Wisconsin Center for Dairy Research

DAIRY PIPELINE

A Technical Resource for Dairy Manufacturers

July 2004, Volume 16 Number 2

Uncovering the cause of cheese defects, is it the retailer, the cheesemaker or the packaging?

by Mark Johnson, senior scientist, Wisconsin Center for Dairy Research

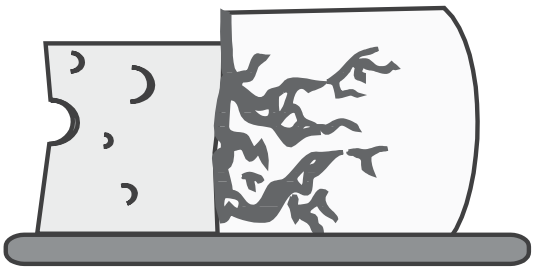
Calcium lactate crystals

Yellow-Green "blue" cheese

Puffy cheese packages

Gassy cold pack Swiss

No holes Havarti



We have all seen these common cheese defects, and so have the consumers who have declined to buy them. Instead, cheeses with these defects get sent back to the distributor and eventually the cheese maker has to deal with the complaint. What is the explanation? It may be that something is wrong with the cheese but it is also possible that the cheese was mishandled or improperly packaged.

Calcium lactate crystals in cheese were discussed extensively in the April 2004 Pipeline, so I will only tell you that these crystals can be avoided in cheese prone to the defect, at least until the cheese is opened. (See sidebar on page 8)

Yellow-green "blue" cheese is the result of oxygen starvation. *Penicillium roqueforti*, the mold that makes blue cheese blue, requires oxygen to do its job; which is to produce the characteristic flavor of blue cheese. Without oxygen, the development of traditional blue cheese flavor is curtailed. In addition, the mold literally suffocates itself and may turn yellow-green. However, this is reversible since it will turn blue when re-exposed to oxygen. Therefore, vacuum packaging may produce color variation. Some manufacturers choose to control this by pulling a light vacuum on blue cheese that slows ripening but still allows enough oxygen to prevent yellowing of the cheese. Storing the cheese at a low temperature also prevents mold from growing and using the oxygen.

Puffy packages can be the result of gas produced by bacteria added as a starter adjunct, including *Leuconostoc* sp. and *Lactococcus lactis subsp. lactis biovar. diacetylactis* (havarti, gouda). These bacteria are able to ferment citric acid in the cheese. Sometimes vegetables, especially canned peppers may contain added citric acid as a preservative. Citric acid is also a normal constituent of milk. *Leuconostoc* sp. will also ferment lactose, so adding whey to cold pack cheeses where *Leuconostoc* was used as a culture in the base cheese could prove detrimental. Making cold pack cheese out of Swiss cheese may require the use of higher salt, or lower pH to inhibit fermentation of lactic

continued on page 8

What's Inside:

Monitoring the Biological Safety of Dairy Plants

Part I: Looking for Listeria (and finding it in all the wrong places)

Produced from a presentation by Dennis Bogart, Randolph Associates
at the Wisconsin Association of Food Protection, Education Workshop on June 2, 2004 in Madison, Wisconsin

I don't know how many of you have had food poisoning, but I know that I have. A chicken salad sandwich eaten at the Space Needle in Seattle—at the time I noticed it was a little warm but I ate it anyway—essentially wiped out three days of my honeymoon in 1968. In 1995 I had lunch in a restaurant in Monticello, Arkansas named Peggy Sues before I was hospitalized for 3 days. The latest episode happened a couple of years ago in Cairo, Egypt. It was parsley. Fresh parsley, right out of a field irrigated by the Nile River, not real smart.

The point is that food poisoning affects us, and it affects our families. Estimates reveal that every year approximately 75 million people here in the US get food poisoning. Think about that; we only have 290 million people. Furthermore, out of those 75 million people, 5,000 to 10, 000 people die from food poisoning. That is tragic.

In 1985 we went into something called listeria hysteria. The California Jalisco cheese outbreak changed the food industry, and it especially changed the dairy industry because it hit so hard. At the time we didn't know much about this bug. We knew it killed people, but we didn't know how, or who. Today, we have some answers.

Listeria grows at refrigeration temps

Listeria is not the most common cause of food poisoning, but it has a relatively high mortality rate. This bacterium is psychrotropic. Not only will it grow at refrigeration temperatures, cold may actually select for it. It doesn't need a lot of air, and it forms biofilms. People who have a compromised immune system are most susceptible to listeria. That category includes anyone undergoing chemotherapy, elderly people, and sick people. Listeria also has an affinity for the human uterus, which means it can cause premature births and it can be deadly for newborns. Today, I believe people have become complacent about listeria. You cannot do that.

Remember, refrigeration will not save you. Back when I was in college, refrigeration was considered a savior. Keep it cold they said. Then we found out about bugs like listeria, dangerous because it will grow at 40ºF, and even at 35ºF. One thing about listeria, and a few others, is they don't compete real well with other bacteria. If you have a vigorous psychrotropic bacteria growing in your plant, listeria will not compete well. However, we have done a good job cleaning up our plants. For example, it wasn't too long ago that sawdust covered the floor of our meat plants. When we cleaned up our plants we got rid of all those competing bacteria.

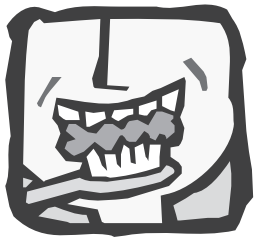
Freezing won't kill listeria. If it did, the ice cream industry wouldn't have problems. The bugs might be in a state of suspended animation, or damaged, but they won't be killed. They are hardy little things.

The "microfix"

I want to tell you about an approach to food safety that I have seen in the butter industry as well as frozen vegetable plants. One particular butter plant had a coliform standard. Coliforms in this type of testing are not considered pathogens, they are considered indicator organisms. Coliforms travel the same routes that pathogens do. If you find coliforms then you probably should worry about pathogens. In this particular butter operation they freeze the butter. The coliforms aren't dead, but they are damaged and they won't show up on a coliform test so the product is released. What happens to the pathogens or the listeria that's in that butter? That listeria in the butter is still there. This plant had an entire department named the microfix department, 8 or 10 employees and a big freezer. It was not an occasional thing. They would freeze the butter for 2 weeks, then pull it out and test for coliforms. What is going on here? Well, this is a classic stick your head in the sand approach. Do not take this route.

Listeria is a facultative anaerobe. It will grow in an oxygen environment; it also grows in a nonoxygen environment. Packaging really doesn't help because if you take all the oxygen out it will eventually grow. If it is there, it will grow. Listeria is also a very common bacteria. People frequently spread it in your plant because we carry it on our clothes, our hands, and our shoes.

And now we have learned about biofilms. I'll give you an example of a biofilm, every morning when you wake up and you feel that furry surface on your teeth—that is a biofilm. Biofilms are polysaccharide films created by bacteria for protection. Bacteria produce biofilms because it helps them survive. If you want another biofilm example feel your drains. That slimy covering is not food soil, it's a biofilm. Inspect your metal tracks in the dairy plant, that build up is not milk—it's a biofilm.



Listeria forms heavy biofilms. This has an immense influence on our ability to get rid of them. No sanitizer will get rid of listeria in a biofilm. I was at a conference in 1986, or '87, and watched some researchers stand up and tell the audience that there was no sanitizer that would kill a listeria biofilm. You can imagine how quiet that room got. Chlorine wouldn't kill it, acid sanitizer wouldn't kill it, nothing would kill it. Then someone asked the question, "Did you try cleaning it before sanitizing?" The answer was, " No, we hadn't thought of that."

Sanitizers are never used without first cleaning the surface. Biofilms are nothing more than a soil, a soil you have to clean. I run into a lot of people that have listeria in their plants. They say, "I can't get rid of it, I've tried this sanitizer and that sanitizer." I ask them, "What did you do to raise your level of cleaning?" Most of the issues in most plants are not sanitizing problems; they are cleaning problems. People have not cleaned well enough in order for the sanitizer to actually work. Biofilms are tough to clean off, really tough.

Plant design—It makes a difference

What is the condition of the floor in your plant? Is it there? I've been in a plant that was built around 1890, and then they steadily added on. When I found my way to the original basement of the original plant I found stalactites coming off the ceiling. Look in your coolers. Are there cracks in the walls? Do you have tile floors, and if you do what does the grouting look like? Do you have concrete floors? Does the aggregate show? What are the walls made of? What condition are the ceilings in?

People do a good job at looking at things right in front of them, from about 2 ft to 6 ft. If you are going to look under 2 ft. you have get down and look. You need a ladder to see above 6 ft. It is amazing what you can see below 2 ft. and above 6 feet.

If you want to find listeria in your plant look in the blowers in your cooler, and in drip pans and the drains coming off those drip pans. That's where you will find it. Those blowers act almost as a filter, filtering out everything. Listeria gets in there, goes through the defrost cycle and here it comes—right out that drip pan to where it's going. How many of you have drip pans in your coolers that are not hard plumbed to a drain? A lot of older plants, and even some new ones, drip right straight down to the floor. Here you have the number one spot for growing listeria and it can also dump listeria all over the floor. Not only that, but this spot is in a cooler where it will select for listeria. Now, I try to be practical. It's a little difficult to tell people that they need to tear out all these walls, put in new coolers and replumb everything—and do it by the day after tomorrow. That isn't going to happen.

What can a plant do if they have this problem? There is one thing that works pretty well. You can buy a product that looks like little hockey pucks, however, they are made of iodine. Most chemical companies can supply these. After you clean that drip pan, you place two or three of those up there in the pan. Then you put that drip pan on your monthly maintenance schedule and you monitor it on a monthly basis. Normally, it will take two or three months for your iodine puck to disappear, but if you have a lot of water going through there it could happen faster. This solution works pretty well.

Access points

It is a joy to work in new plants because they have something I like, and that is lot's of room. You know in five years or so that space will be filled with more equipment. Remember to make that equipment accessible. If you put a piece of equipment right up against the wall then it is going to take a real effort to get behind it to clean it. You have to think ahead, know where you going with it.

External areas

When you have a visitor, say a new customer, the very first impression they are going to get is the outside of your building. If it is in the middle of a swamp with trash scattered all around they are going to be afraid of what is inside. Keep the outside neat and clean.

Equipment design

How are you going to get in to clean it? How are you going to inspect it? What type of gaskets are you using? Cheap vs good gaskets, you will see a huge difference. I visit a lot of plants and I tell them you really should look at specifying 3-A

continued on page 4

continued from page 3

standards, or at least cleanability standards when you buy equipment. I remember inspecting a filler operation that at first glance looked great. But, when it was time to take it down for maintenance, it turned out the entire thing was bolted together and it took 4 or 5 hours to take apart. This is not efficient.

There are many lubricants that can present a cleaning issue. On example is Petrogel, and a lot of plants use it. But you can't clean it because it melts at 190º. This leaves a thin layer of grease over everything and that is a real problem. Now, what we recommend is a product called CIP lube. There are similar products; the point is that you should buy products that are cleanable.

Choosing the sanitizer

I have a slightly different philosophy than most people might have when it comes to picking a sanitizer. First, look at your product and figure what would attack it. Then pick the best sanitizer available to get rid of potential problems and forget about it. Just let it do its job. Always remember that there is no sanitizer out there that will kill everything. After you choose a sanitizer, spend 95 to 99% of your effort on getting surfaces clean.

Let's discuss environmental surfaces. I'm talking about the floors, the walls, the ceiling, outside surfaces of equipment, the drains, the foot baths. The number one product I recommend in most operations is an acid quat, a quaternary ammonia compound that is acid based. It's good for plants with hard water, and listeria doesn't like a pH of 2.5. Now, some people don't like the idea of quat because they worry about killing off their starter culture. And it's true, as little as 2 ppm in your culture will give you a dead vat. But I look at it this way, if quat, that is way over there in your footbath, or in your drain, is getting into your culture vat—the most sacred place in the plant—then you have a different kind of problem. I might even be thankful that quat showed me that problem because something is wrong. This is why I don't mind using these sanitizers; you can put them on the walls and the floors and the drains, and they leave a nice residual effect.

> "Something is clean or it is dirty. There is no such thing as a little dirty or almost clean, it is either clean or dirty. And if it is dirty then you can't sanitize it."

The other product I like for environmental surfaces is relatively new. People have taken a PAA sanitizer and added a foaming agent. It works really well; although it doesn't leave a residual film, it does have a great knock out rate.

What sanitizer will kill listeria? Listeria is relatively easy to kill if where it resides is clean. If it's not then nothing is going to get it. If it's clean, chlorine will kill it, iodine will kill it,
And quat will kill it. They all will kill it. In case you are wondering what might be the best sanitizer to use in your operation, the answer is that the right sanitizer is the right one for you.

In conclusion, I want you to remember that something is clean or it is dirty. There is no such thing as a little dirty or almost clean, it is either clean or dirty. And if it is dirty then you can't sanitize it. Listeria has a difficult time making a home in a clean, sanitized plant.

Research Update

Reducing the risk of Listeria monocytogenes or Preventing listeriosis

Researchers from the University of Helsinki in Finland have recently presented and published their summary of listeria outbreaks in Europe and the conclusions they drew from the study. The authors note that half of the reported outbreaks of listeriosis in Europe have been associated with dairy products, a statistic that has motivated several European countries to increase efforts to prevent outbreaks and decrease the incidence of listeriosis. Their efforts included a combination of preventive measures in processing plants, earlier detection of outbreaks, and educating consumers.

These efforts seem to have made a difference, reducing the incidence of listeriosis in some European countries. The authors, Lunden et al, suggest that preventive measures at processing plants were more effective than consumer education in the effort to reduce the incidence of listeriosis. In particular, good manufacturing practices (GMP's) and maintaining the hygiene of processing machines turned out to be key factors.

"The authors suggest preventive measures at processing plants were more effective than consumer education in the effort to reduce the incidence of listeriosis."

The data was presented at the joint American Dairy Science Association (ADSA) and American Society of Animal Sciences (ASAS) in June, 2003. You can also find this study published in the Journal of Dairy Science, 87: (E. Suppl.) E6-E11.

FDA's Listeria Action Plan

Meanwhile, here in the US, the Healthy People 2010 goals for national health promotion and disease prevention called on federal food safety agencies to reduce foodborne listeriosis by 50% by the end of 2005. Although the recorded incidence has decreased from 0.5 cases per 100,000 people per year in 1996 to 0.3 cases per 100,000 people in 2001, the rate of decrease has leveled. In order to achieve a lower rate of 0.25 cases per 100,000 people the Food and Drug Administration (FDA) and the Centers for Disease Control (CDC) launched the *L. Monocytogenes* Risk Assessment. The Assessment evaluated health risks from listeria as well as foods that can transmit the pathogen. According to the agencies, their results support the need for additional targeted action. The six areas for action (listed on the website: http://www.cfsan.fda.gov/~dms/lmr2plan.html) include:

- Develop and revise guidance for processors that manufacture or prepare ready –to –eat foods and develop or revise guidance for retail and food service and institutional establishment.
- Develop and deliver training and technical assistance for industry and food safety regulatory employees.
- Enhance consumer and health care provider information and education efforts
- Review, redirect, and revise enforcement and regulatory strategies, including microbial product sampling.
- Enhance disease surveillance and outbreak response.
- Coordinate research activities to refine the Risk Assessment, enhance preventive controls and support regulatory, enforcement, and educational activities.

Karen Paulus, editor

Cold pack cheese—It's a Wisconsin original

In the first edition of his definitive "Cheese & Fermented Milk Foods" Frank Kosikowski comments that club cheese is "a cheese with an interesting flavor and good spreadability, favored by gourmet groups." That was back in 1966 and gourmet groups might have moved on to a new favorite but plenty of fans of club cheese are out there in the marketplace.

Cold pack cheese, comminuted cheese, club cheese, and "snappy" cheese are one and the same. The Federal Code of Regulations defines this cheese as "food prepared by comminuting, without the aid of heat, one or more cheeses ... into a plastic mass." Because cold pack is not heated it is considered more flavorful than process cheese and it also differs by having a shorter shelf life. The Standard of Identity hasn't hampered the variety of cold pack cheese available. Cheese makers are allowed to be creative; they can add spices and flavorings like meats, vegetables, nuts, spices, smoke and alcohol to produce variations like port wine cheese, or blends with horseradish, blueberries, almonds and peppers. Sweetening agents, like sugar, corn syrup, and maltose are allowed, as well as mold inhibiting agents like sorbic acid and potassium sorbate.

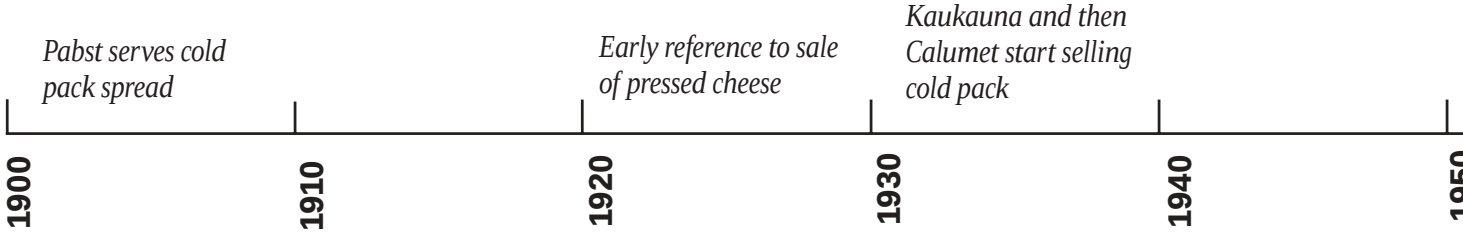
Home cooks have been making cold pack cheese

It's likely that frugal home cooks have been making cold pack cheese spreads for quite some time. Betty Wason, in "A Salute to Cheese," suggests that "Dips and spreads can serve as economical uses for old cheeses that are beginning to dry up." She also notes that the Swedes have been using leftover cheese in much the same way for centuries, combining cheese with butter and aquavit to produce a Swedish potted cheese, or Pot KÂS.

The history of commercial cold pack cheese is a bit more recent. Paul Hernke, one of the three cheesemaking sons of Armin Hernke, recalls that cheese spreads were served in the hospitality center at the Pabst Brewery in Milwaukee in the early 1900's. This early pairing of cold pack cheese and beer was a harbinger of the future because it was an association that continued. Hubert Fassbender, the man who first manufactured cold pack cheese as we know it today, started out in the beer depot business. According to his granddaughter, Betty Hensel, back in the early 1930's Hubert was asked if he could bring something to serve along with the beer he delivered. It probably wasn't an unusual request given the history of the free tavern lunch that often included, along with cheese, pickles, deviled eggs, pretzels, ham and rye bread. In fact, when New York State banned the free tavern lunch in 1895, cheese makers felt the loss—free lunches accounted for 15 million pounds of cheese or one-sixth of the state's yearly production.

By 1933 Hubert Fassbender had developed his cold pack cheese spread and awarded it to customers who bought enough beer. According to Gary Fassbender, who runs White Clover Dairy (and whose grandfather Henry was Hubert's brother), eventually people didn't want all the beer, but they did want to buy the cheese. The Kaukauna Klub™ cheese business grew from there, first selling crocks to taverns, then retail, and finally becoming a national brand.

In 1934 Wisconsin dairy manufacturing plants included 539 butter factories, 2,136 cheese factories, 83 condenseries, 57 milk powder plants, 532 receiving stations, and 112 plants manufacturing casein. It's likely the competitive nature of the industry convinced Armin Hernke to use his surplus cheese to develop his own version of cold pack cheese. In 1934 he began making cold pack in the factory his father Albert had built in



The earliest reference to commercial cold pack that I could find is reproduced below. Published by the New York Produce Review and American Creamery in 1924, this account makes a point of noting that the new cheese is not "cooked."

New York Produce Review and American Creamery April 23, 1924

A NEW CHEESE

A Review representative was shown one of the latest additions to the growing assortment of package cheese in the store of Haupt & Burgi, 9 Worth St. This is a pressed prepared cheese, put up in 8 oz. cakes, wrapped in foil and a second moisture proof cover. There are two kinds, Swiss and American. The cheese is called "Velveeta" and is put up by the Velveeta Cheese Co. of Monroe, Wis., of which M. O. Schaefer is the leading spirit. Mr. Schaefer is best known as the manufacturer of Liederkranz cheese and a high grade of domestic round Swiss which is manufactured by the Monroe Cheese Co.

The new cheese is smooth and pleasing to the taste. It is made of well aged Cheddars and Swiss and according to Mr. Schaefer is produced by a patented process and is not "cooked."

It is packed one dozen half-pound bricks to the box.

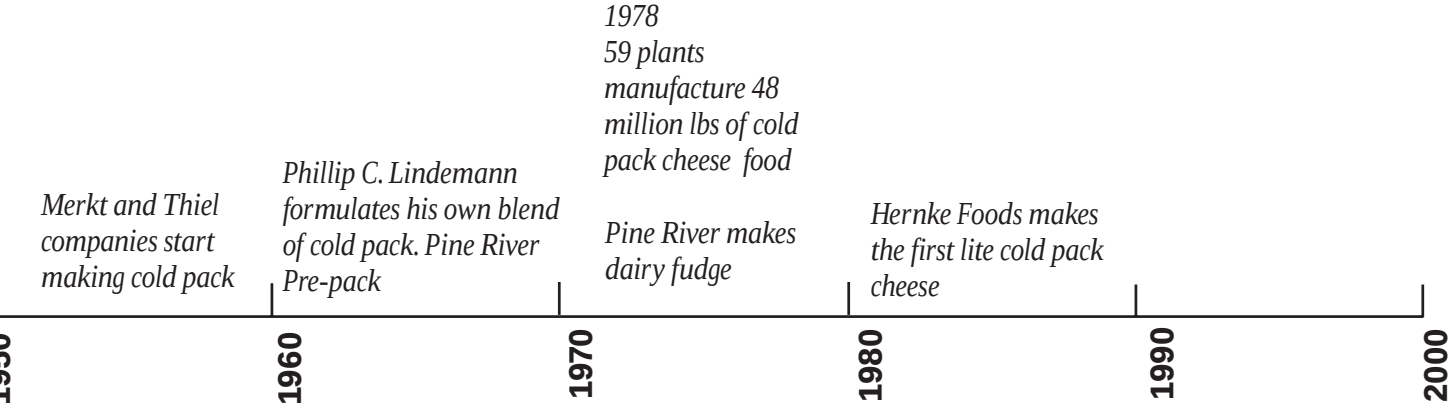
1896 and by 1938, he and a couple of other cheesemakers formed the Calumet Cheese Company, named after Calumet county. The people at the Calumet Baking Powder Company weren't too happy with them, so when a central Wisconsin marketing association named Wisconsin Pride disbanded, the name was given to Armin who then shortened it to WisPride™.

By the 1950's George Merkt of Salem, Wisconsin and Ken Thiel of Thiel Cheese had also entered the cold pack market. Thiel Cheese starting by selling cold pack in the food service segment and from there moved to retail. They have come full circle, changing their name to Thiel Cheese and Ingredients™ and selling cold pack in the form of a sauce to food service customers.

According to family members, Gustave O. Lindemann, a cheese grader who also worked in sales at Northern Wisconsin Produce Company, would field phone calls and take orders at the plant. Sometimes he took orders for club cheese spreads, even though he didn't have a source for it. That changed in 1963 when Philip C. Lindemann took Henry Fuhrman's advice and formulated his own blend of cold pack cheese food. In 1964 the business was incorporated under the name Pine River Pre-Pack and by 1979 Pine River was making 17 flavors of cold pack cheese food.

Cold pack cheese remains a popular product today; many varieties are available and it meets the needs of today's convenience minded consumers. According to John Jaeggi, cheese applications coordinator at CDR, "Because cold pack cheese is not heated, it might be a good vehicle for temperature sensitive functional ingredients like probiotics, or fortification with healthy fats like omega three fatty acids." But Paul Hernke thinks it is pretty nutritious already; he notes that, "You just about bring it back to whole milk, since you are adding the whey back and all the things you separated out." Cold pack cheese is something that the Hernke brothers most likely sampled as toddlers and Paul concludes with a laugh, "I still love it today."

Karen Paulus, editor



continued from page 1

Another method to eliminate calcium lactate crystals

Another proven method to eliminate calcium lactate crystals in Cheddar cheese was recently published in the Journal of Dairy Science, 87:863-867.

Peggy Swearingen et al, from Land O Lakes, compared cheese with and without calcium lactate crystal formation. When looking at pH, lactic acid, calcium (total and soluble) and NPN, they found no significant differences. They measured cheese at make and early cure.

The work showed that pH drive post manufacture was likely the strongest factor, and this was driven by starter culture selection.

Cheese defects can be influenced by the cheese making process, the packaging process or problems at the point of display.

acid by the *Propioni* bacteria used. In other words, gas could develop in a properly made cheese with deliberately added bacteria. However one additional requirement must be met. In order for the formation of gas —the bacteria must be metabolically active. That requires proper temperatures, usually warmer than 40ºF. So cold storage will help prevent gas development or at least greatly reduce the amount of gas formed. Unfortunately, many retail outlets for cheese do not or can not keep cold pack cheeses that cold.

Havarti, colby, and muenster come in two forms these days, closed and open. The original cheeses were full of small holes, or what have been referred to as mechanical openings. But, because of mold problems packagers began to tightly vacuum seal these cheeses and as a result the openings collapsed. Consequently, it is more common to see tight cheeses; the holes have disappeared. So, in this case, it is the packaging.

Defects are most often caused by a combination of factors

The truth is that cheese defects are most often caused by a combination of factors. The cheese and deli display cases were not designed to bring out the best in cheese. For one thing the temperatures are often too high, and then they cycle in order to remain "frost free". This influences the development of free water, which then provides ideal conditions for microbial growth. In addition, the intensity of the display lights can cause a pink color defect and promote the development of oxidized flavors. Inattention to inventory control and slow turnover only compound these problems.

In conclusion, cheese defects can be influenced by the cheese making process, the packaging process or problems at the point of display. There's plenty of problem solving that can be attempted at each level.

Skimming the Shelf–

What's New in Print?

The US Dairy Export Council (USDEC) recently published three new monographs on the benefits of whey proteins. You can easily download them as PDFs from the USDEC website and I recommend that you do. These monographs are well written, in-depth summaries of the health effects of whey proteins and the many bioactive components of whey. Each monograph lists extensive references of the research supporting the particular subject, an impressive list of documentation. Take the time to look over the other monographs on this site. The new monographs include the following:

Whey Proteins and Body Composition

Aimed at end users of whey products, this monograph makes the case that the consumption of whey protein, in combination with resistance training exercise, is a safe and effective strategy to build and maintain muscle mass and to preserve one's health throughout the aging process.

Whey Proteins and Immunity

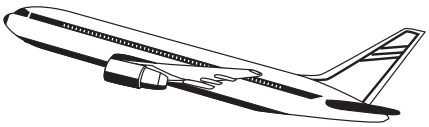
Designed to educate users of whey products about whey protein's unique ability to optimize a number of key aspects of immune function.

Whey Proteins and Senior Nutrition

Designed to educate users of whey products about the properties of whey proteins that may provide specific benefits to mature and senior adults.

The monographs are available on the USDEC website at www.usdec.org.
<http://www.usdec.org/>
Go to the Publications section and click monographs. Hard copies will be available in September. For more information, please contact Molly Lipka at 703-528-3049 or mlipka@usdec.org <mailto:mlipka@usdec.org> .

News from CDR



International Food Technology

In the food science world summer is the time for research meetings and this year was no exception. Carol Chen, CDR cheese researcher, traveled to the 2004 IFT Annual Meeting, July 12-16 in Las Vegas, Nevada to present her research on the "Rheological properties of mozzarella cheese."

American Dairy Science Association

The 2004 American Dairy Science Association met in St. Louis, Missouri from July 25-29. CDR researchers were busy, participating in the presentation of data from the following efforts:

Effect of emulsifying salts on the texture of pasteurized process cheddar cheese. N. Shirashoji, John Jaeggi, John Lucey

Effect of insoluble calcium phosphate on cheese functionality. J. Choi, D. Horne, Mark Johnson, John Lucey

Nutritional properties of whey proteins. K. J. Burrington

Use of reverse osmosis concentrated milk from the manufacture of cheddar and Colby cheese; impact on Ca equilibrium and functional properties. Mee-Ryung Lee, John Lucey, Mark Johnson

Impact of type of concentrated sweet cream buttermilk on the manufacture and functionality of pizza cheese. Tammy Lin, Rani Govindasamy-Lucey, John Jaeggi, Cynthia Martinelli, Mark Johnson, John Lucey

American Agricultural Economics Association

Brian W. Gould, CDR and Department of Agricultural and Applied Economics along with colleague Diansheng Dong of Cornell University, Dept. of Applied and Managerial Economics, presented "Product Quality and the Demand for Food: The Case of Urban China" at the 2004 Annual Meeting of the American Agricultural Economics Association, August 3, in Denver, Colorado

Curd Clinic

Curd Clinic Doctor for this issue is John Jaeggi, Cheese Application Coordinator at the Wisconsin Center for Dairy Research

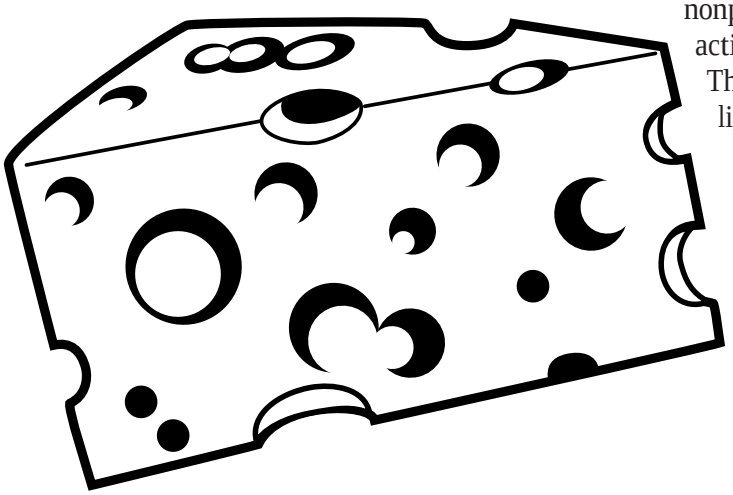
Q. I have been developing several new types of cold pack spreads using my cheese and I am running into flavor issues. In particular, a rancid off-flavor develops. What could be causing this?

A. There are several possibilities that can initiate this defect, however they all merge to a final commonality—encouraging, releasing or increasing lipase activity. The lipase enzyme breaks fat molecules apart to produce a variety of fatty acids; the type depends on where the enzyme action occurs. Fatty acids influence flavor, both the desired and less desirable flavors! For example, if too much butyric acid is produced you will taste it, a flavor note made famous around here when Bob Bradley compared it to baby vomit. A preponderance of fatty acids with either 6 or 8 carbons delivers a goaty flavor while the fatty acids with higher numbers of carbon in the molecular framework can produce soapy notes.

Getting back to the origin of the flavor defect in this case requires taking a look at the milk, in particular the cow lipases, which are enzymes. Enzymes are inactived by pasteurization. However, cows with mastitis may be putting out so much lipase that you still have some active lipase after pasteurizing. In addition, you may find increased leucocytes, or white blood cells in milk from mastitic cows. These cells can puncture the membrane surrounding the fat globule, allowing the lipase access.

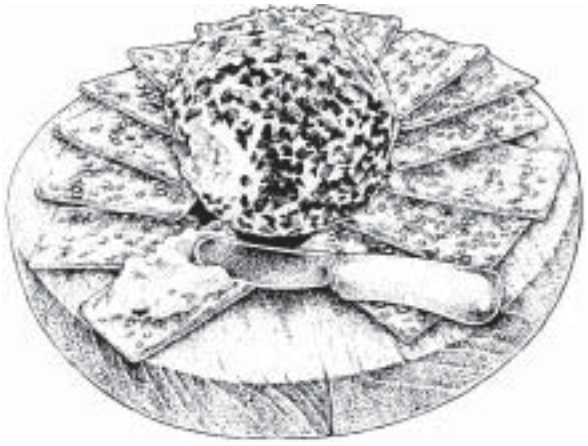
Heat resistant lipase

Also, if you have Pseudomonas in your milk, you have bacteria that can produce a heat resistant lipase, one that will not be inactivated during pasteurization. If you are using nonpastuerized milk you may still have some lipase activity left, even after 60 days of aging your cheese. These are the scenarios that might lead to enough lipase available to release an excess of fatty acids.



All of the above mentioned factors apply mostly to the cheese used as a base for cold pack. For you, as a cold pack cheese manufacturer, the concern is locating a high quality source to use for manufacturing your cheese. Use the information above to do some problem solving with your supplier.

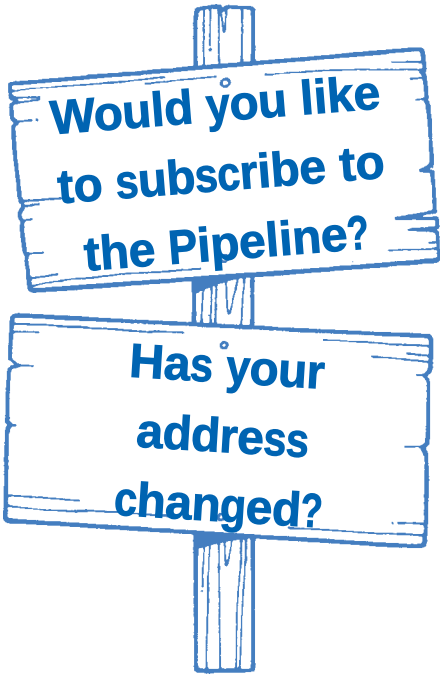
"My advice to you is to preblend and pregrind your ingredients, including all powders and liquids."



Another possibility is that the solution to your problem might be found in your own operation. A second route to off-flavors in cold pack cheese comes from the mixing process. For example, it is possible you are chopping your cheese too much. In this case you are actually breaking the larger milk fat globules into many more small globules, effectively increasing the membrane surface area available to the lipase enzyme.

Preblend and pregrind your ingredients

My advice to you is to preblend and pregrind your ingredients, including all powders and liquids. Don't depend on the cutter to do the mixing. In addition, you should use cheese made from pasteurized milk and prevent temperature abuse of your product, which is never good for cold pack cheese. Review your packaging; does the container prevent oxidation from light? Are your container lids opaque? If you follow these suggestions you should be able to improve the flavor profile of your cold pack cheese.



Please help us keep our mailing list current! Simply phone, fax or e-mail the information requested below to:

The Dairy Pipeline
Center for Dairy Research
1605 Linden Dr.
Madison, WI 53706
phone: 608/262-8015
fax: 608/262-1578

You can also choose to forgo a mailed copy and get on our e-mail subscription list which will remind you to read the Pipeline on the web. E-mail this request to hogensen@cdr.wisc.edu

Name _____

Company _____

Street Address _____

_____

City _____

State _____

Zip _____

Country _____
(and mailing code)

☐ CHANGE ☐ ADD ☐ REMOVE

Dairy Pipeline

The Dairy Pipeline
Center for Dairy Research
1605 Linden Dr.
Madison, WI 53706-1565
phone: 608/262-5970
fax: 608/262-1578

Karen Paulus, Editor

Technical Reviewers:
Mark Johnson, CDR
Norm Olson, Dept. of Food Science
Jim Path, CDR
Marianne Smukowski, CDR
Tom Szalkucki, CDR
Karen Smith, CDR
Bill Wendorff, Dept. of Food Science

The *Dairy Pipeline* is published by the Center for Dairy Research and funded by the Wisconsin Milk Marketing Board.

To subscribe to the Pipeline simply phone, fax, or e-mail your request to CDR. (Form on page 11) We welcome your questions and comments. Send them to:

Karen Paulus, Editor
e-mail: Paulus@cdr.wisc.edu
phone: 608/262-8015

You can also find the Dairy Pipeline on our website: www.cdr.wisc.edu

Calendar

Sept. 28-29 Dairy, Food and Environmental Health Symposium. cosponsored by Wisconsin Association of Food Protection, WI Association of Dairy Plant Field Reps, and WI Environmental Health Assn., Wis. Dells, WI. For more information, check the WAFP website at www.wafp-wi.org.

Sept. 28 Cheese & Butter Evaluation Clinic. World Dairy Expo, Madison, WI. Sponsored by Wis. Dairy Products Assn. For information, call WDPA at (608) 836-3336.

Oct. 4-8 Wisconsin Cheese Technology Short Course. Madison, WI. Call Bill Wendorff at (608) 263-2015.

Oct. 13-14 North Central Cheese Industries Assn. Annual Convention. Brookings, SD. For information, call Dr. David Henning at (605) 688-5477.

Oct. 19-20 Membrane Processing of Dairy Products Short Course. Madison, WI. Program Coordinators: Bill Wendorff (608) 263-2015 and Karen Smith (608) 265-9605.

Nov. 4-6 Great Lakes Dairy Sheep Symposium. Hudson, WI. For information, contact Lorraine Toman at the Spooner Ag Research Station at (715) 635-3735.

Nov. 9-10 Cheeses of France Artisan Course, Madison, WI. Program Coordinator: Jim Path, (608) 262-2253.

Nov. 16-17 Cheese Grading and Evaluation Short Course. Madison, WI. Call Scott Rankin at (608) 263-2008.

Dec. 2-4 Premium Ice Cream Short Course. Madison, WI. Call Scott Rankin at (608) 263-2008.

Wisconsin **Center for Dairy Research**
University of Wisconsin-Madison
1605 Linden Drive
Madison, Wisconsin 53706-1565

Nonprofit Org.
U.S. Postage
PAID
Madison, WI
Permit No. 658

ADDRESS SERVICE REQUESTED