should be selective about the animals that made up the dairy herd. It encouraged breeding of cows by sires which had come from high production cows. Further, it encouraged the keeping of milk production records, to see which cows produced the greatest amount of milk. Food consumed by the cow was weighed, and its value ascertained. Farmers were urged to keep only those animals in the dairy herd that made a profit.

The Babcock Test

Earlier we remarked that since milk was sold by weight, that frequently this encouraged the adulteration of milk with water. There was no good way known by which the quality of milk could be scientifically determined. The College of Agriculture, after several years of

experimentation, finally came up with a device known as "the Babcock milk tester." By means of this contrivance it was possible to ascertain the butterfat content of milk. This test indicated that in some milk produced the butterfat content was about 3% of the total volume of milk, and in others there was about 5% butterfat. The College of Agriculture recommended that payment of milk be based on the pounds of milk delivered, multiplied by the butterfat test of the milk. Payment would be on the basis of pounds of butterfat delivered to the factory. This has remained a basis for milk payment that is in use today. This was a device that tended to discourage the practice of watering milk. Someone described the Babcock test as a device that was better than the Bible to keep a man honest.

The College devised other tests to determine the quality of milk. There were tests to determine the freshness of milk, tests to determine the amount of sediment in milk, and tests of milk cleanliness. For quality cheese production it was necessary to maintain high standards in milk as it was delivered from the farm to the factory. Only milk that had been kept cool, and was reasonably fresh, could produce cheese of high quality.

Scientific Practices Introduced In Raising Farm Crops

Farmers were encouraged to adopt scientific methods in crop rotation. It was discovered that certain crops were soil depleters, and others actually increased the fertility of the soil. The College of Agriculture recommended that there be good balance between crops that were soil depleters and those that aided in the increase of soil fertility. Crops such as corn and grain were soil depleters, while those like clover and alfalfa were those which increased the nitrogen content of soil. A good rotation therefore would be one in which a plot of ground would have corn grown on it one year, some kind of grain the next, and followed by about two years of clover. The use of barnyard manure as a means of increasing the fertility of soil was encouraged.

In another monograph there was reference to farm machinery having been a valuable aid in the development of better farming practices and methods. There is no doubt that Wisconsin could not have become a great dairy state had not farm machinery been improved to aid the farmer. With improved methods of preparing the soil for planting, the application of commercial fertilizer in

desirable amounts, and improved harvesting practices, crop yields were increased substantially, and made farming a profitable venture.

Attention is Given to Improvement of Health of Dairy Cattle

It was in the 1920's that the College of Agriculture directed attention to the need to improve the health standards of dairy cows. Medical science had discovered that tuberculosis could be transmitted to human beings through milk from diseased cows. The legislature of the state enacted laws which made it compulsory for farmers to have cattle tested for tuberculosis, and which compelled their removal from the dairy herd before milk could be offered for sale. To share the burden of financial loss, farmers were given a subsidy by the state so that they could replace diseased animals with healthy ones.

In the 1930's a campaign was initiated to eliminate another cattle disease, namely one known as Brucellosis or "Bang's disease." The germs of this disease also could be transmitted to humans in milk. It gave to human beings a disease known as undulant fever. It was a disease that affected the joints of people, and it was often accompanied with high fever. A similar approach was used to eradicate this disease among cattle. In due time Wisconsin could claim that only milk from disease-free cattle could be marketed in Wisconsin. With the further development of pasteurization of milk and other quality controls, Wisconsin established a reputation for quality milk products.

Dairying Moves Forward with Improved Transportation to Markets

With the emergence of dairying as a way of life for Wisconsin farmers, an interest in good highway and railroad transportation soon developed. Milk was a perishable product, and unless it could be brought from the farm to the consumer in a day, its value diminished, or it might even become unsaleable. Thus, Wisconsin early became interested in railroad transportation. The market area of Wisconsin milk was extended as railroad refrigerator cars became available, and as the speed of trains was increased. Improvements in railroad transportation were made so that Wisconsin milk found its way to eastern sea coast cities and also to cities in the south.

In the mid-teen years of this century, improved highways became an issue of increasing importance. City residents

were interested in these highways so that easy and comfortable automobile transportation was possible. The farmer sought ways of getting his products to market. Thus, there was a unanimity of opinion about need in improved transportation and soon ribbons of concrete extended across the state. At first cheese factories needed to be located in the neighborhood of the farmer. However, with improved transportation milk could be delivered to factories at a greater distance away. Volume production with improved types of machinery and equipment then became possible.

Marketing Problems Develop

With the great increase in production of all kinds of dairy products, the next problem that needed to be resolved was that of finding markets for these. Again the College of Agriculture lead the way. Some of the steps taken to resolve this problem were:

1. Packaging of butter and cheese in packages of convenient size and attractive in appearance.
2. Making of cheese that was attractive to foreign tastes was encouraged. Thus, Canadian and English markets were found for Wisconsin butter and cheese.
3. Marketing associations were formed to which buyers might come to bid on Wisconsin butter and cheese. The cheese marketing association was centered at Plymouth, Wisconsin, while butter was usually sold on the Elgin (Illinois) market.

The tastes of people for cheese also needed to be cultivated. Americans were not great cheese eaters in the late years of the 19th century. Meat had always been abundant and cheap. Cheese in those days was regarded more or less like a relish, rather than a staple article of family diet.

The chief means by which Wisconsin went about the problem of increasing consumption of dairy products was by means of advertising. In these promotion efforts, newspapers and magazines were used extensively. In all of the fairs that were held, be they local, county, state fairs or the national expositions, there were contests among cheese makers to produce a quality product. When these contests involved national competition, and Wisconsin cheese makers were recipients of the blue ribbon, Wisconsin gained the reputation as a leading state in the production of cheese. These helped significantly to enhance the reputation of Wisconsin as "America's Dairyland".

Steps Taken to Maintain Our Reputation as a Dairy State

No amount of advertising can overcome the careless or undesirable practices of some farmers in their handling of milk. Strict rules for the care of milk in the farm need to be set up, and regulations had to be set up for factories where dairy products were manufactured. It was imperative that there be high quality standards. By means of legislation, and controls at the factories, these have been maintained.

Lamphard in his book entitled, "The Rise of the Dairy Industry in Wisconsin", (p. 145) remarks, "No branch of agriculture witnessed more spectacular changes in the second half of the last century than dairying, and in no other type of farming was the theory and practice so radically transformed. Dairying, more than any other activity, has been able to benefit from mechanical invention, scientific investigation, and the intelligent practice of skilled operations. Dairy practices were subject to less fluctuation than those of other major farm crops." This summarizes well why there was a transformation of farming practices in Wisconsin.

Some Summary Thoughts

As we would conclude the discussion with the benefits of the dairy industry to the economic welfare of the farmer, we would direct attention to the fact that dairying resulted in having Wisconsin farmers able to maintain the fertility of their soil. In 1880 the soils had become depleted of nutrients because of one-crop farming. It was the new crop program of the dairy farm which helped prove its superiority over other types of husbandry. Dairying was in itself an exercise in good conservation practice. Its great virtue was that a larger proportion of that which was raised on the farm was ultimately fed there and restored to the farm in the form of barnyard manure. The fields of Wisconsin were no longer exported to Europe. Dairy products contained so small a portion of soil matter that the loss to the soil is scarcely perceptible. The crop rotation program, furthermore, fostered all that was best in rotation practice, encouraging the growth of clover, alfalfa and other legumes, which helped fix the nitrogenous properties of the soil. It was estimated that whereas a ton of wheat removed \$7.50 of plant food from the soil, a ton of butter worth nearly \$500 removes less than 50 cents from the soil.

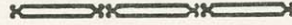
Of course, these changes had great

effect on farm management. In pioneer days almost the entire capital investment was in land. Farm machinery represented only 4 to 6% of the total investment. During the present century land has contributed a declining share of the total farm investment. Following World War II it was estimated that land represented 31% of the farmer's capital investment, buildings 30%, machinery 16%, livestock 20%, and sundry items 3%.

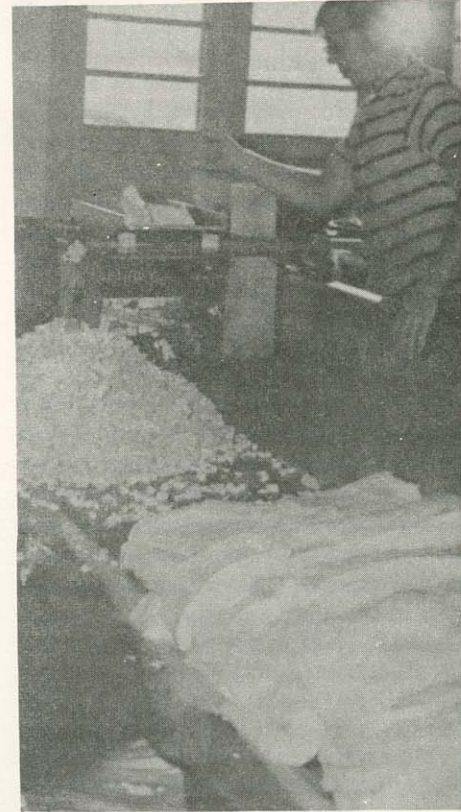
Surely the farming operation today is a far different one than the one that persisted in the early 1900's. It was said then that all one needed to go into farming was a team of horses and a plow. Today the farmer needs capital amounting to many thousands of dollars, and a scientific know-how as great as are the knowledge and skills that modern industry requires. The trend today is toward ever larger farms. Farms are mechanized to the point where milk is taken from the cow and transported to the factory without contact with human hands at any point. Because of these changes in farm operation and in dairying, all of us benefit, be we residents

of the city, village, or the farm community. We have the good life as men with vision, willingness to work hard, and to adopt the best methods of farming, made of our state and county one of the leading ones in the production of dairy products in "America's dairyland."

Although this monograph may seem more like a history of the development of dairying in Wisconsin, rather than a recital of what happened in Manitowoc county, actually, the history is the same. There was a transition from one-crop farming to dairying, and the problems encountered in this development by Manitowoc farmers were the same as those which were encountered all over southern Wisconsin. The farmers of Manitowoc county were leaders in this development, so that today a share of the economic growth of dairying in Wisconsin must be attributed to Manitowoc county. And ours is a share of the glory, too.

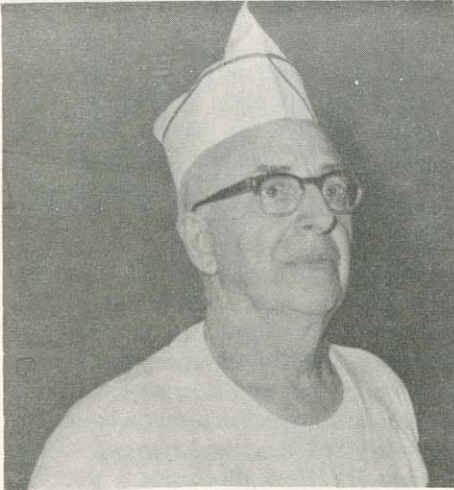


The first ice cream sundae was made in Two Rivers.



AN INTERVIEW WITH ROLAND MATTES —

A CHEESE MAKER FOR FIFTY YEARS AT COLLINS, WISCONSIN



Roland Mattes

Roland Mattes owns and operates a cheese factory a few miles to the south and west of Collins, Wisconsin. It is the only trade and business that he knows well, having been engaged in it for fifty years.

Mr. Mattes was born in Kiel and raised on a farm in the vicinity of Collins. His parents were John and Anna Mattes. He attended the school at Collins in his youth, and as was the custom in those days, helped his father with the farm work. He was born in 1901.

In 1920 John Draheim was in desperate need of a helper in his cheese factory, and Mr. Mattes agreed to give him a helping hand. The following year he began working for C. C. Brick who had cheese factories at Quarry and in Collins. He was employed by Mr. Brick until the Newton cheese factory sought his services. Mr. Mattes remained with the Newton company until 1927 when he became an employee of the Fairview Cheese Factory at Collins, which at that time was a farmer's cooperative. Four years later he purchased this factory from the farmers, and has been there ever since.

Roland Mattes was married to Freida Berkholtz in 1923. A son, Kenneth, was born to this union. Roland and Freida Mattes are the proud grandparents of five grandchildren. His son now operates the Fairview factory with Mr. Mattes, and two grandsons are working there on a part-time basis, and the other one works full-time.

When Mr. Mattes began working at the Fairview factory there were 16 patrons who delivered about 6,000 pounds of milk daily during the "flush" season. At that time all of the cheese that was manufactured was American cheese, with Longhorns and Colby cheese featured.

Cutting Curd

Thirteen years ago production of an Italian type of cheese was begun. The trade name of this cheese is Mozzarella, and is a favorite of those who like pizza dinners.

As Mr. Mattes told his story of fifty years as a cheese maker he took note of changes that came about in cheese making, and also in the operation of cheese factories. Most patrons of the cheese factory fifty years ago were within driving distance of the factory. Milk had to be delivered daily during the summer months, and every other day during the winter months. It had to be at the factory no later than 8:00 o'clock in the morning. Since few patrons had farm trucks in those days, the milk was delivered in some kind of horse-drawn vehicle. Thus, the patrons of a factory usually lived within two miles or so of the cheese factory, for a farmer hardly would have time to do the morning milking, and drive to the factory with the day's production of milk if he lived at a greater distance. Sometimes farmers in a neighborhood shared this duty, with one farmer hauling the milk on one day and the neighbor the next day.

After the milking was done at night, the milk had to be cooled. Since mechanical refrigeration was not then known, about all that could be done to cool milk was to use cold water, which

might have been gotten from a spring fed well located somewhere in the vicinity of the barn yard. Pasteurization of milk in that day was, of course, unknown.

One of the problems of the cheese maker in those days was to maintain quality standards for milk. Hand milking was the general rule. Cows were pastured in those parts of the farm not under cultivation, and often cows invaded marshy areas, or walked around in small streams that might have flowed through the farm. Thus the udders and teats of the cow became mud caked. Washing of these parts of the cow was required before milking could begin. Some persons who did the milking preferred that the hands be wet as milking was done; others preferred to do "dry milking". Obviously the wet milking process added to the possibility of having dirt and sediment get into the milk. Sediment in milk could affect the quality of the product, therefore a "sediment test" was devised, and those who did not meet quality standards were required to improve their milking practices.

The milk pail in use in those days was made of some kind of tin. Washing in scalding hot water was required, and drying of milking utensils in sunlight. The open pails, however, invited dirt and sediment to drop into the milk as it was drawn from the cow, and thus it was necessary that the milk be strained as it was poured into the milk can. Cotton cloth was used as a strainer of the milk. Later packs of gauze were placed between layers of cotton cloth, and this helped much to improve the straining process.

There were certain seasons of the year when it was possible that the milk might attain an "off flavor." This happened when cows ate while in the pasture a plant which would produce the off flavor. Garlic, wild onions and leeks were plants that were common in pasture areas, and could cause milk to have an "off flavor." Off flavored milk, of course, would cause the resulting cheese to have an off flavor too. In fact, this was so objectionable, that unless it was detected before the milk was dumped into the vat, the whole lot of the cheese from that vat might be unsaleable. The cheese maker, therefore had to be very alert as milk was delivered so that quality standards could be maintained. Farmers were urged to improve standards of barn cleanliness. Whitewashing of walls and ceilings in the barn was recommended, and at periodic intervals cobwebs and other foreign material were swept away. Only about half of the farmers had milk houses until

it was required by law in 1948. The "milk house" where milk was kept was required to be some distance away from the barn, for milk would quickly and easily take on "off odors" if not handled properly. Once milk was tainted with these odors, nothing could be done to remove them.

Cans, pails and other milking utensils and equipment needed to be thoroughly washed and cleaned. There were seams on cans and pails, and sometimes these had the tendency of opening up. The result was that in the residue of milk which got into the seams, an offensive odor would be caused. Furthermore, it was a place where bacteria could grow. Thus, these utensils had to be checked regularly to see that imperfections of this kind did not exist.

In due time the problem of quality control became one of such major consequence that cheese factory operators found it necessary to employ "field men" who would visit the patrons at least once every two weeks. The field man would inspect barns, dairy herds, milking equipment, and milk houses, and take note of milk cooling practices and facilities. Notice would also be taken of the barnyard and conditions that prevailed in the pastures. Anything that might affect the quality of milk would be within the province of the field man. These men would give instruction in the proper handling and care of milk, if that was necessary. To aid the field man in determining milk quality, a "blue test" was performed. This test determined the presence of antibiotics in milk.

Cheese making is not an occupation which one can learn in one easy lesson. It is a chemical operation involving study of milk and its properties. The more understanding there is of operations in the cheese making process, the better cheese maker the person will be.

When the cheese making operation begins, the first step is to heat the milk to a temperature of 86 degrees. In the meantime the cheesemaker must ascertain how "ripe" the milk is. To determine this, the rennet test must be made. Milk is put into a graduated cup and rennet is added to it. Rennet is made from the juice of a calf's stomach. When the milk coagulates, the number that it stops on determines the degree of ripeness of the milk. If milk ripens too fast then the resulting cheese is sour or bitter. When milk ripens too fast, the cause likely indicates the presence of near sour or sour milk in the vat. If milk ripens slowly, then the power of milk to ripen has been killed. This might be caused by the presence of antibiotics in milk. These might come from the diseased udder of some cow.

When the milk reaches a temperature of 86 degrees, and the ripeness of milk is ascertained, a "starter" must be added. The starter contains lactic acid. This causes milk to develop curd. As soon as the milk has the proper amount of acid, the rennet is applied. Three ounces of rennet is used for every 1,000 pounds of milk. The milk in the vat will coagulate or thicken in about twenty minutes at a temperature of 86 degrees fahrenheit.



Fairview Cheese Factory, Collins

At this point the thickened milk is cut into little cubes. The curd will separate from the whey. Incidentally, 1/10 of the milk is curd, and the rest is whey. After the whey has been removed, heat is applied again, and the whole mass heated to a temperature of 102 degrees. While this is being done, agitators turn the curd around and around. The purpose of this is to have the heat penetrate all parts of the curd. This has a tendency of "firming up" the curd or to harden it.

When this operation is completed, the agitators are turned off, and a rake is used to push the curd back, and to draw off the remaining whey. Then the curd is cut into slabs, tipped, and checked for acidity again. The slabs of curd are piled one on top of the other — four slabs high. The purpose is to widen the slab and to thin it. When the curd has matted out, then it is run through a curd mill and salt is added. A mechanical fork is used to distribute the salt evenly. The whole mass of curd is forked over until the salt is worked into it. At this point the curd is put into hoops and the cheese presses. The cheese is left in the presses until morning, when it is removed from the hoops, bandages put on, and put on shelves of the cheese storage room for curing. It is kept in the curing room for at least three days. During this time the cheese dries out. If it is removed too soon paraffin will not stick to the cheese. The law prohibits sale of cheese that has not been cured for at least three days. In the curing room, temperatures should be kept between 35 and 50 degrees. Cheese should be shipped within a week after having been put into the curing room for there is a possibility that mold might begin growing on cheese, and this would affect its saleability. There also is the possibility that the cheese might shrink unduly because of excessive drying out.

Mr. Mattes remarked at length about changes in equipment used in cheese factories through the years. At first the vats were wood-fired. At one end there was a fire pot built under the vat. Sticks of kindling wood about two or three inches in thickness were placed in the fire pot. This was done up to a length of about six feet of the vat. There was a jacket around the entire vat and above the fire pot. This jacket was filled with water. The heated water then brought the curd to the proper temperature.

Vats, of course, are larger and of different design today. Heat comes from steam which is gotten from a steam boiler. The steam is applied evenly to all parts of the vat and it can be controlled

with minute exactness. Incidentally, it was at Kiel, Wisconsin, that an industry developed which was instrumental in mechanizing the cheese making process. A company known as Stoelting Brothers has been a leader in the industry in providing machinery useful in the production of cheese, butter, and other dairy products.

Whey, a by-product of cheese making, was always regarded as a good food for pigs. In due time it was discovered that there was a certain amount of butterfat in the whey. By means of a separator the butterfat was removed, and this then was used to make butter. The remaining liquid was then run into a whey tank from which it was taken by the farmers, after they had brought milk to the factory.

In any dairy operation, floors and equipment must be kept scrupulously clean. Hot water is used in many phases of the cleaning operation. This then is drained off. At one time these liquids were permitted to run off into roadside ditches, or perhaps into nearby streams. The odors from these accumulations of factory waste products became quite offensive, and as one rode along a country road it was not hard at all to detect the presence of a cheese factory or creamery in a locality as these odors permeated the atmosphere. Of course, this was a form of pollution of streams, which today is prohibited. Regulations require the factory operator to dispose of these factory waste products properly. Some use some kind of cess pool to dispose of these. Others have small disposal plants of some kind. In many of these plants the bacteria in the wastes are killed by action of sunlight. Thus through natural processes the water becomes purified.

"Fairview" Changes from Manufacturing Cheddar Cheese to Manufacture of Italian Cheese

About a decade or so ago, the taste of Americans for pizza, and for an Italian type of cheese was developed. At that time the Fairview factory was converted to the manufacture of cheese known as "Mozzarella." The cheese making process was an altogether different one than when cheddar cheese was made, and it also required a different kind of equipment. The cheese making operation began at one o'clock in the morning, and was completed by noon of that day. The cheeses (five pound loaves of Mozzarella) were then left in salt brine until the next morning and then were vacuum packed,

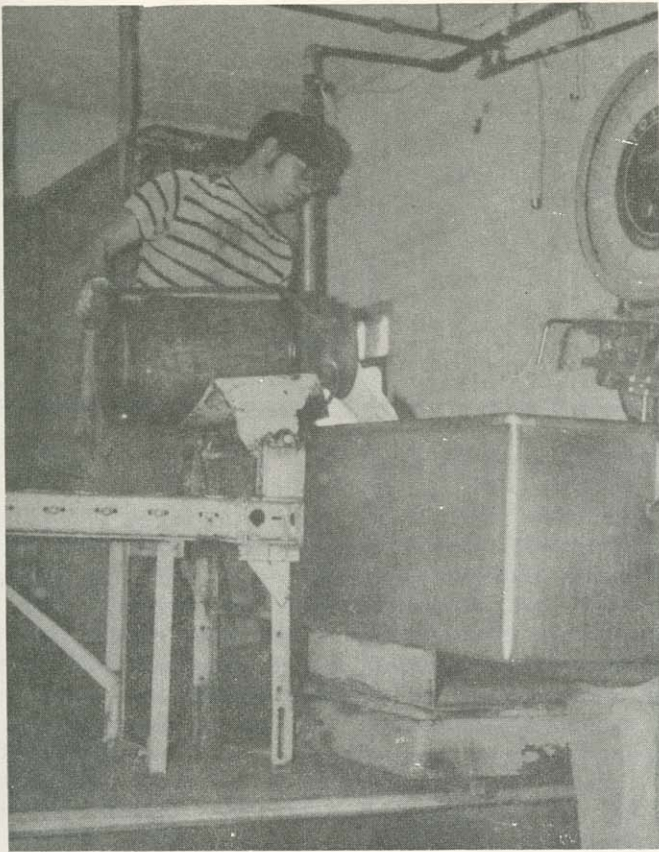
boxed, weighed and shipped. There had to be a daily shipment of cheese in this kind of operation. The wholesale houses which received this cheese were located at Fond du Lac or Plymouth. When the truckers' went on strike this last spring, Fairview had to stop making Italian cheese because of not being able to make daily delivery of cheese, and for the duration of the strike cheddar cheese was again made.

Mr. Mattes stated that his factory now uses about 70,000 pounds of milk each day. No cheese making is done on Sunday. It is possible now to keep milk under refrigeration so that it can be manufactured on a following day, if necessary.

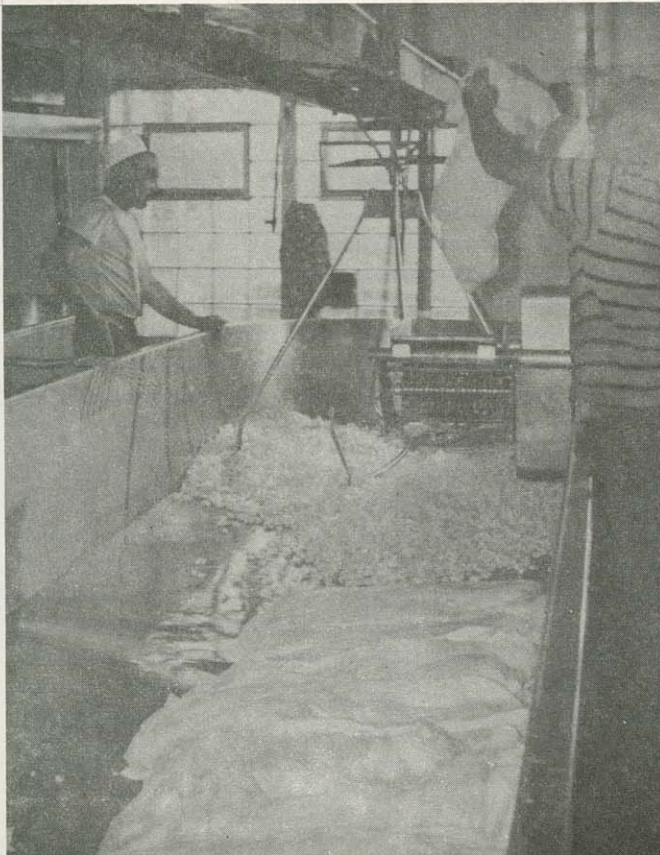
Other Changes in Factory Operation

Once upon a time a cheese factory could have as patrons only those farmers who were within driving distance from the factory. Nowadays the milk is gathered from farmers who may live a considerable distance away. Bulk milk trucks which are refrigerated are used to haul the milk from the farm to the factory.

On the farms, milking machines are generally used. Hand milking has disappeared almost entirely. On some farms the milk is removed from the milking machines by means of pipes which flow into cooling tanks. These are of stainless steel, and are large enough to hold the milk produced on the farm for that day, or occasionally two days. When the truck driver comes to the farm, he removes the milk from the cooler to the tank truck by means of a vacuum process. The milk is taken into a tank truck which is capable of holding about 20,000 pounds of milk at one time. (The truck makes two trips a day, one truck hauls the same amount of milk that five trucks did once upon a time.) The milk is then transferred to a holding tank where the milk is kept under refrigeration until such time as the cheese making process begins the day following. Obviously, equipment of this kind is costly, both to the farmer, the driver of the milk hauling truck, and the cheese factory operator. Thus, only those who produce a large volume of milk can afford this kind of equipment. The small farmer may still need to have his milk hauled in cans. However, milk hauled in this way must also be kept under refrigeration. State regulations require that all cans be kept in perfect sanitary condition. When a rust spot appears, or when a can becomes defective in some way, a red tag is put on it and it cannot



Weighing Milk at Intake



Agitating Curd

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be used again until the can has been retinned, or the imperfection has been corrected.

It would seem that with production of milk under nearly perfect sanitary conditions that the problems in cheese production should be few. Mr. Mattes stated, however, that one must be ever alert for signs of less than perfect circumstances. Sometimes careless habits cause situations to develop which create problems. The field man must try to ascertain the source of the difficulty.

Today the state sends out inspectors to check all phases of the operation where dairy products are produced. There is one state inspector for every nine field men who are employed by the local factories. These inspectors make every effort to maintain standards so that Wisconsin's dairy products are of the highest quality. The maintenance of high standards pay off in the form of sales, not only in local markets, but also in foreign areas.

Cheese making has become automated and as much as one quarter million pounds of milk can be manufactured into cheese in a major plant in twenty-four hours.

When Mr. Mattes began his career as a Wisconsin cheese maker, the state was the source of about 15% of the entire national supply of dairy products. By the late 1920's more milk was sold from Wisconsin farms and converted into dairy products than from any other state in the union. This position has been enhanced in the years since so that today no one challenges the fact that Wisconsin is indeed "America's dairyland." It is Wisconsin's chief claim to distinction and acclaim.



EDITOR'S NOTE: The Society would like to obtain a list of all the cheese factories that were in operation in Manitowoc county at some time or other in the past or at present. Anyone having information about this is asked to write Secretary Edward Ehlert, 1115 North 18th Street, Manitowoc, Wisconsin 54220. Please give the location of the cheese factory, facts about who owned and operated the factory, and the years during which the factory was operated. Any other information about a factory that can be given would be appreciated also.



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