CENTER FOR DAIRY RESEARCH

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QUARK: SPREADING THE GOSPEL OF THIS VERSATILE AND UNDERAPPRECIATED CHEESE

If you visit Germany or other parts of Europe, it's likely that you will encounter a soft cheese called Quark. In fact, "Quark" is the German word for curd. Across Europe Quark, or similar varieties of cheeses, are very popular. For example, in Austria, there is a similar cheese called Topfen and in eastern Europe there is a cheese called Tvorog.

However, in the United States, Quark is virtually unknown.

Quark is a unique cheese – it has a soft body with a slightly grainy texture with a bright, acidic bite and milky flavors. Dean Sommer, Food and Cheese Technologist at the Center for Dairy Research (CDR), compares it to Chevre, "Quark is, in essence, Chevre made with cow's milk instead of goat milk. And, because the cow milk proteins are different, the texture of Quark isn't as smooth as Chevre."

"To me, Quark is kind of in the middle between cheese and yogurt; it has some properties of both," Sommer said. "It's kind of in this middle zone. It has some qualities of yogurt it's soft it's spreadable. It's like a really firm yogurt."

Quark is tremendously popular in Europe. In Germany, the per capita consumption of Quark is around 15 pounds per person per year and in the U.S. most people have never tried it.

An Acid-Set Cheese

Instead of using rennet to coagulate the milk, the Quark cheesemaker relies on the cheese cultures to create enough acid to coagulate the milk. Other acid-set cheeses include Mascarpone and Paneer. Perhaps the most popular acid-set dairy product in the U.S. is Greek yogurt. Like these products, Quark is very acidic. Typically, Quark is around pH 4.5-4.6, compared to most rennet-set cheeses like Cheddar, which are around pH 5.1-5.2. Quark's lower pH gives the cheese its distinct tart flavor.

During the manufacturing process, Quark is strained, similar to Greek yogurt, to remove excess whey. This can be done by putting the curd in bags and then allowing the whey to strain out. Or the cheesemaker can use a Quark separator, which removes the excess whey via centrifugal force. Once the whey is drained, Quark is packaged and ready for consumption.

Although Quark separators are not common equipment in the U.S., CDR acquired a quark separator during its recent renovation and expansion. Cheesemakers and dairy processors interested in Quark cheese can work with CDR equipment and staff to develop their product.

A Versatile Cheese

One of the big draws of Quark is its versatility. "People will use it like yogurt with granola and fruit or have

What's Inside:

it for breakfast," said Bob Wills, a Wisconsin Master Cheesemaker and owner of Clock Shadow Creamery, which is one of the few manufacturers in the U.S. making Quark. "You can spread it on bread for lunch. It's great on bagels or rye bread."

Quark can be used in sweet or savory applications. Restaurants have used it in Crab Rangoon and pizza. In Germany, it is the basis for cheesecake called Kaesekuchen. Similarly, it can fill blintzes or kringles.

In a recent article posted on the Food Network's website, Kurt Gutenbrunner, chef-owner of Wallsé, a fine dining Austrian restaurant in New York City, said Quark is everywhere.

"In Austrian cuisine we use quark in lots of different ways, starting from breakfast to dinner, such as simple Quark spreads with fresh herbs," Gutenbrunner said. "And Austrian cheesecake is usually made out of Quark which is very different from the American baked cheesecake. We also use it for baked Quark strudel."


Stacy Kunesh, CDR

Stacy Kunesh, CDR Culinary Technician, has utilized Quark in several novel applications and found it very easy to work with. "It's great in salads," Kunesh said. "I've used it as a Ricotta substitute because it doesn't break down like Ricotta. Quark is crumbly and perfect in a lot of dishes. It's great on pizza. It's just really versatile."

Kunesh has also used Quark in her family pierogi recipe. Pierogis are stuffed dumplings that are boiled. Kunesh's family recipe calls for dry curd Cottage Cheese to be used for the filling. However, it can be hard to find dry curd Cottage Cheese, so she tried Quark. "It worked really well; it's a perfect substitution," she said. (See Kunesh Family Pierogi Recipe).

The possibilities with Quark are almost endless. "I've put it in soups," Wills said. "For a while my kids were going crazy because I was putting it in everything I cooked including mashed potatoes and pumpkin pie. I've gotten over that somewhat, but I still like to experiment with it. We have sold quark with added flavors including maple syrup, garlic, and brandy old fashioned."

In Europe, people will also mix in herbs like parsley or dill and use it to top various dishes like soups or warm potatoes or other vegetables. Or often it will be combined with fruit jams and used as a spread on hearty breads.

Another possible draw of Quark is that it is often made with reduced-fat or even skim milk. So, Quark can be a low-fat, high-protein dairy food. It could be viewed as a high-protein, low-fat substitute for sour cream.


CDR's Quark separator.

Wisconsin-Made Quark

Clock Shadow Creamery is an urban cheese factory based in Milwaukee, Wisconsin, which has a strong German heritage and culture. Wills said when he started Clock Shadow Creamery in 2012, a German woman came into the store and encouraged them to make Quark. "She was making it at home for herself and a small group of people who were buying it from her," Wills said.

Wills began making Quark and found that it sold well in Milwaukee. "Because of the Northern and Eastern European heritage in Milwaukee, a lot of people were familiar with the cheese," Wills said. "So, we had a built-in market. And, as other people try it for the first time, they really like it and become converts."

Clock Shadow Creamery's Quark cheese has won numerous awards at contests over the years. In Europe, you will find many different variations of Quark and Quark-like cheese. Wills said that the Quark that Clock Shadow Creamery produces is a little drier and grainer, "To me, that's the more traditional variety and one that is easier to bake with. We are able to make smoother Quark for customers requesting that." Additionally, Wills said their Quark has less added salt than some other suppliers, which Wills said he believes is a little closer to the version of the cheese found in Europe.

Wills and his cheesemakers also opt for the more hands-on approach to manufacturing Quark. They produce the cheese in small batches and place the curd in bags and then allow the bags to rest while the whey drains out.

Potential in the U.S.

Staff at CDR believe that this cheese could find a significant market in the U.S. However, Sommer says the first step is acquainting Americans with the cheese. "Ultimately education is needed because the U.S. consumer doesn't even know what Quark is," Sommer said.

As Wills has found, once people become familiar with Quark, they often like it and discover how versatile it is. Kunesh said that she has found that she must call her local retailer to ask if they have Quark on the shelves because it sells out so quickly after it is delivered to the store.

As mentioned earlier in the article, CDR has a Quark separator and has the staff and expertise to help dairy processors develop a Quark cheese. If interested, contact Ben Ullerup Mathers, CDR Lead for Specialty Cheese, at bmathers@cdr.wisc.edu

Kunesh (Czapkowitz) Family Pierogi Recipe

Potato Filling for Pierogi

Ingredients:

5 T. butter
1 large onion
1# potatoes, peeled and cut into 1 inch pieces
6 oz. Quark

Sauté onion in butter until golden brown
Boil potatoes in salted water until tender. Drain and mash, cooling slightly. Add quark and onions with sautéing butter. Season to taste with salt and pepper.

Making Quark

1 Cheesemaker Felix Thalhammer scoops curd out of the vat.
2 The curd is gently poured into cheese cloth bags.
3 The cheese cloth bags rest on a drain table, which allows for the whey to drain out.
4 Next, the cheese cloth bags are hung up to remove more whey.
5 The Quark is removed from the cheese cloth bag and is ready for packaging.

Technical Contributor: Daniel Wilbanks, CDR

This is part of a CDR Monograph Series focused on yogurt production. Watch for further installments of this series in the Dairy Pipeline.

Filtration has been used to concentrate cultured milks for thousands of years. Concentrated yogurts – such as Greek yogurt, labneh, and skyr – were historically produced by straining yogurt through a cloth. Whey passes through the cloth while the white mass is retained, increasing the protein and fat content in the yogurt.

Traditional modern yogurt concentration begins with a white mass cultured in a large tank, which is stirred and concentrated using cloth or a filtration system such as ultrafiltration (UF) or plate-and-frame. Straining through cloth is similar in principle to other filtration processes in that portions of the white mass are concentrated based on the physical size of the components (Figure 1), similar to straining pasta.

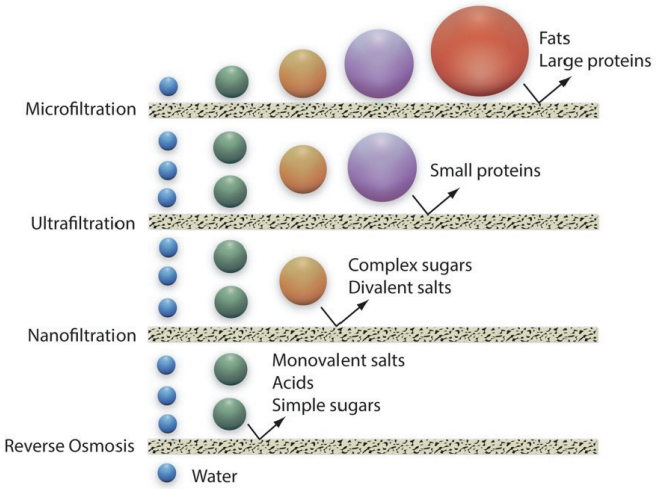

Figure 1. Membrane filtration separates components based on size differences.

Cloth straining is an ancient but inefficient technique referred to as dead-end filtration because the product flows in the same direction as the permeate. This causes large particles to block pores, reducing the rate at which whey is removed – referred to as flux. In contrast, plate-and-frame and UF push feed across the filter (cross-flow) which dramatically improves flux. Cross-flow filtration

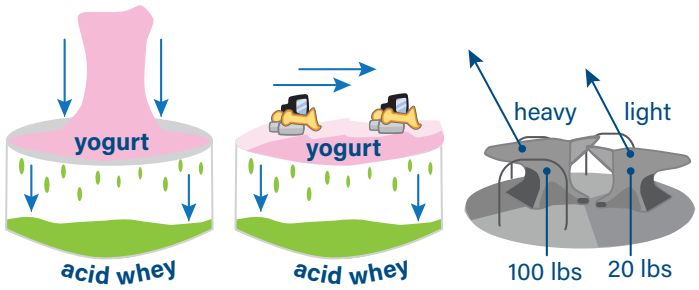

Figure 2. Illustration of dead-end **(A)** and cross-flow **(B)** filtration mechanical separation **(C)** concentrates based on differences in density exploited at high centrifugal force, like a merry-go-round.

may be used before or after culturing. Mechanical separators may also be used to concentrate yogurt, but only after culturing. Separators are fundamentally different from filtration in that they separate streams based on differences in density (Figure 2), producing a heavy (protein) and light (fat and water soluble components) phase.

Because the milk is heated at high temperatures before culturing yogurt, whey proteins are denatured and coagulate during fermentation. Hence, they are not found in the whey of yogurt. The absence of whey proteins in yogurt whey (acid whey) is a major point of distinction between it and cheese whey (sweet whey). True to its name, acid whey is more acidic and so has a high mineral content.

The concentration of calcium in milk exceeds its solubility limit. Calcium in excess of its solubility would typically precipitate, like a kidney stone. To avoid mineral deposits in milk, nature has cleverly "stored" most of the calcium in milk within the casein proteins. While stored, this insoluble calcium is inert which allows for the remarkably high calcium content in milk. If milk is concentrated before culturing it retains most of the calcium stored within the casein. However, insoluble calcium is dissolved in the presence of sufficient acid (pH ~5.3). So, yogurt concentrated after culturing will have a lower mineral content because the calcium is dissolved and removed with the whey (Figure 3).

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WISCONSIN MASTER CHEESEMAKER® PROGRAM – MOVING THE WISCONSIN CHEESE INDUSTRY FORWARD

The Wisconsin Master Cheesemaker® program is the premier advanced education program for experienced Wisconsin cheesemakers. In addition to driving Wisconsin cheesemakers to be the best they can be and upholding the highest standards, the program promotes and markets these cheesemakers and the high-quality cheeses they manufacture.

The program is made possible through a partnership with the Center for Dairy Research (CDR) and the Dairy Farmers of Wisconsin (DFW). It is the only of its kind in the United States and continues to move the industry forward while preserving traditions passed down from generation to generation.

The first class of Wisconsin Master Cheesemakers graduated in 1997 and included Wisconsin cheesemakers Terry Lensmire, Randy Kranbuhl, and Tom Jenny. Today, the program continues to grow and evolve with more than 65 Master cheesemakers currently making more than 45 different cheese varieties.

The Wisconsin Master Cheesemaker® program is governed by the Wisconsin Master Cheesemaker board. The board consists of 9 voting positions including the chair (program coordinator), 4 representatives appointed from the Wisconsin Cheese Makers Association, 2 representatives appointed from the Wisconsin Dairy Products Association, 1 DFW representative, and 2 elected Master Cheesemakers. CDR and DFW also have 6 nonvoting Ex Officio members or Administrative Leads. Among other responsibilities, the board is tasked with maintaining the integrity of the program, setting and approving program requirements, and approving candidates that have applied to enter or have completed the program.


John Jaeggi, CDR

John Jaeggi is the Coordinator of the Wisconsin Master Cheesemaker® Program. Jaeggi, who is also Coordinator of the Cheese Industry & Applications Group, is a third generation licensed Wisconsin Cheesemaker with over 45 years of experience in the industry. As program coordinator, Jaeggi works closely with stakeholders to uphold the Master Program's rigorous standards.

"It is an honor to be part of the Master Cheesemaker Program since its inception," Jaeggi said. "One of the biggest rewards is watching the growth of the Masters during their time in the program. Their personal growth elevates the standards of the Wisconsin cheese industry."

In addition to Jaeggi, Lindsey O'Brien serves as assistant coordinator for the Wisconsin Master Cheesemaker® program. As assistant coordinator, O'Brien is responsible for assisting with various aspects of the day-to-day operation of the program. She is also the dairy foods trainer at CDR where she is involved in all of the Center's training including short courses and private trainings. O'Brien has a decade of experience in the dairy industry, working in the manufacture of American-style and Chevre cheeses. She also researched food borne pathogens in foods for 11 years at the University of Wisconsin-Madison's Food Research Institute.

The program has benefited from strong leadership from staff like Marianne Smukowski who served as program coordinator from 2004 to 2019. Joanne Gauthier served as assistant coordinator for almost 30 years, from the time the program started in 1994 to 2019. Jim Path, retired CDR specialty cheese coordinator, founded the program and served as the first program coordinator. Path created the program to further cheesemakers' education and training and also help support and promote the manufacture of specialty cheeses in Wisconsin. Staff from the Wisconsin Milk Marketing Board (now DFW),

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Dairy Food Fraud Primer

Technical Contributor: Alex O'Brien, CDR

The United States dairy industry is one of the safest food supplies in the world. The percentage of outbreaks in the United States due to issues of dairy foods has decreased from >25% in 1938 of all recalls to <1% in 2015 (Lucey 2015).

However, food fraud is an issue that the industry needs to keep in mind as work continues to ensure the safety and quality of dairy products. Dr. John W. Spink, assistant professor in the Department of Supply Chain Management in the Business College at Michigan State University, defines food fraud as the intentional deception of consumers for economic gain using food products. It is not intended to cause public harm.

Classification	Outcome	Intent
Food Quality	economic gain	unintentional
Food Fraud	economic gain	intentional
Food Safety	harm	unintentional
Food Defense	terrorism, widespread harm	intentional

The table above compares food quality, food fraud, food safety and food defense. One of the main points is that the motivation behind food fraud is that it is intentional and for economic gain.

According to Spink, here are some of the common food fraud risks.

Adulteration: a component of the finished product is fraudulent or should not be present (i.e. melamine added to milk).

Tampering: a legitimate product and packaging is used in a fraudulent way (change expiry information, swapping out a high cost ingredient with a low cost one and not accurately reflecting this change on the label).

Over-run: legitimate product is made in excess of production agreements (under-reporting of production).

Theft: legitimate product is stolen and passed off as legitimately procured (stolen products are co-mingled with legitimate products).

Diversion (or parallel trade): the sale or distribution of legitimate products outside of intended markets (e.g. relief food aid redirected to markets where aid is not required)

Smuggling: genuine product covertly transported to avoid taxes, fees, or other restrictions.

Simulation: illegitimate product is designed to look like but not exactly copy the legitimate product ("knock-offs of popular foods not produced with the same safety assurances).

Counterfeiting: intellectual property infringement, which could include all aspects of the fraudulent product and packaging being fully replicated (e.g. copies of popular foods not produced with same food safety assurances).

In the dairy industry, specifically, food fraud can take many forms. Dr. Rodrigo Ibáñez, CDR Associate Scientist, lists some of the food fraud risks that have surfaced in the dairy industry:

Replacement of an ingredient or constituent (e.g. milk fat replaced with vegetable oil)

Addition of non-authentic substance to mask inferior quality

Removing or intentional omission of an authentic and valuable constituent without the knowledge of consumers

Milk fraud

- Addition of water to increase volume
- Addition of starch, flour and other non-dairy ingredients
- Addition of a lower cost milk (cow) into a high cost milk (e.g. goat, sheep, camel)
- Additions of an unapproved chemical to increase shelf-life (e.g. antioxidants)

Other ingredients and inclusions can also be the source of food fraud. Olive oil currently is a very high-risk item, with reports of sophisticated theft of oil, and selling stolen olive oil as well as mixing of different cheaper oils passed off as olive oil. The country of origin may matter as well and for some products it could increase the risk of food fraud and should be part of your assessment.

If your dairy product contains one of the ingredient types on the next page this may increase the risk of food fraud: herbs and spices, olive oil, foods labeled organic, honey and maple syrup, seafood, coffee and tea, wine and spirits and some fruit juices.

Top Food Fraud product categories
Honey & royal jelly
Live animals
Meat and Meat products
Fish and products thereof
Fats & oils
Poultry meat & poultry meat products
Dietetic foods, food supplements & fortified foods
Crustaceans & products thereof
Plant protection products
Cephalopods & products thereof
Fruit & vegetables
Non-alcoholic beverages
Feed materials
Confectionery coca & cocoa preparations, coffee & tea

While food fraud cases in the dairy industry are rare, if it occurs, the impact to brand reputation can be very damaging. It can result in economic loss, long-term damage to brand, and potential consumer health issues.

One recent dairy food fraud incident took place in Italy in 2021 when a milk hauler was found to be adding water to milk. The hauler was mixing water into the milk by means of a double bottom or hidden water tank on the truck. When the truck arrived at the plant, the milk was tested and found to be acceptable. Then, when it was time to pump the milk over in the plant's tanks, the hauler used an electronic button that controlled a pump that mixed water from the hidden tank with the milk (Casula, F. 2022).

Another recent example of food fraud occurred in Ireland and Great Britain when fake branded milk chocolate bars appeared on the market. This is an example of product counterfeiting that was an intellectual property rights infringement. The counterfeit chocolate bars were packaged using artwork and logos stolen from Wonka Bars and Prime brands. The fake branded chocolate bars posed many risks including the fact that they were possibly made or repackaged by unregistered business or criminals who may not have followed food safety practices when manufacturing or packaging the bars (Southey, F. 2024).

The good news is that due to the implementation of programs like the Pasteurized Milk Ordinance (PMO), the United States milk supply is at low risk of having food fraud issues. That said, the dairy industry is still required under law, as well as auditing schemes like the Global Food Safety Initiative (GFSI), to assess risk for food fraud. It is the plant's responsibility to review suppliers, you are the expert on your suppliers and should assess the risk. Here is a guide to reviewing your risk and specific risks to keep in mind.

RAW MILK

Risk: Addition of water to milk

Mitigation: Approved Supplier/ Trustworthy supplier of milk

Potential Detection Strategies: Cryoscope (milk freezing point analysis)

Risk: Use of non-milk substances to boost protein content

Mitigation: Approved Supplier/Trustworthy supplier of milk

Potential Detection Strategies: Detailed component testing

Risk: A2 versus A1 milk (claiming milk is A2 milk when it is actually A1)

Mitigation: Approved Supplier/Trustworthy supplier of milk

Potential Detection Strategies: Techniques like capillary electrophoresis can detect genetic protein variants

Risk: Substitution of higher value milk (Goat/Sheep) for lesser value (Cow Milk)

Mitigation: Approved Supplier/Trustworthy supplier of milk

Potential Detection Strategies: PCR (testing Cheese), Triplex-PCR (testing Cheese), Multiplex PCR assay (testing Cheese), Commercial ELISA (testing Cheese), MALDI-TOF MS (testing Cheese), RP-HPLC method (testing Cheese)

CHEESE PRODUCTION

Risk: Ingredient fraud (i.e. spices, honey, olive oil, fish)

Mitigation: Supply Chain assurances, COAs, 2nd and 3rd party audits

Potential Detection Strategies: Various testing available

CONVERSION

Risk: False claims (made in Wisconsin claims, European PDO)

Mitigation: Supply Chain assurances, COAs, 2nd and 3rd party audits

Risk: Standard of Identity (SOI) violations – Cheese being produced with components that aren't in alignment with the SOI (e.g. Cheddar having moisture >39%, etc.), and/or added ingredients that are unlabeled that violate the SOI laid out in 21 CFR 133

Mitigation: Approved Supplier Program, Supply Chain assurances, COAs, 2nd and 3rd party audits

Potential Detection Strategies: Component testing (moisture, fat)

Risk: Converting and mixing imitation cheeses with standardized cheeses

Mitigation: Approved Supplier Program, Supply Chain assurances, COAs, 2nd and 3rd party audits

Risk: Too much of an approved ingredient added to increase volume: i.e. Cellulose in grated parmesan cheese

Mitigation: Approved Supplier

Potential Detection Strategies: Digital image analysis of shreds

WHEY

Risk: Getting cheese made with palm oil or corn oil that are undeclared/unapproved additives

Mitigation: Approved Supplier

Potential Detection Strategies: Fatty Acid Testing, NMR Testing

GENERAL LABELING

Risk: Organic claims

Potential Detection Strategies: Very difficult to find, 2nd and 3rd party audits, visits evaluating chemicals used, storage of materials, and ingredients.

For a meta-analysis on several different detection strategies, view this article: https://go.wisc.edu/ta14g6

Having a trustworthy supplier and good relationship goes a long way. Once you believe you need detection, your facility is not in a good place. Emphasize the importance of customer and 3rd party audits.

This article is intended to raise awareness of potential food fraud risks in the dairy industry. For more information regarding mitigation, testing and more, view the resources below or contact Alex O'Brien, CDR Dairy Safety & Quality Coordinator at aobrien@cdr.wisc.edu

Resources:

CDR Food Fraud Short Course: go.wisc.edu/v33hpu

Food Fraud Think Tank Primers: go.wisc.edu/i301hu

SSAFE Food Fraud Vulnerability Tool: go.wisc.edu/0da0zh

Dairy Food Safety Alliance Food Fraud Vulnerability Assessment Example: go.wisc.edu/bjhra8

European Commission 2022 Annual Report Alert and Cooperation Network: go.wisc.edu/2gy03t

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including Cathy Hart, Andrea Neu and consultant Mike Dean, were also instrumental in getting the program started.

True to Path's vision, the Wisconsin Master Cheesemaker program has helped support the continued growth of specialty cheese in the state. When the program started specialty cheese production was a small percentage of total cheese produced in the state. Today, Wisconsin produces almost a billion pounds of specialty cheese. In total, 48% of all specialty cheese made in the U.S. comes from Wisconsin.

A core tenet of the Wisconsin Master Cheesemaker program is continuing education and training for experienced cheesemakers. To apply for the program, cheesemakers need to have held an active Wisconsin cheesemakers license for a minimum of 10 years (among other requirements). If a cheesemaker is accepted into the program, it typically takes about three years to complete the training requirements (short courses), plant visits, and a comprehensive written exam. In addition, as the cheesemaker is working toward completing the program, their cheeses are tested to ensure they exceed standard expectations for the variety of cheese.

The Wisconsin Master Cheesemaker® program continues to expand with each new class. Since 1997, more than 100 cheesemakers have graduated from the program. That tradition continues today as the 2024 class of Wisconsin Master Cheesemakers will be honored April 18 in Milwaukee, Wisconsin. Watch for an article featuring the cheesemakers of the 2024 class in the next issue of the Dairy Pipeline.

For more information visit, cdr.wisc.edu/master-cheesemakers/brown or wisconsincheese.com

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CDR RECEIVES FEDERAL GRANT TO SCALE UP INNOVATIVE TECHNOLOGIES TO UTILIZE DAIRY CO-PRODUCTS

The Center for Dairy Research (CDR) is one of 60 organizations, and the only one in Wisconsin or in the food industry, to receive a "Build to Scale" grant from the U.S. Department of Commerce's Economic Development Administration (EDA).

The grant awards $1.2M to CDR to support inventors, entrepreneurs, and businesses that are developing methods to utilize dairy co-products, like permeate and acid whey, and convert them into higher value products like bioplastics, organic acids, and food ingredients. In addition, partner organizations have matched funds or provided in-kind support totaling another $1.2M in cash or in-kind value.

Build to Scale

The Build to Scale (B2S) grant program will allow CDR to select innovative technologies from anywhere in the U.S. that are ready to be scaled up. Successful applicants will bring their promising technologies to CDR's world class pilot plant where they will have access to equipment and staff expertise to scale up their technology so that it can be implemented in the dairy industry.

The dairy industry produces large volumes of dairy co-products that are often used in low-value applications, such as, animal feed or disposed of via land spreading or wastewater treatment plants. Promising technologies are emerging that could provide more sustainable and higher value uses for these dairy co-products.

"It's important for us to try to use every drop of milk that is produced by our cows and to strive to not waste anything," said CDR Director Dr. John Lucey. "The dairy industry makes lots of high-quality products like cheese, but it is the remaining co-product materials, like whey, that some manufacturers look at as a waste material that could instead be the starting material for a completely new industry, such as, the production of green chemicals and value-added food components."

A number of Wisconsin-based organizations are joining in on this effort and are providing matching support or in-kind funds. These organizations include: Discovery to Product (D2P), the Wisconsin Alumni Foundation (WARF), the Wisconsin Economic Development Corporation (WEDC) and Dairy Farmers of Wisconsin (DFW). The additional support from these organizations will help accelerate the work of the inventors, entrepreneurs, and businesses who are selected.

Above and beyond these four major partners, there are 23 other collaborating organizations from across the state and country. These include all nine regional economic development agencies in Wisconsin; the Wisconsin Department of Agriculture, Trade and Consumer Protection; WiSys®; the Wisconsin Technology Council; Wisconsin technical colleges; other Wisconsin research institutes and foundations; and private capital partners like angel and venture capital funds.

As part of the grant, CDR will provide access to its recently opened pilot plant for the development of these technologies by the selected applicants. In addition to CDR's pilot plant, the Center is in the process of acquiring a 400L bioreactor, which will play a key role in helping to develop and scale up the biofermentation technology necessary to convert dairy co-products into higher value green chemicals. There will also be a technical workforce component to this program, making sure future labor is aware of the opportunities and skills needed for these emerging industrial biorefinery jobs.

The EDA BS2 grant will help CDR continue this work and provide opportunities to inventors, entrepreneurs, and businesses that have promising technologies to utilize dairy co-products. If you are interested in learning more about this opportunity, contact CDR at communications@cdr.wisc.edu

CDR will be posting a solicitation calling for interested applicants to apply. Watch for news from CDR or visit the website for updates – www.cdr.wisc.edu

JOIN CDR AT CHEESEEXPO 2024

Join the Center for Dairy Research (CDR) and the Wisconsin Cheese Makers Association (WCMA) for CheeseExpo, taking place April 16-18 at the Baird Center in Milwaukee, Wisconsin.

CheeseExpo is a gathering of over 4,000 cheese industry leaders, suppliers, marketers and more. Learn about the latest in cheese technology, new products, whey opportunities, product safety, marketing and additional issues affecting the industry.

Here is a look at the CDR technical sessions where staff will share expertise and research on cheese functionality, dairy's impact on human health and whey permeate utilization. For more information, including registration, visit cheesecon.org

Wednesday, April 17

CDR Technical Session: Cheese Functionality and Performance | 9:15-11:30 AM

Learn about the latest research from the Center for Dairy Research (CDR) and how to tailor make your products based on cheese functionality and performance. This session will take a deep dive into the functionality of low moisture part skim mozzarella.

Moderator

- Dr. Rodrigo A. Ibáñez, Associate Scientist, CDR

Speakers

- Dean Sommer, Cheese & Food Technologist, CDR
- Graduate Students, University of Wisconsin–Madison

Thursday, April 18

CDR Technical Session: Impact of Dairy on Human Health | 9:30-11:30 AM

Explore the amazing components of milk and how they are designed for human health. This session will review efforts to help improve the health and wellness profile of cheese.

Moderator

- Dr. Rani Govindasamy-Lucey, Distinguished Scientist, CDR

Speakers

- Dr. Rodrigo A. Ibáñez, Associate Scientist, CDR
- John Larsen, Research Assistant, University of Wisconsin-Madison
- Dr. Joseph Pierre, Assistant Professor of Nutritional Sciences, University of Wisconsin-Madison
- Dr. Daniela Barile, Professor and Chemist, Chancellor Fellow, Department of Food Science and Technology, University of California Davis

CDR Technical Session: Whey Permeate Utilization | 9:30-11:30 AM

Discover how Dairy could play a role in the emerging bioeconomy. In this session, Scientists at the University of Wisconsin-Madison will help you discover new perspectives on the use of dairy coproducts like permeate or acid whey that are of low-value and often considered a waste product or used for animal feed or land-applied. Learn about transferring whey into value added materials and the potential for production of products like bioplastics and fermentation derived chemicals.

Moderator

- Dr. John Lucey, CDR Director, Professor of Food Science

Speakers

- Dr. Tim Donohue, Director, Great Lakes Bioenergy Research Center
- Dr. Victor Ujor, Assistant Professor of Food Science, University of Wisconsin-Madison
- Dr. Erica L-W Majumder, Assistant Professor of Bacteriology, University of Wisconsin-Madison

CDR WELCOMES NEW EMPLOYEES

Zachary Delfosse, Cheesemaker

Zachary has seven years of cheesemaking experience, specializing in Gouda and Cheddar.

As a cheesemaker at CDR, Zachary assists with all aspects of the cheesemaking process and is involved in cheese trials and troubleshooting. At CDR, he looks forward to the opportunity of furthering his education and knowledge of cheesemaking.

Jamie Fahrney, Cheesemaker

Jamie comes to CDR with more than 45 years of experience as a cheesemaker. He is a Wisconsin Master Cheesemaker with certifications in Limburger, Swiss, Baby Swiss and Brick.

Jamie has a strong connection to Wisconsin cheesemaking; he was hired by Albert Deppeler, who is known for the development of Baby Swiss. Jamie was also mentored by Wisconsin Master Cheesemaker Myron Olson. As a research cheesemaker at CDR, he assists with all aspects of cheesemaking and is involved with cheese trials and troubleshooting.

Ingrid Havlik, Research Specialist

Ingrid has an undergraduate degree in ACS materials chemistry from Winona State University and a strong interest in research and public service. Her professional experience includes working as a quality assurance lab tech and an associate analytical chemist. Ingrid enjoys using her analytical skills and experience to support the dairy industry.

Katie Hilty, Assistant Coordinator, Cheese Industry & Applications

Katie has professional experience in corporate quality assurance at Emmi Roth and has worked with a wide array of dairy foods including cottage cheese, smoked cheeses and ice cream. She has an undergraduate degree from the University of Massachusetts Amherst. As an assistant coordinator for the Cheese Industry & Applications group at CDR, Katie helps companies manufacture the best products possible and develop new products. She is excited by the hybrid academic/industry realm of CDR looks forward to continuing to grow and learn in the dairy industry.

Brooke McMahon, Research Specialist

Brooke has an undergraduate degree in biochemistry from the University of Wisconsin-Madison.

Previously, she was a quality control analyst for two years working in dairy science with bovine genetics technology. As an analytical research specialist at CDR, Brooke is excited to be a part of an organization that works closely with the dairy industry and where research is at the forefront of CDR's mission and work.

Continued from page 4

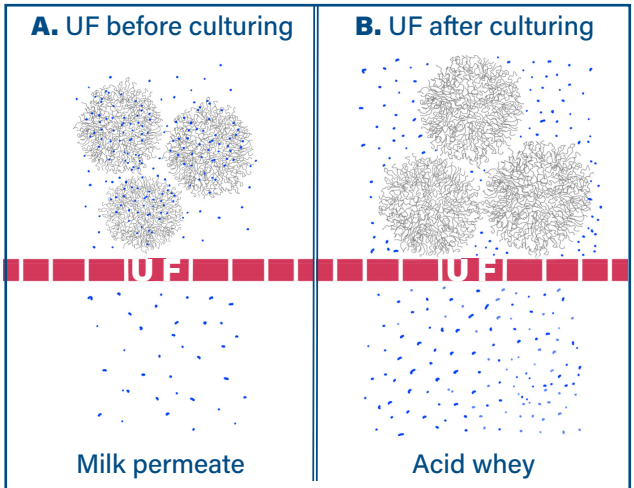

Figure 3. Illustration of yogurt concentration before culturing (A) or after culturing (B). Casein micelles are shown as black lines and calcium phosphate nanoclusters as blue circles.

At high levels, calcium imparts a chalky, dry mouth feel. So, while concentration of milk by UF prior to culturing can achieve a target protein level without producing acid whey, manufacturers should consider the high calcium content of this process. Because of the low protein and high calcium content in acid whey, there is low demand for it and many manufacturers struggle with handling the large amounts of this co-product generated. For this reason, a combination of concentrating before culturing, after culturing, and/or inclusion of dairy solids (such as MPC or WPC) is sometimes used.

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ADDRESS SERVICE REQUESTED

Upcoming CDR Trainings

The Center for Dairy Research is here to help with dairy processing training. Below is a listing of upcoming CDR short courses and other training opportunities.

- February 12 - April 22 - Certificate in Dairy Processing (online, live)
- March 19-21 - Cheese Grading & Evaluation
- March 22 - Cheese Judging
- March 19 - June 19 - Cheesemaking Fundamentals (Spanish language) | Fundamentos de elaboración de queso (online, self-study)
- April 3-4 - Cheesemaking Fundamentals
- April 22-26 - World of Cheese
- May 1-2 - HACCP Certification
- May 7-9 - Advanced Cheesemaking: American Varieties
- May 21-23 - Process Cheese and Cold Pack Cheese
- June 18-20 - Buttermaking Comprehensive

For the latest information or to register visit | cdr.wisc.edu/education

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