Wisconsin Center for Dairy Research

Dairy Pipeline

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A Technical Resource for Dairy Manufacturers

2013 Wisconsin Master Cheesemakers

This year, the Wisconsin Master Cheesemaker®Program will be honoring its 17th class of cheesemakers. The Master program was established in 1994 through joint sponsorship with the Wisconsin Center for Dairy Research, University of Wisconsin-Extension and the Wisconsin Milk Marketing Board. The 2013 class will welcome three first-time Master Cheesemakers and four returning Masters. These Masters will be honored at the 2013 Wisconsin Cheese Industry Conference U.S. Champions Awards Banquet on April 18. A special thanks to WMMB for funding the Wisconsin Master Cheesemaker® Program.

Alan Greunke

Maple Grove Cheese, Milladore
Certified Master: Cheddar & Monterey Jack

Alan Greunke has never questioned his decision to become a cheesemaker. As the grandson of a 1912 UW-Madison dairy school graduate and the son of a cheesemaker, Greunke always knew he would keep with the family tradition.

In fact, Greunke was just 13 when he earned his cheesemaker's licence and began working in his father's plant.

"I enjoyed working in the cheese plant," said Greunke. "I was young, I wanted to make cheese and I was lucky enough to have the opportunity to do so."

Greunke eventually contracted to purchase the cheese plant from his father. More than 20 years later Greunke is still proud to be making cheese in his family's plant and can now add the honor of becoming a Wisconsin Master Cheesemaker® to his list of accomplishments.

"There are so many things to love about being a cheesemaker" said Greunke. "Every day brings something new and exciting."

Pam Hodgson

Sartori, Plymouth
Certified Master: Fontina & Hard Cheese

The granddaughter of an award winning cheesemaker, Pam Hodgson found her true calling the first day she made a vat of cheese.

"It was like magic," said Hodgson. "Once I started making cheese, I found I really enjoyed it."

That joy brought Hodgson to Sartori where she joined a team of elite cheesemakers working to develop new cheeses and master old ones. Hodgson fell in love with Fontina and made it her personal goal to manufacture the very best.

"I based each reformulation of the Fontina on feedback," said Hodgson. "I tried to make each batch better with my own little touch and I am now honored to earn a Master certification in Fontina."

Hodgson is so pleased to be a part of the Wisconsin tradition of cheesemaking. Her Grandfather attended courses at UW-Madison under Stephen Babcock and today, she is proud to receive her Master certification through the CDR and WMMB's Wisconsin Master Cheesemaker® Program.

"I feel honored to be a part of this tradition, while doing something that I love," said Hodgson. "Honestly, if I'm making a vat of cheese, my day just gets better."

Daniel Omundson

LaGrander's Hillside Dairy, Inc., Stanley
Certified Master: Colby & Monterey Jack

Daniel Omundson didn't always know that he wanted to be a cheesemaker. In fact, when he began making cheese more than 20 years ago, he never imagined that he would grow to love it as much as he does today.

"Several years ago, I moved to Wisconsin and began looking for a job," said Omundson. "The first place to call me back was a cheesemaking facility so I thought I would give it a try."

Omundson became a licensed cheesemaker shortly after joining the cheese plant. During his time at the plant he began to focus on the manufacture of Colby and similar style cheeses.

"I found that I really enjoyed the cheesemaking process," says Omundson. "I'm always striving to learn more and bring those things into our daily make procedures."

Three years ago, Omundson decided to enroll in the Wisconsin Master Cheesemaker® Program to further his education and increase his business opportunities. Omundson again focused on his favorite cheeses, Colby and Cheddar.

Today, Omundson is pleased to receive his Master certification and is honored to have had the opportunity to complete the program.

"When you enjoy what you do and the people you work with, it makes it easier to be a positive role model and pass the things I know onto coworkers."

Returning Master Cheesemakers

Gary Grossen

UW-Madison Babcock Hall Dairy Plant
2013 Certifications: Havarti & Gouda
Previous Certifications: Brick, Cheddar, Muenster

An award winning cheesemaker many times over, Gary Grossen knows the importance of dedication, hard work and an education.
"I demand very high standards in regards to the products I make," said Grossen. "Having a Master certificate lets customers know that the products I make are of the very highest quality."

Grossen entered the program for the first time in 2002 and has since received a Master Cheesemaker certificate in five cheeses. His cheesemaking experience really began, however, as a child growing up around his family's cheese factory.

"I found that there is so much to learn," said Grossen. "I loved learning about the different functions of the cultures; each culture does something different. It fascinates me that you can get the cheese you want by manipulating the cultures."

Grossen currently works in the Babcock Hall Dairy Plant on the University of Wisconsin-Madison campus where he has the opportunity to sell his cheese in the dairy store as well as a few local grocery stores. In addition to his local recognition, Grossen is also renowned internationally as an award winning cheesemaker, and is particularly well known for his gouda cheese.

"The Wisconsin Master Cheesemaker® Program has given me many opportunities," said Grossen. "People do see the brochures and buyer guides and realize that you took the time to further your education. You really feel good when people recognize that. It's a reason to pat yourself on the back and feel proud of what you do."

Steve Hurd

2013 Certifications: Romano & Asiago
Previous Certifications: Provolone & Fontina

After more than 35 years, Steve Hurd is still fascinated by the "art and chemistry" of cheesmaking.

"It has always been fascinating, especially how small changes can make a huge difference in the finished cheese," said Hurd.

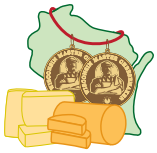
A Master in four cheeses, Hurd knows the challenges and rewards that come with the title Wisconsin Master Cheesemaker.

"Prior to getting involved with the Master's program, I considered myself an average cheesemaker," said Hurd. "I knew how to make cheese, but I really did not know how things actually worked. Through the short courses, I learned to trust my senses; I really found the connection between art and science."

Despite Hurd's great success today, he remembers feeling nervous about enrolling in the program. ➤➤

"I struggled with whether I should get involved in the Wisconsin Master Cheesemaker® Program. I saw many of my friends get their Master certificate and a few asked me why I had not joined the program," said Hurd. "My reservation was that I did not think I could measure up. I soon found, however, that being a Master is not about what you know going in, it's about the passion to learn more about the art and science of cheesemaking."

Brian Jackson



Foremost Farms USA, Marshfield
2013 Certifications: Brick, Colby
Previous Certifications: Monterey Jack & Cheddar

Wisconsin Master Cheesemaker Brian Jackson has always enjoyed a challenge, which is just one of the reasons why he was drawn to the Wisconsin Master Cheesemaker® Program. To date, he has been certified in four cheeses and in 2013, he plans to complete the program for a third time to receive his fifth certification.

"There were times during the program I wondered what I had gotten myself into this time," said Jackson. "This program isn't for everyone; it's not an easy ride, but the pride, recognition and rewards of being a certified Master Cheesemaker are well worth all the hard work and time required of you."

A cheesemaker for more than 35 years, Jackson is proud to work at Foremost Farms where he is the Marshfield plant superintendent.

"I'm proud of what we do here at the plant and that we are recognized throughout the world for the products we produce and the lives, families and jobs that depend on us," said Jackson. "I'm also honored to be a resource. The amount of people I've gotten to know because of the program is endless."

Randy Krahenbuhl

BelGioioso Cheese Inc., Green Bay
2013 Certifications: Fontina
Previous Certifications: Swiss & Gouda

A member of the first graduating class of Master Cheesemakers, Randy Kahenbuhl is no stranger to the challenges and rewards of the program. A Master in three cheeses, Kahenbuhl is proud to be a Wisconsin Cheesemaker after venturing out of state for a short time to work at another plant.

"I was encouraged by BelGioioso to get involved in the program again," said Krahenbuhl. "I was more than happy to sign up for another certification."

Krahenbuhl's passion for cheesemaking goes back to his childhood. His father, the owner of a small cheese plant in Monticello, first introduced him to the art of cheesemaking.

"I found that I loved the manipulation of the cultures and being able to make them do what I want them to do," said Krahenbuhl.

For many years, Krahenbuhl worked as a cheesemaker, business partner, and owner/operator of his family's business where he manufactured swiss style cheeses. Today, Krahenbuhl focuses on Italian style cheeses as a cheesemaker supervisor at Bel Gioioso Cheese.

"I have met a lot of people in the industry that have influenced and enriched my life and much of this is thanks to the Wisconsin Master Cheesemaker® Program," said Krahenbuhl. "I was there in the early planning of the program. We all felt we had to make the standards high. The program gave me a lot of confidence to try new things and blend procedures to come up with successful results."

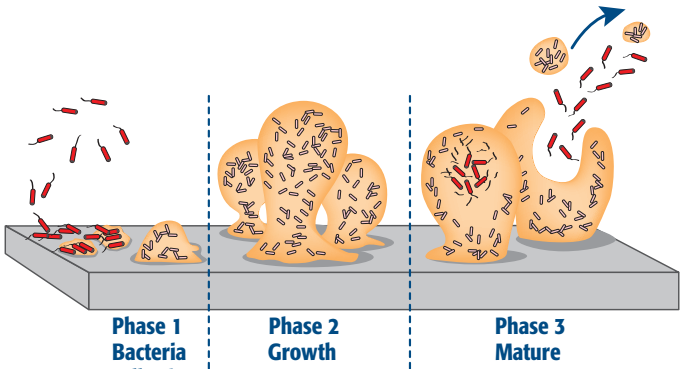
Wisconsin Master Cheesemaker Class of 2013

Photos © WMMB & Sartori

Understanding Biofilms:

Last November CDR held a roundtable discussion on biofilms. CDR's Senior Scientist Mark Johnson and guest speakers Pam Ruegg, Dairy Science Extension Specialist, University of Wisconsin-Madison and Tony Erickson, Ecolab spoke to CDR's industry team regarding the risks of biofilms and the research projects working to reduce them. It is important to note that biofilms are a threat to the food industry. Whether the organisms in the biofilm causes damage to your equipment, gas formation in your cheese, or accelerated acid development during cheesemaking, biofilms affect the quality of the product being produced and remain an issue of cleaning and sanitation practices.

Biofilms Defined:
In plain terms, a biofilm is a result of the adherence of microorganisms to a surface. More specifically, a biofilm occurs when bacteria and/or yeast begin to build up inside equipment. Microorganisms secrete a sticky material, known as exopolysaccharide, which is responsible for the gooey film that makes biofilms so hard to remove. As the biofilm enters phase 3, shown below, it becomes more likely that microorganisms from the original biofilm may slough off and contaminate your product or another area of the equipment. Biofilms can also cause reduced flow of liquids, corrosion of equipment, cleaning chemical resistance issues and more. Also note, a recent Harvard University study showed that biofilms may increase in size by five fold in 24 hours making prevention through cleaning and sanitation essential to keeping any problems at bay. Given the many adverse effects of biofilms, it is important to know the warning signs that your plant may have a biofilm problem. The stages of biofilm formation are outlined below.



Based on 2003, Center for Biofilm Engineering at MSU-Bozeman
Marshall ASM News 58: 202, 1992

How to identify and isolate biofilms:
Biofilms can contain lactobacillus, streptococcus or other damaging microorganisms which can include gas producing bacteria, a major concern for cheesemakers. In order to maintain a quality product and save your equipment from the issues outlined above, it is important to know the signs of biofilm formation.Several **"red flags"** are listed below:

- High numbers of bacteria in pasteurized milk may indicate:
  - High initial raw milk numbers
  - Biofilm formation in regen section of pasteurizer, piping and gaskets
- Note that if the standard plate count enumerated at 32°C, after pasteurization, is greater than 200 cfu/ml milk or if *Streptococcus sp* counts enumerated at 42°C are greater than 100 cfu/ml, you may have a biofilm problem.
- *Lactobacillus* counts after pasteurization should be less than 10 cfu/ml on Rogosa SL agar at 32°C. If they are higher, you may have a biofilm.
- Also, if you see a glistening surface or film on your equipment, test that area immediately for biofilm contamination.

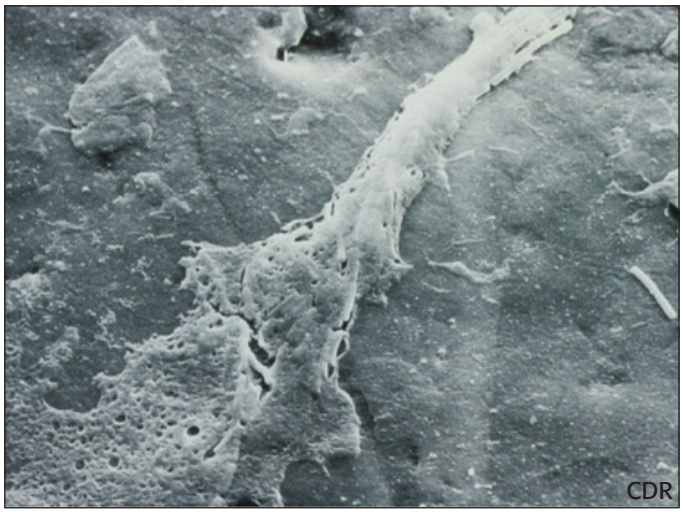
In order to test for a biofilm, you can use a simple swab or you can use one of the many sampling devices on the market.

You have a biofilm, so where did it come from?:
Biofilms are the natural state of microorganisms in the environment, so it can be difficult to pinpoint the source of your biofilm and eliminate it once you have a problem. While organisms can stem from biofilms on manufacturing equipment, biofilms that start on the farm can be found on bedding material or milking equipment.

Pam Ruegg's research focuses on biofilm formation on the farm and specifically the microbial quality of pre-harvest milk. Her research shows that cows may be exposed to many more pathogens on the farm than previously thought and this may be affecting the type of bacteria causing mastitis. This is important because mastitis caused by *Staphlococcus aureus* for example, may form biofilms. Further research shows, however, that these bacteria shed in low numbers and that pasteurization will kill them. Ruegg also investigated coliforms on the farm, which is a more serious issue. This can come from biofilm build up in the milking equipment, plate coolers or non-hygienic milking practices, but again it can be hard to trace. More research is needed to identify all of the possible factors and determine which are of consequence. In particular, Ruegg would like to look at the biofilms in dried manure for bedding in relation to the increased use of digesters on the farm.

How to reduce a biofilm:
The number one way to reduce a biofilm is to use proper cleaning and sanitation practices. This includes cleaning and sanitizing at 8-10 hour intervals, using heat, alkaline, enzyme cleaners or molecular brushes. Keep in mind that ➤➤

higher temperatures are best during sanitation, but also note that as your equipment heats and cools, spaces may loosen and pull biofilms into odd parts, bolts, and other areas so be sure to clean gaskets carefully. Companies such as EcoLab® continue to research and develop products that may do a better job of cleaning these hard to reach places.



Biofilm

Exopolysaccharide removed

Want to learn more?:
If you would like to learn more about the effects of biofilms on your equipment and products please join Dr. John Lucey, CDR, Dr. Mark Johnson, CDR, Tony Erickson, Ecolab, Heinrich Iversen, Tetra Pak and, Dr. Bernadette O'Brien, Teagasc Agriculture & Food Development Authority, Moorepark, Ireland at the Wisconsin Cheese Industry Conference, April 17 in La Crosse, Wisconsin for a detailed discussion on milk quality, biofilms and dairy products. To register, visit www.cheeseconference.org

Whey Clinic

Mike Molitor and Dean Sommer, CDR Processing Group

Question: We use ultrafiltration (UF) to process our sweet whey into Whey Protein Concentrate (WPC). How can I ascertain when we should be changing our UF elements?

Answer: A range of business and technical aspects can be taken into consideration when making the decision to change out expensive UF elements. Some companies schedule the replacement of their UF elements on a somewhat routine, although potentially arbitrary schedule. Strong economic performance or the desire for a tax write off could be another type of subjective benchmark to justify the replacement of expensive consumables like UF elements. Other situations could trigger the sudden need to change UF elements, such as a regulatory inspection that reveals dirty elements or questionable construction integrity. Also, accidental situations or overly aggressive cleaning procedures can lead to the premature replacement of the UF elements.

Ultrafiltration (spiral element) system

CDR occasionally hears comments from companies stating that they have received a very long, successful life from their UF elements. The rationale for these comments is understandable, since membrane replacement is an expensive and significant capital cost for a plant to undertake. On the other hand, striving to maximize membrane life to save replacement costs without looking at other economic factors may not be a prudent practice.

Ideally, when striving to maximize UF element life, the criteria to determine when to replace the UF elements should be based on the extent of protein loss into the permeate or poor permeate flux rate performance, whichever threshold fails first. Remember, these criteria are directly linked to the economics of the process.

Some plants may set a maximum threshold of turbidity in

Continued on page 10 ➤➤

CDR Building Update & Donor List of Companies Pledging over $10,000

CDR is proud to announce that we have reached the $16 million mark for the CDR/Babcock Hall building campaign thanks to generous support from the dairy industry. While this is a major milestone, one which will be celebrated at the Wisconsin Cheese Industry Conference on April 17, 2013, our work continues as industry has encouraged us to build the footprint as large as possible to facilitate the changing industry needs of the future. Additional funds will be used towards increasing the size of the CDR processing areas, providing the latest in processing equipment and building a state of the art education center.

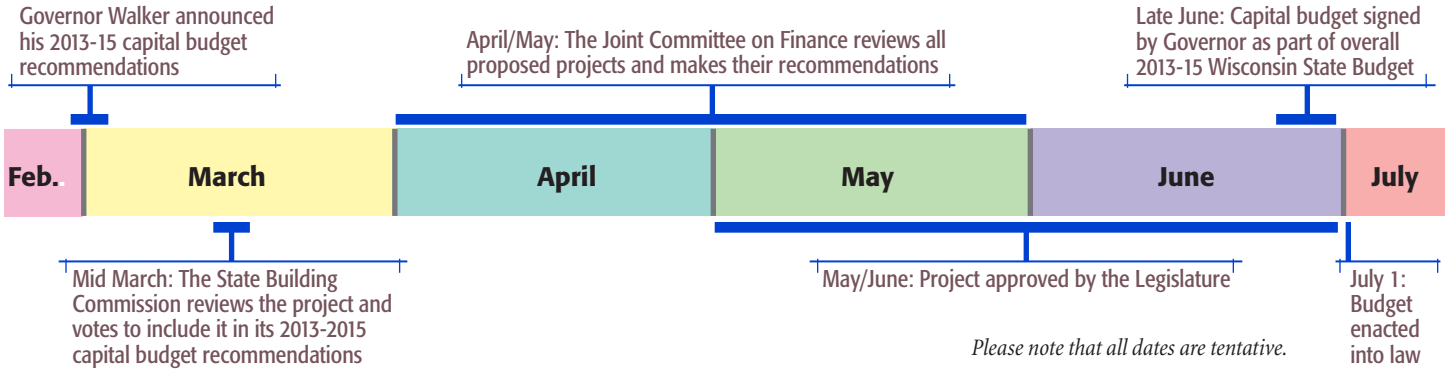
Supply companies are also encouraged to get involved as we want to have world-class equipment to help complete our state-of-the-art facility. There are many pieces of equipment still on the "wish list," which CDR can secure through generous donations or through a bidding process that will take place during the construction project itself. If your company is interested in donating equipment, please contact Dr. Lucey or Barb McCarthy at the number listed on the next page.

- Advanced Process Technologies, Inc. (APT)
- Agrimark
- Agropur
- Ampco Pumps
- AMPI
- Arla Foods
- Arthur Schuman
- Baker Cheese
- Bel Brands USA
- BelGioioso Cheese
- Dr. Bill and Hallie Wendorff
- Bob Bush
- Brewster Dairy
- Carr Valley Cheese
- Cedar Valley Cheese
- Cedar Grove Warehousing
- Cheese Market News
- Chr. Hansen
- Colony Brands Inc.
- Crystal Farms
- CS Facilities LLC/ Continental Dairy Products
- Culvers
- Curwood/ Bemis
- Dairy Connections Inc.
- Dairy Farmers of America
- Decatur Dairy
- Dominos
- DSM
- Dupont Cheese
- Eau Galle Cheese Factory Inc.
- Ecolab
- Elanco
- Ellsworth Cooperative Creamery
- Emmi Roth
- Excel Engineering
- Exopack
- Fair Oaks Farm
- Foremost Farms
- Fristam Pumps USA
- Galloway Company
- GEA
- George Hutson
- Georgia Pacific
- Glacier Transit & Storage
- Glanbia/Select Milk Producers
- Grande Cheese
- Green Bay Packaging Inc.
- Great Lakes Cheese
- Great Northern
- Guggisberg Cheese
- Hennings Cheese
- Hilmar Cheese Company
- Hydrite Chemical Company
- Ivarson Inc.
- Jerry Dryer
- Kelleys Supply Inc.
- Kerry Ingredients and Flavors
- Klondike Cheese
- Kraft Foods
- LaGrander's Cheese
- Land O' Lakes Inc.
- Lynn Dairy
- Maple Leaf Cheesemakers Inc.
- Masters Gallery Foods
- Marathon Cheese
- Meister Cheese Company
- Mike Matucheski
- Milk Specialties Global
- Mill Haven Foods
- Mullins Cheese
- Nasonville Dairy
- Nelson-Jameson
- Organic Valley
- Packaging Corp of America
- Pine River Pre-Pack Inc.
- Quaker Oats
- Saputo Cheese USA
- Sargento Foods
- Sartori Foods
- Sealed Air/Cryovac
- Schreiber Foods
- Soft-Trace
- Sorrento Lactalis
- Southwestern Wisconsin Cheesemakers Association
- Steve Braun
- Swiss Valley
- TC Jacoby
- Tosca
- Walter V. Price Family
- Wisconsin Cheese Makers Association
- Wisconsin Dairy State Cheese Company
- Wisconsin Milk Marketing Board

Thanks to generous support from industry, CDR is now concentrating on the next steps of the building process. The UW has initiated the process required to hire the architectural/engineering design team (for the project) and will soon submit the request document to the Division of Facilities Development for review. This consultant hiring process takes several months to complete. We are hoping that the successful team will be selected in summer 2013.

Once this firm is selected, CDR will be putting together a team of industry members to assist in the planning process and attend project meetings. Additionally, CDR will be updating our website regularly with information regarding the building progress and planning to help industry stay up-to-date on the process.

Steps to be completed before final approval of the CDR/Babcock Hall building project can take place.



If you have additional questions regarding the campaign or you would like to donate, please contact:
CDR Director John Lucey, jlucey@cdr.wisc.edu, 608-265-1195 |
Barb McCarthy, UW Foundation, barb.mccarthy@supportuw.org, 608-265-5891
www.cdr.wisc.edu/building/index.html

Wisconsin Cheese Industry Conference (WCIC)

CDR invites you to attend the Wisconsin Cheese Industry Conference (WCIC), April 17-18, 2013 at the La Crosse Center in La Crosse, Wisconsin.

The Wisconsin Center for Dairy Research will once again co-host the event with the Wisconsin Cheese Makers Association (WCMA). This year's sessions will include a blend of CDR scientists and industry experts discussing topics ranging from biofilms and food safety to whey and cultured products.

We encourage you to attend one of our sessions:
Milk Quality, Biofilms and Dairy Products
- Wednesday, April 17, 8:30-10:30

Which Whey to Go? Today's Challenges & Opportunities
- Thursday, April 18, 8:30-noon

Opportunities in Fresh Cheeses & Cultured Products
- Thursday, April 18, 8:30-noon

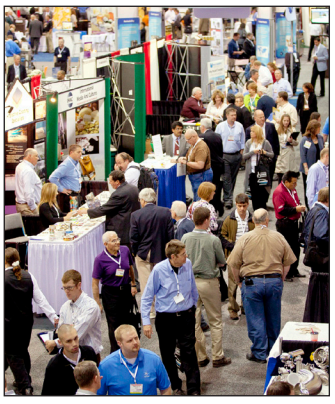
Honing your Cheese Contest & Cheese Grading Skills
- Thursday, April 18, 1:15-3:15 (a limited number of conference attendees can sign up for this workshop)

On Wednesday, April 17, there will also be a table-top mini expo in South Hall A&B. CDR invites you to visit us @ **booth 158**, and discover the latest in dairy research.

In addition to the sessions and expo, a celebratory luncheon will also be held on April 17 from noon to one to honor industry donors who have helped us achieve our building campaign fundraising goals.

We hope you will join us in La Crosse and take advantage of this unique opportunity to learn and network with the industry.

For more information or to register please visit www.cheeseconference.org



Mike Roemer Photography

Future Uses of Wooden Boards for Aging Cheeses

Bénédicte Coudé & Dr. Bill Wendorff

Wooden boards have been used for many years in most traditional cheesemaking countries as a shelving mechanism for aging cheese. In France, more than 300,000 tons of cheese are ripened on wooden boards each year (Meyer, 2005). Most artisan cheesemakers feel that wooden shelves favor cheese rind development and improve the organoleptic qualities of aged cheeses thanks to the formation of a biofilm on the wood surface. Is this biofilm safe? Might it favor the development of spoilage and potential pathogenic bacteria? The purpose of this review is to look at the benefits of wooden boards as well as the potential concerns and how to avoid them.

Experiences with Wooden Shelving for Aging Cheeses

In a French study on the biofilm ecology of shelves used in ripening raw milk smear cheese (Mariani et al., 2007), French researchers did a microbial characterization and found that most of the microflora was composed of micrococci-corynebacteria (7.2 to 7.3 log10 cfu/cm2) and yeasts/molds (6.0 to 6.1 log10 cfu/cm2). Based on these findings, they concluded traditional methods of cleaning wooden cheese ripening boards by soaking them in cold water and brushing them minimized the risk of contamination by pathogenic microorganisms, thus allowing useful microflora to be preserved. When large-scale pathogen contamination occurred, however, pathogenic microorganisms could not be satisfactorily eliminated; even with the use of disinfectants. In case of heavy contamination the wooden boards had to be destroyed.

In another French study (Lemoine, 2002), newly sawn wooden boards were surveyed for potential pathogens. The study found no evidence of pathogens on the board surface or within the wood. Processes for cleaning wooden boards used for aging cheeses were also evaluated. It was determined that the most effective cleaning process, in terms of pathogen removal, was to involve a washing at 179.6°F for 30 minutes.

The effect of cleaning and heat disinfection processes on the survival of *Listeria monocytogenes* on wooden shelves used for cheese ripening was also examined (Zangerl et al., 2010). *Listeria monocytogenes* is a gram-positive rod-shaped bacterium that can be found in fresh cheeses and unpasteurized milk. The cut boards were inoculated with a suspension containing $5.5X10^{7}$ colony forming units (CFU)/ml of *L. monocytogenes*. Survival of *L. monocytogenes* was investigated in the wood shavings. During the 24-hour incubation period in a humidity chamber, Listeria counts increased by 0.8 log units on average (n = 9), compared to results one hour after incubation, indicating the absence of antimicrobial properties of the wood in use. Additionally, after incubation for 24 hours at room temperature, the boards were cleaned by soaking them for 15 minutes in a solution of hot alkaline detergent followed by brushing and rinsing with warm water. Some of the cleaned boards were subsequently heat treated at 176°F for 5 minutes and at 149°F for 15 minutes, respectively. The cleaning procedure alone was not sufficient to render *L. monocytogenes* from the upper 2 mm wood layer inactive. In the case of both temperature-time combinations for heat disinfection, however, *L. monocytogenes* was not detectable. The present study shows that the use of wooden shelves does not affect the hygienic safety of cheeses if such shelves are in good repair and are thoroughly cleaned and sanitized by heat treatment.

Results from a two-year French research study called ACTIA (Association de Coordination Technique pour ➤➤

l'Industrie Agro-alimentaire) (2004-2006) involving professionals, technical centers and research agencies including INRA (Institute National de la Recherche Agronomique) may have a significant impact on acceptance of wooden boards for aging cheeses. This study involved two types of soft smear cheeses: Reblochon and Muenster. The risk of contamination by pathogenic bacteria was studied by analyzing the growth of *Listeria monocytogenes*. The researchers have shown the presence of a living biofilm on wooden shelves that presents anti-Listeria properties. This inhibiting effect appeared to be active against two strains of *L. monocytogenes* that were chosen for their different surface properties and their presence in certain cheesemaking environment. The anti-Listeria effect was not affected by the level of Listeria inoculation nor the origin of the cheeses ripened on the shelves.

Scientists from the INRA/AgroParis Tech center developed an experimental system reproducing the anti-Listeria effect to understand the inhibiting properties. The idea was to analyze the metabolites produced by the biofilm and the two Listeria strains inoculated. The study showed that competition occurred when the microbial biofilm entered a stationary phase and stopped the growth of Listeria. At this stage, it did not appear that the metabolites produced contain any inhibiting molecules. Further collaborative research should provide a better understanding of the inhibiting effect of biofilms against pathogenic microorganisms.

Wooden boards seem to be more sanitary than plastic boards when using extraction procedures for assessing number of bacteria retained on the surface of boards. The bacterial contaminants were bound tightly enough in the wooden boards to keep them from being extracted and they actually formed biofilms. Several researchers (Cools et al., 2005; Mariani et al., 2007) have investigated the potential for pathogens to be retained in the biofilm. Cools et al. (2005) stated that there is a higher risk for cross-contamination from *Campylobacter jejuni* surviving and persisting at the surface of a polypropylene cutting board than from C. jejuni being present in the deep interior of the wood, as the latter has less direct contact with food. The pathogen is more easily removed from the upper non-porous surface of the plastic board than from the interior of the deep crevices and pores in the wood.

The wood used to make the shelves is usually carefully selected. The caves of Joseph Paccard in Haute-Savoie, France that make Reblochon use spruce wood that is cut in December when the sap goes back down from the top of the tree into the ground. This is really important

for the quality of the wood. In order to be able to age cheese on wood, the shelves have to be cut close to the heart of the tree without including the heart otherwise the wood tends to split and the shelves cannot be used. Finally, the shelves have to be dried naturally for at least 18 months. In summary, wooden boards, especially spruce, fir, pine and larch, seem to be more effective than plastic boards in trapping bacteria in pores and controlling them with possible antimicrobial properties.

Future for Wooden Shelving for Aging Cheeses

Wooden boards have been traditionally used for cheese ripening shelves because of their moisture retaining properties and porosity that aids in the retention of potential bacterial contaminants. The future use of wooden boards for aging cheeses will depend on the cleaning and sanitation of those boards. A.K. et al. (1994b) reports that cleaning with hot water and detergent generally removes most of the residual bacteria, regardless of bacterial species, wood species, and age of the wood. Zangerl et al.(2010) reported that the cleaning procedure alone was not sufficient to eliminate *Listeria monocytogenes* from the upper 2 mm wood layer of wooden shelves used for cheese ripening. They recommended heating the cleaned boards to 176°F for 5 minutes or 149°F for 15 minutes to eliminate the potential for pathogens. Yang et al. (2009) reported that quaternary ammonium compound (QAC) – based sanitizers and sodium hypochlorite sanitizers were effective against *L. monocytogenes* on cutting boards.

In general, with the use of softwood boards, e.g., pine or spruce, along with a hot wash using hot water and detergent, most boards should be fairly clean. The freshly cleaned boards should then be sanitized by heating the boards to 176°F for 5 minutes or sanitized with either a chlorine-based or QAC-based sanitizer to ensure freedom from any potential pathogens.

Finally, considering the beneficial effects of wood boards on cheese ripening and rind formation, the use of wood boards does not seem to present any danger of contamination by pathogenic bacteria as long as a thorough cleaning procedure is followed.

CDR Sensory Update

The CDR sensory team recently completed several updates which will allow for greater efficiency and more work space as the demand for sensory evaluations continues to grow. These updates include a renovated lab space as well as new technology which will help coordinators to design questionnaires, conduct evaluations and gather statistical data more effectively.

A New Sensory Lab:
The new sensory lab, which is a remodeled room in the north wing of Babcock Hall, will host a majority of the descriptive and expert screening panels held by the sensory team. Note that all consumer affection panels will continue to be held in the sensory area of the Babcock Dairy Store.

The new sensory lab includes an Impinger, stonelined and home oven along with all of the equipment needed to perform pizza and other cheese functionality tests. Industry and panelists will benefit from the convenience and efficiency created by a single space lab.

"Our new lab has essentially everything in one place," said Sensory Coordinator Luis Jimenez-Maroto. "We have a lot more room and we are now able to complete our functionality testing all within one space."

FIZZ Update:
The new FIZZ analysis software program announced in the Dairy Pipeline Volume 24, Number 3, is now being used on a regular basis to evaluate descriptive and consumer affection panels. Staff have installed the software on eight tablets which panelists use as a means to enter their data. The FIZZ software can then generate basic data analysis feedback in as little as 30 minutes.

"The tablets have proven to be much faster and more reliable than our previous method of pen and paper," said Jimenez-Maroto.

Given its recent success, the sensory team is now learning to code for FIZZ which will allow them to create customizable tests in the future. Right now, FIZZ is capable of performing discrimination, quality control screenings and consumer preference tests, but the hope is that the program may be able to help with expert screening panels and more in the future.

If you are interested in a sensory evaluation of your product, please contact Sensory Coordinator, Luis Jimenez-Maroto at 608-262-3990 | ljmaroto@cdr.wisc.edu.

Whey Clinic continued from page 5
the UF permeate to conclude that the membranes are failing to efficiently retain true protein and as a consequence replace the elements. The turbidity is due to butterfat leaking into the UF permeate and unfortunately the level of turbidity does not necessarily have a strong correlation with the concentration of the whey proteins escaping into the UF permeate.

In an UF operation running sweet whey, the membranes express purpose is to retain the true protein, the most valuable component in the whey. As the UF elements get older, the pore size of the membranes tends to slowly open up which allows increasingly greater quantities of the valuable true protein to pass into the permeate stream. The technical phrase would be 'the true protein retention coefficient' decreases as the UF membrane ages. This can represent a hidden cost of trying to squeeze too much life out of your UF elements. While the membranes may appear to be working properly, valuable protein can be slipping away into your permeate stream, costing your operation significant lost dollars.

A practical approach to address this is to set up a routine monitoring program to measure the protein content of your UF permeate streams on a regular basis. Infrared (IR), not near IR, testing equipment that is routinely used for fluid dairy product testing can provide the simple, fast and inexpensive means to generate results with excellent test sensitivity to true protein. In fact, IR is essentially an indirect test method for true protein because the IR "protein" wavelength only detects true protein, not non-protein nitrogen (NPN) compounds found in milk, whey and the UF permeate.

A simple charting exercise of protein in permeate over time can also help you visually follow the efficiency of your membranes and thus alert you to any developing trends. Furthermore, it is easy to conduct an economic evaluation by taking into account the volume of UF permeate generated, the amount of true protein lost into the permeate and the current market value of that protein in comparison to the UF element replacement cost. Taking protein leakage into account along with other standard measures of membrane performance and life expectancy will help a WPC operation run more effectively and profitably.

Short Course Million Challenge

A big thank you to everyone who donated to the Short Course Million Challenge last year! We are honored by your donations which will work to improve the educational facilities at Babcock Hall/CDR. As many of you might recall, in 2012 we entered all donors in a drawing for a chance to win a free short course. That winner has been selected. Now, in 2013 we are offering another chance to win. Any donation received before June 15, 2013 will qualify the donor to be entered for a chance to win a free short course. Please note that all donations to the Short Course Million Challenge will count towards the overall CDR building fund. Donations can be sent to:

Barb McCarthy, University of Wisconsin Foundation
1848 University Avenue, Madison, WI 53726-4090

or

CDR Short Course Million Challenge
1605 Linden Drive, Madison, WI 53706

Please specify **Short Course Challenge** in your check's memo section. You can also donate online with a credit card by going to www.cdr.wisc.edu/building

News from CDR

Congratulations to CDR Safety and Quality Coordinator, Marianne Smukowski on her recent ISO/FSSC 22000 certification.

CDR Welcomes Research Specialist Mike Donath

Mike comes to CDR with more than five years of experience in biochemistry and molecular biology related research. Most recently Mike worked with UW-Madison Professor Jim Steele studying biofuels through *Lactobacillus casei*, an ethanol producing bacteria. He previously worked for the Great Lake Bioenergy Research Center, where his research also focused on ethanol producing bacteria. Mike has a B.S. in Biochemistry and Molecular Biology from UW Eau Claire and will join the CDR analytical team as a research specialist, testing and studying the chemical and physical aspects of cheese and milk products.

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Dairy Product Evaluation Team

The UW-Madison Dairy Products Evaluation Team recently competed with 16 other teams from the U.S. and Canada in the annual intercollegiate competition. Eight samples of six dairy foods including butter, cheddar cheese, vanilla ice cream and more were evaluated by each contestant in a timed regimen. UW competitors did well in collecting awards for individuals and team awards.

All Product Award:	Individual Awards:
Second Place Team (Tie)	Third Place (Tie) Butter
Team Awards:	Second Place Milk
First Place Cottage Cheese	Second Place Cottage Cheese
Third Place Butter	

Coach Dr. Bob Bradley, Assistant Coach Clair Kushner, Katie Trokey, Anna Schartner, Sarah Hermes, Dave Carpenter, CEO, Chr. Hansen

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www.cdr.wisc.edu

Short Course Calendar:

Cheese Tech Short Course, March 18-22
World of Cheese, April 28-May 2
Cleaning and Sanitation, May 7
HACCP, May 8
Applied Dairy Chemistry, May 14-15
Cheese Grading, June 4-6
For detailed information on each CDR short course
www.cdr.wisc.edu/shortcourses

Events:

WCIC, April 17-18, 2013, LaCrosse WI
WDATCP HTST Pasteurizer Operation and Procedures Training Workshop, April 23, www.wifoodprotection.org
National Conference On Interstate Milk Shipments, April 19-24, Indianapolis, Indiana
The Wisconsin Association for Food Protection (WAFP) Spring Food Safety Workshop, June 12
Holiday Inn Hotel & Suites Madison West