CDR RESEARCH IS INVESTIGATING A POTENTIAL NEW SOURCE OF LATE GAS FORMATION IN CHEESE

In 2016, Dr. Mark Johnson, CDR Distinguished Scientist, conducted a research project on biogenic amines in raw milk cheeses and noticed that tiny gas bubbles appeared in the cheese during ripening. At the time, Johnson hypothesized that the late gas formation was the result of the formation of the biogenic amines. Johnson and Dr. Rodrigo Ibáñez, CDR Associate Scientist, have since confirmed that late gas formation can be attributed to the formation of biogenic amines in cheese.

Current research projects at the Center for Dairy Research, funded by the CDR Industry Team and the Dairy Innovation Hub, are investigating biogenic amines and their undesired effects. Biogenic amines are degradation products from amino acid catabolism that, even at very low levels, can cause an allergic-type reaction when consumed. They are found in fermented products including meat, vegetables, wine, beer and dairy products, including cheese.

The most common biogenic amines found in cheese are histamine, tyramine and cadaverine. If high levels of histamine are ingested it can lead to a condition known as “histamine poisoning” with similar symptoms to an allergic reaction, including low blood pressure, skin irritation, headaches, nausea, vomiting, edema and rashes typically lasting a couple hours. Histamine poisoning can occur when spoiled fish with very high levels of histamine is consumed – this is called scombroid fish poisoning (spoiled fish can have free histamine levels of 5,000 mg/kg to 20,000 mg/kg). Once produced, biogenic amines, like histamine, are not degraded by cooking. In cheese, histamine levels occur at a much lower than fish and are typically perceived only as a tingling/burning mouthfeel when consumed.

Biogenic amines will also impact the flavor and smell of cheese. For instance, cadaverine and putrescine are associated with unclean and putrid notes. And, perhaps, most noticeably, biogenic amines are a source of late gas formation and can cause undesired eyes, slits and cracks in cheese as well as puffy packages.

How Do Biogenic Amines Form in Cheese?
Cheese is a complex matrix of proteins, fats, carbohydrates, water, vitamins and minerals. During manufacture and ripening, the proteins in cheese undergo proteolysis or breakdown. During proteolysis, the proteins are successively broken down into smaller units like peptides and then amino acids. Proteolysis is driven by coagulant activity and microbial enzymes and takes place during manufacture and more slowly while aging.
For biogenic amines to form in cheese, there needs to be free amino acids and unwanted microbes, such as Lactobacilli and Enterobacteria with decarboxylase (enzymatic) activity. For instance, histamine is formed from histidine, a common amino acid found in the proteins of milk. If certain bacteria are present, such as *Lactobacillus parabuchneri*, histidine can be liberated from the protein by the bacteria’s proteolytic enzymes, ultimately producing amines from the amino acids.

To be clear, amines are formed by the decarboxylation or cleavage of CO$_2$ from amino acids (Figure 1). The enzyme responsible for this decarboxylation is called a decarboxylase. For example, the specific type of carboxylase found in *Lb. parabuchneri* resulting in the formation of histamine, is called histidine decarboxylase. This enzyme cleaves off the carboxyl group (CO$_2$) on histidine resulting in the formation of histamine.

Certain conditions like temperature, pH and salt can also promote the growth or activity of these unwanted microbes that produce biogenic amines. Cheeses with a higher pH and a lower salt content may be more susceptible to biogenic amine formation. Higher ripening temperatures (> 50°F) can also facilitate biogenic amine formation because of increase growth and metabolism of the bacteria responsible for biogenic amine formation. It has been reported that as little as 2 colony forming units per ml milk of *Lb. parabuchneri*, can eventually lead to high levels of histamine in cheese ripened at 50°F.

Conditions that lead to the formation of biogenic amines:

1. Must have enough amino acids that are free in the cheese serum;
2. Need to have sufficient microorganisms with decarboxylase (enzymatic) activity present to break down the amino acid into biogenic amines; and/or
3. Environmental conditions can also promote the growth of these unwanted microorganisms that cause biogenic amine formation, i.e. low acid development, high storage/ripening temperatures are ideal conditions for microorganisms to develop biogenic amines.

Given these necessary conditions and steps that must take place, biogenic amines can take a long time to develop. In some cases, if there are microorganisms with high decarboxylate activity, biogenic amines may be present in the cheese within weeks of manufacture but in most instances, it takes months or even up to a year for them to form and for the undesired defects to show up in the cheese.

As mentioned earlier, these undesired defects include off flavors, safety issues for consumers and gas formation, which can result in slits, cracks and blown packages. The gas formation in particular is different than other gas formation in cheese which is typically the result of unwanted microbes fermenting sugars and organic acids in the milk and cheese. In the case of biogenic amines, gas (CO$_2$) forms during the process of biogenic amine formation (amino acid decarboxylation). Specifically, research has found that one molecule of amino acid will lead to formation of one molecule of biogenic amine, which in turn will release one molecule of CO$_2$.

**Raw Milk and Environmental Risks**

Since unwanted microorganisms with decarboxylate
activity are the main catalysts for the formation of biogenic amines, cheeses made with raw milk have higher risk of biogenic amines/late gas formation than cheeses made with pasteurized milk. Biogenic amines have especially been an issue in traditional Swiss cheeses manufactured with raw milk, resulting in off flavors and undesired slits and cracks in the cheese.

It should also be noted that lower heat treatments like thermization may reduce certain types of microorganisms but not all types. Cheese produced with thermized milk will still be at risk of biogenic amines formation.

Pasteurized milk cheeses are at a much lower risk of biogenic amines but the unwanted microorganisms that can cause biogenic amines can also be environmental. A plant can have very clean milk but if these microorganisms are present in the pipes, cheese vats or elsewhere in the plant then the cheese will develop biogenic amines.

In some cases, these microorganisms will have attached themselves to equipment and formed protective layers or biofilms, which may make them difficult to remove as they may evade and resist cleaning and sanitation efforts. 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 establishes itself, 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. It is recommended that you contact your cleaning representative for specific cleaning agents to control and remove biofilms.

**CDR Researching Prevention Strategies**

Current research projects at CDR are examining potential strategies to prevent biogenic amine formation in cheese.

A grant from the Dairy Innovation Hub is funding research at CDR to investigate strategies that help prevent biogenic amine formation or breakdown biogenic amines. CDR will be examining if the use of selected adjunct cultures in cheese can suppress the growth of bacteria that can form biogenic amines. Another strategy that CDR will be researching is the addition of ingredients during cheese manufacture. This is another strategy that could have a protective action against unwanted non-starter lactic acid bacteria (NSLAB) with undesirable decarboxylase activity, reducing the final concentration of biogenic amines in cheese and thus, the occurrence of defects associated with gas formation and off-flavors.

**Sources**


HOW TO GET A WISCONSIN CHEESEMAKER LICENSE

Which situation best describes you?

You have held a Wisconsin cheesemaker license within the past 10 years.

You have at least 18 months of work experience as a cheesemaker assistant. (under the supervision of a licensed cheesemaker)

You have at least 12 months of experience as a cheesemaker assistant. (under the supervision of a licensed cheesemaker)

You have at least 6 months of work experience as a cheesemaker assistant. (under the supervision of a licensed cheesemaker)

Within the previous 5 years you have completed at least 240 hours of on-the-job training in the complete process of cheesemaking under the direct supervision of a licensed cheesemaker.

You need to complete one of the following qualifications:

1. Complete a cheesemaking short course at the University of Wisconsin, or an equivalent course from an accredited post-secondary educational institution, within 10 years prior to the current license application.

2. Obtain a 2-year or greater degree, with a food science or equivalent major, from an accredited post-secondary educational institution.

You need to:

1. Holding a 4-year or greater degree, with a food science or equivalent major, from the University of Wisconsin or another accredited post-secondary educational institution.

2. Complete approved courses in all of the following subjects:
   - Cheesemaking.
   - Production of safe dairy foods.
   - Hazard analysis critical control point (HACCP) process control.
   - Principles of milk pasteurization.
   - Dairy sanitation.

You qualify to take the Wisconsin cheesemaker license exam!

1. Visit the DATCP website
2. Scroll down to Cheesemaker and click “Start the Licensing Process”

The licensing process is under the purview of The State of Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP).

Information taken from Chapter ATCP 69

Link? www.cdr.wisc.edu/cheese-butter-grader-licenses

You can find a list of approved courses from CDR here:
DBIA AWARDS $1.19 MILLION IN GRANTS TO MIDWEST DAIRY ENTREPRENEURS

The Dairy Business Innovation Alliance (DBIA), a partnership between the Center for Dairy Research (CDR) and Wisconsin Cheese Makers Association (WCMA), is awarding more than $1M to dairy farm and processor entrepreneurs and existing dairy businesses. In total, 26 dairy entrepreneurs from the five-state region of Illinois, Iowa, Minnesota, South Dakota and Wisconsin were selected to receive up to $50,000 each in awards from DBIA.

“The 52 applications we received this round were very competitive,” shares Vic Grassman, DBIA. “The total request for grants was approximately $2.3 million, and we saw a significant increase in the quality of the business planning and budgeting within the applications. It was also great to see the applicants make use of the DBIA webinar series as a resource to assist in drafting their applications. The benefits were clearly seen in the quality of applications.”

“We are delighted to be able to help our dairy farmers diversify, to assist the growth of farmstead operations and to encourage more value-added products,” said John Lucey, CDR Director.

“With targeted financial investments and broadly-available training, the Dairy Business Innovation Alliance is helping producers and processors get new value-added dairy ventures up and running,” said John Umhoefer, WCMA Executive Director. “The projects we’re supporting in this grant cycle hold great potential to strengthen the dairy industry, from farm to vat – and we look forward to funding more projects in the years ahead.”

For more information about each of the grant recipients’ projects, visit the DBIA grant program website: www.cdr.wisc.edu/dbia-grant-program

Associated Milk Producers, Inc – Minnesota
Berrybrook Organics – South Dakota
Carr Valley Cheese Company – Wisconsin
Cider Farm Brands, LLC – Wisconsin
Cinnamon Ridge, Inc. – Iowa
Concept Processing, LLC – Minnesota
Country View Dairy, LLC – Iowa
Deerland Dairy – Illinois
Farm Life Creamery, LLC – South Dakota
GoodSport Nutrition, LLC – Illinois
Hollands’s Family Cheese, LLC – Wisconsin
Kasemeister Creamery – South Dakota
Klemish Creamery – Wisconsin
Landmark Creamery, LLC – Wisconsin
Maple Leaf Cheese Coop dba Monroe Farmers – Wisconsin
Millerville Cooperative Creamery Association – Minnesota
Moore Family Farms/Moore Local – Iowa
Nature’s Prime dba Khaza – Minnesota
Olala Creamery, LLC (Alpinage) – Wisconsin
Pasture Pride Cheese, LLC – Wisconsin
Redhead Creamery, LLC – Minnesota
Royal Guernsey Creamery, LLC – Wisconsin
Simple Life Farms – Iowa
Specialty Cheese Company, Inc. – Wisconsin
Tuls Dairies dba DARI, LLC – Wisconsin
Yodelay Yogurt, LLC – Wisconsin

SOUTH DAKOTA
3 GRANTS
$125K

MINNESOTA
5 GRANTS
$246K

WISCONSIN
12 GRANTS
$550K

IOWA
4 GRANTS
$175K

ILLINOIS
2 GRANTS
$100K
BABCOCK HALL BUILDING PROJECT UPDATE

A sneak peek of some of the new equipment, facilities and capabilities in the new three-story CDR addition.

**Babcock Hall, CDR’s home on the University of Wisconsin campus, is undergoing a $72.6 million project.** The building project is creating a three-story addition for CDR and renovating spaces in the current building for dairy plant manufacturing and processing. This project was possible with support from members of the dairy industry, the State of Wisconsin, and Dairy Farmers of Wisconsin.

**Cheese Vats** – CDR now has two new 2,500-pound enclosed horizontal cheese vats from APT. Having the two vats side by side will be perfect for training operators and conducting real-world trials and research in the Great Lakes Cheese Innovation Hall.

**Cheese Vats** – In addition, CDR will have four 1,000-pound Relco open vats in the Agropur Cheese Research Room that will allow us to program specific formulations and precisely control operations like heating and stirring.

**Sargento Training Center** – On the ground floor, the state of the art Sargento Training Center will seat about 80 industry attendees at any short course or training meeting. It will have a drop-down screen at the front of the room backed by the porcelain tile, as well as two white boards on either side. In addition, every table and seat will have power for laptops/phone. The AV system will allow live streaming of activities in the pilot plant to the auditorium, or a demonstration in the applications lab.
GEA Raw Room – CDR will have its own raw room for processing, blending and standardizing all the different types of unique milks needed for the facility. The raw room includes three raw milk silos, five batch tanks, a milk separator, several valve clusters to simplify process flows, a homogenizer and a pasteurizer that will have a regular holding time as well as the long hold tube needed for products like yogurt. There is also a testing lab attached to the raw room, which is where CDR will have Foss units to quickly standardize milks.

WCMA Conference Room – The new conference room will be used for industry meetings and other events. It is conveniently located just off the CDR reception area, and will have windows on the north and west side of the room, including windows that look into the second floor dairy processing area.

Ripening Rooms – The new facility has 9 cheese ripening rooms or caves each with its own air conditioner to control temperature, humidity and airflow. The rooms can set to the exact conditions for all types of specialty cheese from the mold ripened to alpine style and beyond.

Sensory Booth – The addition includes six new sensory booths to evaluate products. Each booth will have its own sink as well as computer for scoring.

Other new facilities/equipment – Some of the other key areas not pictured include: new loading dock, Klondike Specialty Cheese Rooms, Foremost Farms Dairy Ingredients Innovation Hall, Grande Industry Room, spray dryer room, aseptic beverage area, Schreiber Foods Cultured Products Innovation area, and new Marathon Cheese CDR offices. Click here to watch a video tour of the new CDR addition.
Butter consumption continues to increase in the United States. Data from the USDA Economic Research Service shows that in 2019, U.S. citizens consumed 6.2 pounds per person – a more than 26% increase from 2010.

Butter, like many dairy products, is made from only a couple of ingredients. An Act of Congress that was approved March 4, 1923 defines butter as being “made exclusively from milk or cream or both, with or without common salt and with or without additional coloring matter and contains not less than 80% by weight of milkfat, all tolerances allowed for.” In addition to salted and unsalted butter, there are two main types of butter – sweet cream butter and cultured butter. The typical composition of butter is: 80-82% fat, 16-17.5% water, 1.5% salt, and 1% milk solids (vitamins, minerals, and lactose).

While butter is a simple product made from only a couple of ingredients, the physical changes that take place during butter production are more complex.

**Cream Quality**
The most important aspect of buttermaking is cream quality. If you do not have quality cream, you can’t make quality butter. Some important measures for cream are milkfat content and pH. Milkfat content should be in the range of 35-40%. If this value is too high or too low, it will negatively impact yield efficiency. The cream should have pH of 6.4-6.7. If the pH of the cream is too low (below pH 6.4), it is indicative of the presence of undesired bacteria. Other important values to monitor include standard plate count, coliform count, etc.

Since buttermaking by its very nature has the goal of concentrating the fat in cream, the quality of the fat/lipid component of the starting cream is critical. Two main reactions that can occur to fat are lipid oxidation and hydrolytic rancidity. The former involves the reaction of fat with oxygen resulting in cardboard-like off flavors. The latter is usually due to the breakdown of triglycerides by lipases (enzymes that breakdown fats), resulting in baby vomit or soapy-like flavors. Therefore, quality metrics associated with these reactions should be included during cream testing (see table below).

**Lipids**
The lipids or fat and types of fat in milk are important to understanding the science behind buttermaking. Triglycerides make up about 97-98% of the fat found in milk. The rest of the fat content in milk is divided up of mono & di-glycerides (about 0.5%), cholesterol (about 0.3%) and phospholipids (about 0.6%). The amounts and structure of these lipids serve important roles in the emulsification effects in buttermaking, which impact melting and spreadability.

The fat in milk is found in the form of milkfat globules, which range in size from 0.1-20 microns. Milkfat globules have three layers that protect fat triglycerides - these layers protect the quality of the fat. Excessive pumping or handling of milk can breakdown and damage the layers surrounding the milkfat globules. This introduces oxygen causing oxidation or allows enzymes to get into the globules causing off flavors to develop (hydrolytic rancidity). This is why it is important to preserve cream quality for buttermaking.

Lipolysis, or the breakdown of triglycerides with the release of fatty acids, produces flavors, which in the case of buttermaking, may not be desired. Intact triglycerides do not have much flavor or taste, but enzymes like lipases can break down triglycerides into free fatty acids, which are more volatile and interact with our olfactory glands to give strong flavors, which, again are not desired in buttermaking.

**Milkfat Structure**
The fat in milk is about 70% saturated (solid at room temperature; single bonds in the fatty acid structure) and 30% unsaturated (liquid at room temperature; double bond(s) in the fatty acid structure). The structure of the fats in butter is very important as they will impact the melting and softness of the butter. As mentioned earlier, triglycerides are the predominant fat found in milk. Triglycerides have a “tuning fork” structure that allows them to nest and form stable structures, which allows the

<table>
<thead>
<tr>
<th>Reaction</th>
<th>Oxidation</th>
<th>Hydrolytic Rancidity (Lipolysis)</th>
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</thead>
<tbody>
<tr>
<td>Causes(s)</td>
<td>Oxygen, light, excessive pumping, metallic contamination, chemical sanitizers, elevated storage temperatures</td>
<td>Lipases (native in milk, microbial origin, etc.), heat</td>
</tr>
<tr>
<td>Chemical end products</td>
<td>Peroxides, aldehydes, etc.</td>
<td>Free fatty acids, monoglycerides, diglycerides</td>
</tr>
<tr>
<td>Off-flavors &amp; odors</td>
<td>Cardboard, crayon-like, tallowy</td>
<td>Baby vomit, soapy</td>
</tr>
<tr>
<td>Analytical tests</td>
<td>Peroxide value (PV), p-Anisidine (p-AV)</td>
<td>Acid Degree Value (ADV), Free Fatty Acids (FFA)</td>
</tr>
</tbody>
</table>
fat to remain solid at room temperature. However, if you introduce unsaturated fatty acids (double bonds) this will cause a kink in the chain and the triglycerides won’t nest together as nicely. This causes the structure to be more unstable and “fall apart” more easily. For example, they may become liquid at room temperature. As mentioned, this impacts the melting point and spreadability of the butter.

The more double bonds you have (unsaturated fatty acid), the lower the melting point and the more likely it will be liquid at room temperature.

**Butter Processing Overview**

Butter processing starts with processing milk in a milkfat separator to separate the cream from the skim milk. Cream is then pasteurized. The minimum time/temperature parameters for pasteurization are 30 minutes at 165°F or 15 seconds at 185°F. These are higher pasteurization temperatures than typically used for fluid milk processing or cheesemaking. These higher temperatures are necessary for cream pasteurization because cream is higher in total solids and the hotter temperatures are needed to ensure proper heat treatment. The higher pasteurization temperatures are also needed to inactivate certain enzymes like lipases, which can cause off flavors in butter made from raw cream.

Once the cream is pasteurized, it is cultured (if making a cultured butter) and then tempered. This step involves gently increasing the cream temperature over time and controls fat loss during the buttermaking process. After tempering, the cream is then ready for churning, working, salting (if applicable), packing, and chilling.

**Culturing**

While sweet cream butter is the predominant butter type in the U.S., more consumers are looking for European-style high fat or cultured butter. Butter is cultured by adding bacteria, like *Streptococcus cremoris*, *Streptococcus lactis sub diacetylactis* and *Lueconostoc* to the cream. Similar to cheesemaking, by adding culture, the bacteria ferment or breakdown lactose and citric acid and form end products like lactic acid and aroma compounds like diacetyl, which has a buttery aroma typically associated with microwave popcorn. The fermentation-produced lactic acid results in cultured butter typically having a pH around 4.4 to 5.0, while sweet cream butter usually has a pH similar to that of cream/milk (~6.0 to 6.7).

**Tempering & Crystallization**

After pasteurization (and culturing if applicable), the next step is tempering. During pasteurization, there will be liquid fat in the milkfat globules because the fat will be above its melting point. As the milkfat cools, some of the fat, beginning on the exterior of the fat globule, will become solid again. During this cooling step, the crystallization of the milkfat is impacted. In buttermaking it is very important to achieve the desired balance of solid (crystalized) milkfat and liquid milkfat. As the milkfat cools, you will get regions within the globules of crystalized milkfat and regions of liquid milkfat. This ratio of crystalized and liquid milkfat dictates how soft and spreadable the butter is going to be. The more solid or crystalized milkfat, the harder, less spreadable the butter will be. Cream temperature will increase as a result of giving up the latent heat of crystallization. For ideal churning with a minimal fat loss, the liquid fat must be on the exterior of the fat globule. During this migration, or inversion, temperature increases. It is important to note that this process takes time – ideally 18-24 hours. This is a simplified version of the chemistry involved. The take-home message is that the interplay between solid/liquid fat in the milkfat globules has a tremendous impact on final butter texture and spreadability.

*Continued on page 10*
Continued from page 9

Churning

The next step in buttermaking is churning, which can occur in either a batch or continuous process. During churning, “phase inversion” is taking place. Cream is being transformed from an oil-in-water emulsion to butter, a water-in-oil emulsion. The cream is churned to encourage the fat globules to coalesce, aggregate, come together, and form solid butter granules/clumps. As this process continues, a more solid structure is formed made up of these butter granules, all the while buttermilk is being released and drained from the churn.

Working, Salting, Packaging, & Chilling

The final steps are working, salting, packaging, and chilling. Working the butter encourages the butter to form nice cohesive mass and further buttermilk removal. At this point, salt (if producing a salted butter) is worked into the butter as well. The final steps are packaging and chilling. There is a slow decrease in temperature as the butter is cooled. During cooling, the nuclei formed in the cream during tempering grow and may decrease spreadability. Chilling too rapidly can promote a short, brittle body and texture. Ideal spreadability develops somewhere in between.

CDR Short Course and Better Butter II

This was a quick look at some of the science behind buttermaking. If you want to learn more about buttermaking, CDR will be holding a Buttermaking Fundamentals Short Course online beginning September 28. For more information or to register click visit www.cdr.wisc.edu/short-courses.

Another resource for buttermakers or those interested in learning more about butter is Robert Bradley’s book “Better Butter II.” Dr. Bradley, an emeritus professor University of Wisconsin-Madison Food Science, covers all aspects of quality buttermaking such as safety and quality issues and new butter products like butter blends and whips. To get a copy of “Better Butter II” visit www.cdr.wisc.edu/store.

CDR STAFF JUDGING AT THE 2021 WISCONSIN STATE FAIR CHEESE AND DAIRY PRODUCT COMPETITION

Center for Dairy Research staff judged at the 2021 Wisconsin State Fair Cheese and Dairy Product Competition on June 24. CDR’s John Jaeggi, Susan Larson and Dean Sommer served as judges at the contest. Former CDR employees Marianne Smukowski and KJ Burrington also served as judges. This was first dairy products competition in more than a year.
NATHAN PRICE AND BRANDON PROCHASKA JOIN CDR STAFF

Nathan Price, Dairy Ingredients Coordinator
Growing up on a dairy farm in central Wisconsin, Nathan became interested in food science and dairy manufacturing. He has a bachelor’s degree from University of Wisconsin-River Falls in Food Science and Technology. Nathan earned a Ph.D. from Iowa State University in Food Science and Technology, studying the concentration and isolation of phospholipids from various dairy by-products. He has experience working in the dairy industry in research and development, working with many types of milk powders and butter production. He also has experience working with specialty whey powders. Nathan is excited about the opportunity to work at CDR and gain knowledge from experts in the dairy industry.

Brandon Prochaska, Sensory Coordinator
Brandon grew up on a dairy farm in southeast Wisconsin. He earned a Bachelor’s degree in Food Science from UW-Madison and a Master’s degree in Business and Data Analysis from Missouri State University. He has experience in the dairy industry working as a Sensory Services Supervisor and Technical Services Manager. In these roles, he helped conduct shelf life testing, trained and maintained panelists, managed a wide variety of projects, and metrics tracking/reporting. Brandon is well versed in different sensory techniques, such as consumer testing, triangle testing, and more. He brings a wealth of experience in sensory science, spray drying expertise, and data visualization/process improvement.

CDR TO PRESENT ON COMMON CHEESE DEFECTS AT 2021 ACS ANNUAL CONFERENCE

Staff from the Center for Dairy Research will be presenting a 3-hour session at the upcoming 2021 ACS Annual Conference that will be held virtually July 28-30, 2021.

Controlling Cheese Quality: Common Defects Seen at Retail & Their Root Cause During Cheesemaking Friday, July 30, 10 am – 1 pm, online
From excessive squishiness to soapiness, some defects are omnipresent in the cheese retail cooler. This session will explore several of the main flaws that are common in certain cheese varieties and how they come about during the cheesemaking process and the supply chain at-large. We will conclude with a mini case study, where participants will be given a “whodunnit” style mystery to solve! This will be a 3-hour session with a Q&A to follow.

CDR Presenters:
Gina Mode, Asst. Coord. Cheese Industry & Applications
Rebecca Hohlstein, Cheese Outreach Specialist
Andy Johnson, Asst. Coord. Cheese Industry & Applications
Ben Ullerup Mathers, Research Cheesemaker
Mark Johnson, Distinguished Scientist Extraordinaire
Dean Sommer, Cheese & Food Technologist
Pat Polowsky, Training Facilitator

For more information, including registration, visit https://www.cheesesociety.org/2021-conference/