



## CDR's Strategic Plan (1995-2000)

*Rusty Bishop, Director*

CDR is continually evaluating its value to Wisconsin's dairy industry. Based on the communicated needs of manufacturers, we have started a detailed strategic planning process to clearly define our mission, objective, strategies, and action plans in order to serve the industry far into the 21st century. These are summarized as follows:

### Objectives

- Conduct an aggressive, balanced basic and applied research program in the following areas:
  - Expand the use of cheese and cheese products through a greater understanding of all properties of these products and systematic techniques to enhance functionality.
  - Improve the value and expand use of milkfat.
  - Recover and/or modify nonfat solids, especially whey components, to enhance their value for food and nonfood uses.
  - Maintain and enhance consumer confidence by developing technologies that will strengthen dairy food safety and quality systems.
  - Provide dairy product marketing information, business management tools and policy analysis to improve the economic well being of individual dairy processors and the WI dairy industry in general.
  - Undertake research and develop programs in traditional or novel areas.
- Create a closer working relationship/partnership with industry
- Effectively communicate research/technical information
- Provide education to industry and university students

→ Increase and diversify funding resources

These five objectives have resulted in no less than 24 strategies and 32 actions steps which we will finalize by October of this year. As CDR strives to fulfill its mission, the link between researchers and industry is critical. Only by coming together can we hope to meet tomorrow's challenges and win in an increasingly competitive environment. To this end, CDR has created four Industry Research Teams in cheese, milkfat, safety/quality, and nonfat solids/whey to provide a formal avenue for industry input, program direction, and industry buy-in to what we believe is the premier dairy research facility in the U.S. If you would like information about these teams and/or would like to participate, please contact me (Rusty Bishop, 608-265-3696, [JRBishop@ae.agecon.wisc.edu](mailto:JRBishop@ae.agecon.wisc.edu)). As always, we appreciate the continued support of Wisconsin's dairy industry, WMMB, DMI, and the University of Wisconsin-Madison.

### Mission Statement

- The Wisconsin Center for Dairy Research will serve as a national leader in strategic research to improve the competitive position of the dairy industry by linking Center/University faculty, staff, students and the dairy/food industries to address key issues resulting in transfer of technology and communication of information.

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## Use of Whey Cream in Cheese Manufacturing

*by Tom Leitzke*

*Bureau Chief, Food Division, Wisconsin Dept. of Ag., Trade, and Consumer Protection*

A question has come from industry concerning the uses of whey cream in cheese manufacturing. The following paragraphs attempt to answer that question and expand on the answer to a similar question in the Winter 1995 Dairy Pipeline.

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## Bringing Back Butter

Highly valued by home bakers, butter may soon be making a come back in commercial bakeries.

Fractionating, or separating, milkfat into fractions according to melting point can provide manufacturers with a consistent product that can compete with vegetable oils.

Currently, regular butter is too variable for many manufacturing uses – but milkfat fractions sidestep consistency problems. The fractionation equipment heats butter oil, then cools and filters it into fractions that have different chemical and physical properties. These properties influence the milkfat behavior in different foods. For example, milkfat fractions with high melting points reduce bloom, the white discoloration on the surface of chocolate. For almost 20 years European bakers have used milkfat fractions to make delicate, flaky croissants and puff pastry. The dough absorbs regular butter, but high melt fractions separate the layers while retaining the buttery flavor.

For people tired of torn bread, low melt fractions can produce butter that will spread even when it's cold. Milkfat fractions can provide a concentrated source of butter and dairy flavors for "flavor houses," the manufacturers of food flavorings.

Milkfat fractions might be used in sucrose polyesters, the zero calorie fat substitutes. Medium chain triglycerides, which show promise as dietary supplements for premature infants, might be another outlet for milkfat fractions. Fractions can also be used to make edible films that prevent migration and mixing in foods. For example, edible films coating the peanuts in a candy bar can keep the peanut oil in the filling from migrating to the chocolate coating.

According to CDR researcher, Kerry Kaylegian, there is still a lot to learn about milkfat fractions; for example how they react with other food components. The new pilot plant (See sidebar) will allow researchers to do this type of strategic research. In addition, the plant makes it possible to combine research expertise with applications to develop the business opportunities milkfat fractions hold for Wisconsin manufacturers.



Here's a summary of new developments in CDR's Milkfat Applications Program –

The Wisconsin Milk Marketing Board has supported CDR's efforts to develop the nation's leading milkfat research program. The support continues, WMMB is funding a new milkfat fractionation pilot plant that will be installed in Babcock Hall this Fall. The pilot plant is another Tirtiaux unit, like the one leased by WMMB during 1993. The hardware consists of a control panel, a stainless steel jacketed crystallizer, a tank to hold cooling medium, a membrane filter press, and assorted pumps, lines, and fittings. This \$300,000 unit will be the only milkfat fractionation pilot plant in the United States and will allow CDR to provide samples of milkfat fractions to the food industry.

To promote industry support and develop an integrated research program, CDR is forming a milkfat fractionation consortium. Consortia members can join the CDR Milkfat Industry Team and gain timely access to milkfat research. Technical consultation is available and CDR will assist with product development, evaluation, and analysis.

Kerry Kaylegian, milkfat applications researcher, with Bob Lindsay, professor in Food Science, turned a research project into a book that will become an industry standard. Over 600 pages, the Handbook of Milkfat Fractionation Technology and Applications organizes, summarizes and interprets a broad range of information about milkfat fractionation. The Handbook includes information in the public domain from research journals, conference proceedings, graduate theses, patents and available company literature. The Handbook is available through the American Oil Chemists Society Press, Champaign, IL, (217) 359-2344.



*Kerry Kaylegian,  
co-author of "The  
Handbook of Milkfat  
Fractionation  
Technology and  
Applications"*

*Although this article focuses on animal agriculture, the environmental issues and perceptions of risk apply to the dairy and food industry, too.*

## Public Perceptions and Policy Imperatives: Animal Agriculture and the Environment

*Adapted from the 1994 American Dairy Science Association (ADSA) Foundation lecture by Otto Doering, Dept. of Agricultural Economics, Purdue University*

Environmental regulation is probably becoming more critical to animal agriculture than any other governmental action affecting the industry. A national goal of improving environmental quality means different things to different people; experts believe they can define the goal in precise terms, while public perception may be something else entirely.

As the public tries to listen to the experts, it is clear that these groups speak a different language. This is a crucial problem to overcome in order to work through the differences between expert and public opinion. Although experts often disagree with each other, the scientific community appears to have a few unified opinions on issues that are important to the public. The question is how society reaches workable long term solutions to problems that incorporate both technical and public considerations, given the critical gap in the way each group views the

world and the decision process. How will we resolve environmental concerns? What decision making process will we devise to allow us to deal successfully with the issues?

If people can cope with the gap between experts and the public and the ill defined nature of environmental quality, how will institutions implement the decisions made? The approach to environmental issues has been piecemeal for several decades. This is a frustrating process. It is also part to the inherent nature of the democratic process. Clearly, the process of democracy is not a logically satisfying one.

### Proxy issues

What emerges from the way people make decisions is the use of proxy issues, "straw men," and scientific hyperbole. Scientists do this as well; they are not immune from the basic urge to reach a goal they hold so important that strange, circuitous, and even expensive means justify the ends. The spotted owl is a case in point. The controversy is not about the spotted owl. The controversy is about old growth forest and whether society values it highly enough to preserve some of the remaining blocks of such forest on the Pacific Coast that are large enough to remain as self sustaining ecosystems. The owl is merely the proxy.

### Risk perceptions

Finally, scientists get frustrated with the public because of the way the public treats risk. To scientists, this treatment reflects the basic fuzzy mindedness of the public, but what the treatment of risk actually reflects are very real basic differences in the way individuals think about risk. Logically, individuals make very different choices about the risks they are willing to take them-

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## Whey cream

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Whey cream may be used as follows:

### Non-standardized/specialized cheese

Whey cream may be used without limit in the manufacture of nonstandardized cheese varieties. The cheese must be properly labeled showing whey cream as a separate ingredient in the correct order of predominance.

### Standardized cheese

Whey cream may not be used as an ingredient in standardized cheese varieties because:

- Cheese standards of identity allow the use of cream.
- The Federal standard for cream does not include whey cream.

### Starter media

Whey cream may be used as an incidental ingredient for use in

standardized cheese varieties. May not exceed 3% of the starter volume.

This is a difficult issue since the same Federal cream standard applies to cream used for the manufacture of butter, and therefore whey cream should not be used to manufacture butter. In Wisconsin, and other dairy states, most whey cream has traditionally been churned into butter.

We are not changing our policy relating to butter, only clarifying the use of whey cream in cheese manufacturing. Since this is grade standard and economic, and not a food safety issue, the department will petition FDA that either the cream standard be amended to include whey cream, or that butter and standardized cheese varieties include whey cream as a separate optional ingredient. The National Association of State Departments of Agriculture (NASDA) Dairy Division has agreed to support our petition. 

*continued from page 3*

selves or the risks to which they are willing to have their families exposed. This difference spawned the Delaney Clause of zero tolerance of food additives. The argument over the possible revision of the Delaney Clause will be a difficult one unless the public has undergone a basic and fundamental change in its perception and treatment of risk. To some extent, this may be happening. New information is making us all think differently about what appropriate food safety rules might be. Similar work relates to environmental concerns and risk trade offs.

### **What is the goal?**

What are the public's environmental goals? How do those goals get translated into change, given the differences in the values people hold, the relative nature of goals and objectives, the gap between the experts and the public, the vagaries of the democratic system, the confusion caused by proxy issues, and the varying perception about risk? The public has no monolithic goal; there are many different goals, by demography, by region, and even by the state of the economy. An observer might say that the public wants bad things to stop and wants to have some gradual improvement from where it is now, yet little discourse has risen from this focus. It would be logical for an industry or a firm to ask itself or the public what the most damaging things are that it does, how these might be mitigated, and how the general impact of those damaging things on the world around it might be lessened over the long term. This is an approach that will become increasingly attractive as the lumbering engine of the political and bureaucratic system gets increasingly serious about making something "good" happen for the environment. This approach is something that firms should consider doing on their own initiative.

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The relative nature of the goals and objectives continues to cause tremendous problems. One of the most pernicious aspects of this situation is that good citizens often take a double whammy. The public, through legislators and regulators, takes a look at a situation and forces everyone to do something about it. Under that scenario, the good citizen firm already operating at reduced pollution levels may also be called on to reduce pollution by 50%. This is extremely expensive for them since the least expensive reductions have already been accomplished.

Our democratic process has had great difficulty dealing with geographical and resource differences. Recent amendments to

the Clean Air Act have changed the rules of the game with the tradable permit system allowing those who have lower cost of control to clean up more than their share of pollutants and make money on it. This system allows other problems of regional differences in downstream pollution loads, and it has become an important political issue.

When animal agriculture is placed against environmental regulations, serious consequences for the size and structure of the industry do not seem to get plugged into the democratic process with the same intensity as the goal of environmental improvement. Small firms suffer.

Environmental regulations are not neutral in size or scale. Some federal laws and some individual states have tried to mitigate this impact. No one has any easy answers for this problem. Delays for economic hardship only forestall the inevitable and do not change the destruction of the economic base of the small, self contained unit. A dairy farmer selling out under such a situation would not be compensated for his buildings and equipment, made almost worthless by such regulations, but only for the raw land and the herd. How does one counsel producers in such a situation? There are no satisfactory answers.

### **Property rights**

Many see property rights as a major issue in environmental regulation. Major farm organizations have made a stand on this issue, but the stand will not prevent rigorous enforcement of environmental regulations if the public believes that goals of those regulations are important. Producers in the countryside should talk to city and town dwellers covered by a full net of zoning, health, safety, and other regulations that are now taken for granted. One of the roles of the Supreme Court is to reflect the basic tenor of the nation, and the nation has already moved well beyond the notion of the American frontier. It is not a question of what one believes is right or wrong. It is a situation in which most of the public has already decided that an individual cannot do things on his or her own property that do damage to others or to the environment. The freight train is already moving in this direction, even with the most recent decisions by the Court. The train may be slowed, but one stands in its way at one's own peril.

### **Coping with the future**

How effectively environmental issues and concerns are dealt with will be a hallmark of whether our society can successfully deal with other critical issues in the future. If our society cannot develop the capacity to deal with these issues, it will also fail on many other fronts. Smoke and mirrors will not be enough. The public will have to develop an increased capacity to accommodate difficult issues where there will have to be some winners and losers.

*next page*

# Inventing a New Niche Product, Part 5

*Paul Scharfman, Specialty Cheese Company and Wisconsin Specialty Cheese Institute*

Every successful new product is clearly “positioned” in the mind of its customers. Usually customers associate a particular stance, an angle or outlook with each product they buy. For instance, a bread can be positioned as the one that “builds bodies ten ways,” or a dish washing detergent can be positioned as “stronger than dirt.” For food products, this unique positioning is usually associated with better taste, more convenience, or perhaps the product is “healthy.”

In prior articles, we have followed the Reenap company, a hypothetical, four employee Cheddar plant, as they worked to develop some new niche products. We have seen how they approached the new product development process by creating a team of their employees, their suppliers, and even some of their inspectors. This team generated a large number of possible new products for the little company to pursue and now they have assigned small work teams to investigate the more promising new product ideas. In our last article we saw that the Company had assigned work groups to explore the potential for Cheshire, Stilton, Manchego, flavored Jack cheese and aged Cheddar in small packages.

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Reflect again on the broader context in which our nation will have to make good decisions:

1. Society’s values are going to continue to change. Everyone will continue to face a moving target, not necessarily logical or consistent.
2. Attaining environmental objectives will be viewed in relative, not absolute, terms. Definitions remain difficult for those attempting to comply.
3. The gap between the experts and the public is serious and will slow down good decision making unless both sides recognize the gap and work around it.
4. Democratic processes will continue to be frustrating by their nature, but genuine participation will be essential for survival as will understanding of the trade offs involved.
5. Proxy issues will waste much energy and make the real problem difficult to solve. Such issues are not new to our society.
6. The public perception of risk (health, safety or environmental) will be a critical factor in eventual public acceptance.

The politics of denial no longer work. The animal industry is most likely to deal successfully with regulations if it comes to the

## Go Ask the Customer

Don, Sara, and Jim were responsible for developing the team’s ideas for small packages of aged Cheddar and then “positioning” their product in the marketplace. They started by going back to the source of their idea and gathering more information.

“Hey Don! You mentioned your dad would buy more cheese if he could get smaller packages. Well, why don’t you call and ask him what else he’d like in the cheese that he can’t get now?”

Don did call his father and the next day, he went back to Sara and Jim with his report. “Seems my dad wants to help us out. He said that we should come over to his place and he’d get some friends of his together for us. He figures we could ask them the same question since they’re all cheese lovers who have cut back. I’ll tell you one thing he said though, it’s not the calories that bother him. He says cheese just doesn’t seem to have the flavor that he remembers from the past!”

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## Only vigorous self policing will soften the regulatory hammer. It is an important proactive step.

table with an interest in and understanding of the concerns of the public. The industry also has to come forward with a willingness to be accountable, accompanied by a sense of responsibility to do what needs to be done and still survive. The cost of a single bad actor can be devastating to others. Only vigorous self policing will soften the regulatory hammer. It is an important proactive step.

The critical fact is that the animal industry, as experts, must overcome the communication gap and convince the public that its concern matches theirs, that it is trying its best, and that it is actually making measurable progress towards public goals. This will be the least-cost way to survive.



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### What is a Focus Group?

The following Saturday, Sara and Jim joined Don to spend the afternoon at his dad's place. They were ushered into a room with seven people in it. "This is my first focus group" said Don's dad.

Some of the team members looked puzzled, so he continued. "You know, this is a focus group. We are a group focused on one subject — your new cheese that you will design for us. I bet we can spend several hours just talking about that subject. Even though it might seem boring to someone else, it won't be for us since you are here to listen."

### What can you learn from a focus group?

During the next two hours Don, Sara, and Jim were riveted to their chairs. At first, they simply listened to the group talk about how Cheddar could be made to meet their needs. When the discussion slowed, the team brought out some products to stimulate the discussion, like low fat cheeses, and "Prevention" magazine. Each time they produced some new items from their shopping bag, they asked how the product fit the needs of the group and whether there was anything they could learn from it for their new cheese.

The team learned a great deal about the reasons that seven senior citizens had for eating less cheese than they used to. Of course, they did not know if those reasons were shared by millions of other people – but they had their "hunches." They could now build complete positionings for their new product idea.

### A Complete Positioning

"It's a taste issue! These folks have lost taste sensitivity over time and they blame it on the cheese. But I bet Cheddar just doesn't taste like it used to because of their aging taste buds," said Sara.

The entire work group agreed with Sara's insight. They developed a positioning for a new product:

To aging Cheddar lovers, new Reenap brand Cheddar is the type of cheese you will find as flavorful as "Cheddar used to be." It is made in a small factory by

cheese makers in the world who saw there was real potential for a new product. If they could have even a 1% share of the Cheddar market, senior citizens their small cheese factory would be quite satisfied.

### Writing a Concept Statement

When the whole Reenap Company New Product Development Team heard about "Cheddar for Seniors" they were enthusiastic. The team member from the Center for Dairy Research even indicated that current research on flavor development in Cheddar might help to make the concept feasible.

One of the Team members took a particular liking to the idea and wrote a one paragraph "concept statement" so that the Team could show it to other senior citizens and get their opinion.

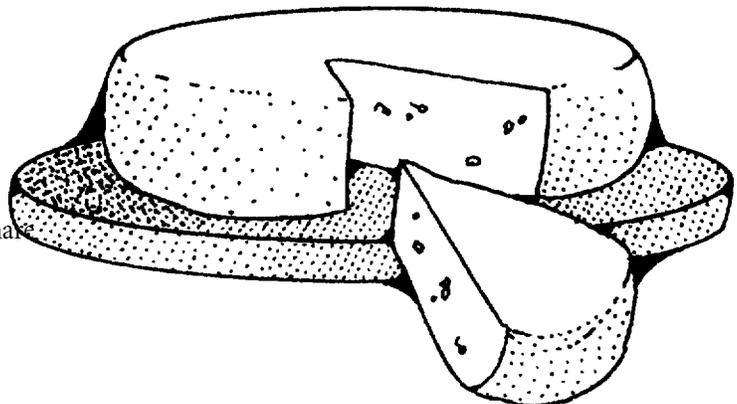
### Introducing Reenap Aged Cheddar

*The taste of Cheddar the way it used to be*

"New" Reenap brand Aged Cheddar is actually not so new. We make it taste the way Cheddar ought to taste by making it the old fashioned way. In our small cheese factory in Wisconsin we remember the traditions of cheesemaking – and live by them. In fact, we use more, stronger cheese cultures than most commercial Cheddar so our cheese develops as much real Cheddar flavor as cheese "used to have."

We realize that you don't need to buy big packages of cheese to enjoy our big flavor so we've packaged Reenap brand Aged Cheddar in

The Reenap group developed several other concepts that they thought might appeal to senior citizens; Cheddar with extra calcium, iron enriched cheddar, and Cheddar for Seniors all seemed worth pursuing. In the next issue we will show you how they evaluated this list of concepts, choosing the product to develop.



## Master Cheese Maker Curriculum Calendar Fall - Spring 1995-96

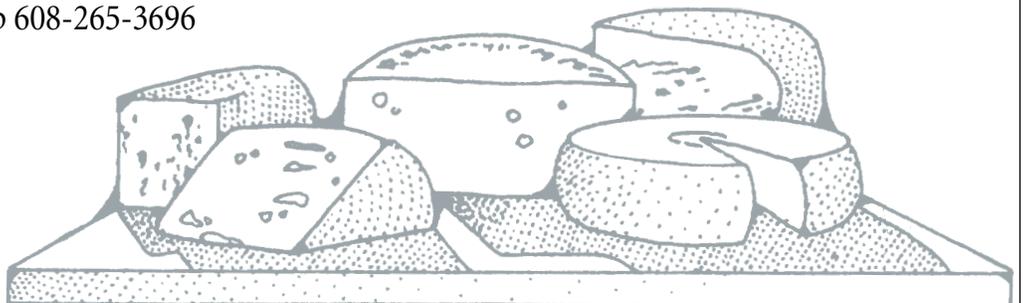
### Required:

		Contact
Wisconsin Cheese Technology Short Course	Oct. 9-13 Mar. 18-22	Bill Wendorff
Wisconsin Cheese Artisan Course	Sept. 26-28 April or May 96	Jim Path
Wisconsin Grading Short Course	Nov 14-15 June 6-7	Bill Wendorff
Cheese Safety Short Course	Oct 24-25	Rusty Bishop

### Elective:

Applied Dairy Chemistry Short Course	May 21-22	Bill Wendorff
Process Cheese Short Course	Feb 96	Jim Path
Milk Pasteurization and Process Control School	Jan 14-15	Bob Bradley
Water and Waste Water Management	May 96	Bill Wendorff
Business and Marketing	To be announced	
Whey and Whey Utilization	To be announced	

- ◆ CALS Conference 608-263-1672
- ◆ Bill Wendorff 608-263-2015
- ◆ Jim Path 608-262-2253
- ◆ Bob Bradley 608-262-2007
- ◆ Rusty Bishop 608-265-3696



## Harnessing neural networks to predict cheese behavior

Predicting traffic, picking stocks, and now, designing cheese ... these are all information processing tasks that neural networks can organize and analyze. Neural networks are considered forms of artificial intelligence, modeled on the human synapse, or contact point between brain cells. These computer generated connections process and sort information to pick out patterns that may not be obvious in large amounts of data.

Neural networks may be useful in the dairy industry. Applying this process to a large experimental data set can predict some of the variables that influence cheese composition. Thus, cheese makers can adjust their procedures to tailor a natural cheese for a specific purpose. (See side bar) The amount of cheese used as an ingredient in other foods continues to increase, so neural networks can be an important short cut when supplying tailor made cheese for this expanding market. Mozzarella on pizza accounts for much of the increase, but cheese used in sauces, stuffings, and toppings are also part of the picture.

### Predicting cheese function

CDR researchers Norm Olson and Dave Bogenrief tackled this problem of predictable cheese functioning in food. They have been working on a systematic approach to sorting the factors that influence physical properties of cheese. To do this, they made over 200 vats of cheese in an effort to evaluate many factors that influence meltability, sliceability, brittleness and hardness of Cheddar type cheese. For example, after using statistical analysis to look for the patterns in their data, they found that moisture, (specifically MNFP or moisture in the nonfat portion that is a ratio of water to protein in the cheese), fat content, pH, calcium, and intact casein all had a significant influence on cheese meltability. This type of specific information can guide the manufacture of cheese, assuring the desired melting at the right temperature.

Olson and Bogenrief continued to generate and analyze data until they linked up with UW-Madison scientists looking for data to analyze with a neural network. Now, Sundaram Gunasekaran, John Norback and Hong Shu Ni are applying neural network processing to the Olson and Bogenrief data set. So far, the neural net correlations match the statistical analysis well. However, the neural net goes further. One of the unique features of neural networks is their ability to “learn” from examples instead of relying on programming to find the right answer. The neural net “trains” on the data set, incorporating patterns into its decisions, or “learning.” Also, adding more data allows the network to continue building on past connections. Not only does the network continue to build, it gets better every time new information is processed.

To satisfy consumers it is important to produce and process cheese that stretches, melts, browns and tastes they way they expect it to. Using a neural network may take some of the guess work out of the manufacturing process and help to deliver custom made, high quality products.

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**One of the unique features of neural networks is their ability to “learn” from examples instead of relying on programming to find the right answer.**

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# A look at how the data can work for you – Potatoes Con Queso



A cheese manufacturer is currently making a 50% reduced fat Cheddar containing 15% fat and 46% moisture with a pH of 5.2 at 45 days of age. This composition equals 27.8% FDM, fat in the dry matter, and 54.1% MNFP, or the ratio of water to protein in unaged cheese.

The cheese is distributed to a food service chain in a shredded form and used as a topping for diced potatoes con queso when the cheese has been aged 30 to 60 days. The cheese manufacturer has been asked to increase the meltability of this cheese by about 25%.

CDR's cheese ingredient study indicates that adjusting pH and MNFP can influence the oven meltability of lower fat Cheddar. Data suggests that the MNFP of cheese be increased by 1% to 55.1% and the pH at 45 days reduced to 5.1. Adjusting the manufacturing conditions, in this case cooking temperature and rate of acid production, can produce the desired changes and increase the meltability of the cheese.

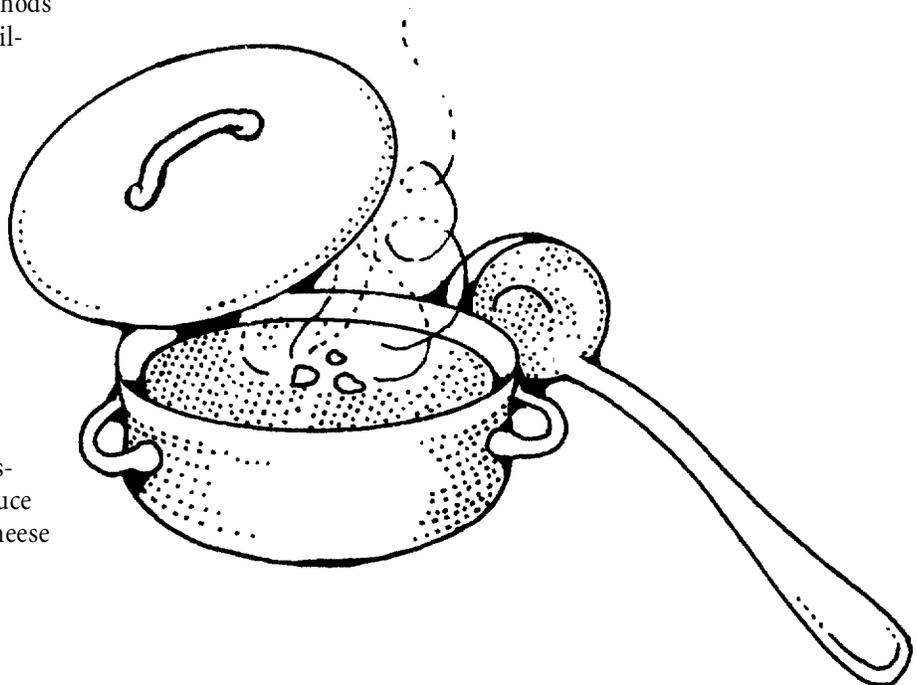
In addition, the cheese manufacturer and the food service operator should realize that the meltability of the cheese will increase during aging. In 30 days the meltability will increase about 30% if the cheese is held at 45°; holding it at lower temperatures, close to the freezing point of cheese, will minimize the changes in meltability.

Adjusting the composition using the methods listed above will also increase the meltability of cheese in a microwave oven. However, the change will be much less, yielding a 5% increase. The increase in microwave meltability after 30 days storage will also be less, around 10%.

Of course, adjusting manufacturing conditions will influence more factors than meltability. Reducing the pH of cheese will also increase its brittleness and this could create some shredding problems. Maintaining the pH above 5.0 should minimize these problems. Increasing MNFP will soften the cheese and reduce its shredding qualities, but reduced fat cheese with the recommended MNFP should still shred properly.



**To satisfy consumers it is important to produce and process cheese that stretches, melts, browns and tastes they way they expect it to.**



## News from CDR

CDR Director, Rusty Bishop, has been selected by the Association of Official Analytical Chemists (AOAC) as the AOAC General Referee of the Year for 1995. The AOAC reviews the study and design of methods to produce quality analytical methods. Rusty's work guiding the development and validation of microbiological methods for dairy products earned this recognition.

International cheese ambassador, Jim Path, crossed the ocean twice this summer. Along with John Jaeggi, CDR, he attended the First International Symposium on Dairy Propionibacteria in Rennes, France. Jim headed back to Europe in July to visit Andrew Lamberton, a lecturer in dairy technology at Reaseheath College in Nantwich, England. Mr. Lamberton will be an instructor at CDR's next Artisan Seminar, "Great Cheeses of Great Britain," on September 26-28. While in England, Jim was also able to attend the Nantwich International Cheese Show. He'll tell you all about it when you come to the seminar!

Be prepared for a change in scenery the next time you take a short course at Babcock Hall. As of July, Room 205 is also known as the Al Tygum Auditorium. Part of the Rennebohm "family" of workers, Al Tygum worked in the Food Service Division for over 40 years. Many of Al Tygum's coworkers, family, and friends happily shared warm memories and a high regard for Al at a recent dedication ceremony in Babcock Hall. It was a generous gift from the Oscar Rennebohm Foundation in Al Tygum's honor that transformed Room 205 into a lecture hall fit for the 21st century, complete with a sound system, built in projectors and, yes folks, comfortable seats.



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## Calendar

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**Nov. 14-15 Wisconsin Cheese Grading Short Course.**  
Madison, WI. Call Bill Wendorff at (608) 263-2015.

**Jan. 2-5 Milk Pasteurization and Process Control School.**  
Madison, WI. Call Bob Bradley at (608) 263-2007 for information, or the CALS Conference Office (608) 263-1672 to register.

**Jan. 8-12 Ice Cream Makers Short Course.** Madison, WI. Call Bob Bradley at (608) 263-2007 for information, or the CALS Conference Office (608) 263-1672 to register.

**March 27 CDR Open House**

## Drink milk ...

Virtually everyone can handle a glass of milk a day, even people with lactose intolerance. That's the conclusion of a recent Minnesota study which evaluated gastrointestinal symptoms in people who reported severe lactose intolerance. Subjects in the study drank one glass of milk each day for two one week periods. During one week the milk was treated with lactase to break down the lactose, the other week's milk was treated only with aspartame to mimic the taste of the treated milk. The researchers and the subjects were unaware of the sampling schedule. No significant differences were found, during both weeks the subjects reported minimal gastrointestinal symptoms, such as bloating, abdominal pain, or diarrhea.

Lactose intolerance is actually a common condition, occurring in 25% of adults in the United States, but in 75% percent of adults worldwide. In most people, the ability to digest lactose is genetically programmed to decrease after weaning. However, people of northern European descent are more likely to carry a gene that allows them to digest lactose in adulthood.

Even though two thirds of the subjects in this study tested positive (with a breath hydrogen test) for lactose intolerance, they were still able to drink a glass of milk a day with minor, if any, symptoms. The scientists suggest that symptoms should still guide diet and use of lactose digestive aids, however lactose intolerance may be blamed for symptoms that are either normal or have other causes.

The Dairy Council of Wisconsin reminds us that consuming an adequate amount of dairy foods in the diet is an important way to get calcium. They suggest several strategies that can improve tolerance to dairy foods:

- consume small amounts of milk with foods
- eat yogurt with active cultures
- eat aged cheeses
- try whole or chocolate milk
- try reduced lactose products
- try lactase enzyme tablets



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Questions for the Curd Clinic?

Send them to:  
*UW Dairy Pipeline*  
Center for Dairy Research  
1605 Linden Dr.  
Madison, WI 53706  
FAX: 608/262-1578  
E-mail: Paulus@ahabs.wisc.edu

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## Curd Clinic

Q. I have been approached by buyers who are interested in cheeses that are both more and less meltable than the product I currently supply. Can I meet these requests – without major manufacturing changes?

A. Yes, you can effectively reduce or increase meltable in a number of ways, without making major changes. A primary consideration is knowing the timing of the desired behavior and, in particular, how old the cheese will be then. This is important because we have found that many full fat Cheddar cheeses have a high meltable in the first 2 weeks of aging, a dramatic decrease over the next month of storage, and a steady increase after that. So if the cheese can be used in an ingredient application within 2 weeks it may exhibit significantly higher meltable than the same cheese one to two months later. Reduced fat cheeses steadily increase in meltable over time. For example, in the first month of aging you can generally expect a 25-30% increase in meltable and by another nine months they are equal to full fat cheese. Thus, storage is one approach to meeting specific meltable requirements but it does involve communicating with the customer and some record keeping on your part to assure they are using the cheese at the right age.

### Know the end use

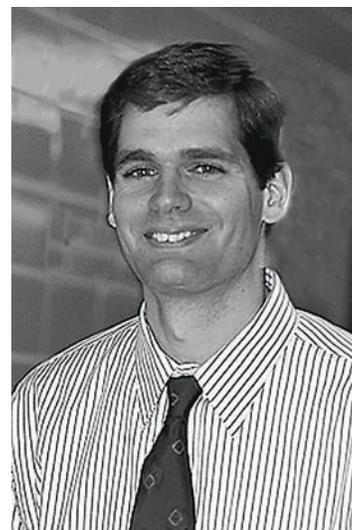
It is vital that you know the end use for the cheese. Cheeses do not always exhibit the same functional properties, heating by microwave differs from oven heating. Meltable of Cheddar cheese in an oven is controlled most readily by adjusting pH and MNFP (moisture in the nonfat portion). MNFP is calculated as  $\frac{\% \text{moisture}}{100 - \% \text{fat}} \times 100$  and is essentially the ratio of moisture to protein in unaged cheese. However, in microwave heating, pH and FDM (fat in the dry matter) are the most important factors and changes in MNFP have very little impact. FDM is calculated as  $\frac{\% \text{fat}}{(100 - \% \text{moisture})} \times 100$ .

### Influencing meltable

If pH and moisture are already at limits that you cannot change, there are other measures that you can use. In one of our studies, full fat Cheddar made from milk pasteurized at 185° F had less than 50% of the meltable of control cheese (164° F pasteurization) for the first 2 months of aging. The difference became less over time but at 9 months it still had 25% less meltable. This is interesting because the 185° cheeses had higher moisture levels, and are still less meltable. You should expect longer clotting times for the higher heat treatments, and some weak body and texture defects if these cheeses are aged out. You may also notice a slightly higher yield due to entrapment of some denatured whey protein, namely  $\beta$ -lactoglobulin. This protein is also responsible for binding the extra moisture and producing a high moisture, less meltable cheese.

In another study examining milk clotting enzymes of different heat stabilities, we produced cheese that was 30% more meltable by using *Cryphonectria parasitica* carboxyl proteinase (available commercially) instead of an equivalent amount of calf rennet. This is due primarily to the hydrolysis of  $\beta$ -casein, a process which is decreased in cheese made with calf rennet. It is important to note that cheese made with the *C. parasitica* enzyme exhibited some bitterness by three months of age, and the cheese was very bitter by nine months of age. If the cheese will be used relatively early or if bitterness is not a problem, this is another option.

Another possibility for increasing meltable is adding dilute citric acid to milk. Acidification of milk to pH 6.0 produced cheeses that were more meltable in the microwave, as well as in the oven. The effect on thermal meltable was probably due to higher moisture



Curd Clinic doctor is Dave Bogenrief, associate researcher, CDR

(MNFP) levels in the cheese as well as significantly lower calcium levels. Reducing calcium levels alone, which you can do with lower drain pH, does not seem to have enough impact to make significant differences in the meltable of Cheddar cheese. However, if this can be coupled with an attribute such as higher moisture it seems the differences are greater.

### No limit to variations

There is nearly an endless number of variations and combinations that you can use to influence the functional properties of cheese. We are working to understand these relationships and make the information useful to the cheese maker. If you have specific problems you would like to address, we have resources at the Center to help you out, just give us a call.

CDR (608) 262-5970

Dave Bogenrief (608) 262-2264



**Sept. 26-28 Great Cheeses from Great Britain.** Master Cheesemaker workshop. Madison, WI. Call Jim Path at (608) 262-2253 for more details.

**Sept. 28-29 Dairy, Food and Environmental Health Symposium.** cosponsored by Wisconsin Association of Milk and Food Sanitarians, WI Association of Dairy Plant Field Reps, and WI Environmental Health Assn., Appleton, WI. For more information, call Bill Wendorff at (608) 263-2015.

**Oct. 4-8 World Dairy Expo.** Dane County Coliseum, Madison, WI. Stop by and visit us at Booth #EH 4513.6

**Oct. 13-17 Wisconsin Cheese Technology Short Course.** Madison, WI. Call Bill Wendorff at (608) 263-2015.

**Oct. 31-Nov. 1 Master Cheesemaker Safety Short Course.** Madison, WI. For more information, call Dr. Rusty Bishop at (608) 265-3696.

**Nov. 2 Basic Milking Systems.** Madison, WI. Sponsored by Milking Research and Instruction Lab, Dept. of Ag. Eng., Dept. of Dairy Science and School of Vet. Medicine, UW-Madison. Call CALS Conference office for more information, (608) 263-1672.

**Nov. 3 Basic Cleaning Systems.** Madison, WI. Sponsored by Milking Research and Instruction Lab, Dept. of Ag. Eng., Dept. of Dairy Science and School of Vet. Medicine, UW-Madison. Call CALS Conference office for more information, (608) 263-1672.

**Nov. 6-7 Advanced Milking Systems.** Madison, WI. Sponsored by Milking Research and Instruction Lab, Dept. of Ag. Eng., Dept. of Dairy Science and School of Vet. Medicine, UW-Madison. Call CALS Conference office for more information, (608) 263-1672.

**Nov. 8-9 Advanced Cleaning Systems.** Madison, WI. Sponsored by Milking Research and Instruction Lab, Dept. of Ag. Eng., Dept. of Dairy Science and School of Vet. Medicine, UW-Madison. Call CALS Conference office for more information, (608) 263-1672.

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