

Frozen Culture Handling and Storage

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Waterford Food Products Inc.

Successful cheesemaking depends on healthy, active starter bacteria which produce acid consistently from day to day. To ensure that starter bacteria perform predictably, it is important to handle and store them correctly.

Starter bacteria differ in their susceptibilities to freezing and thawing. Some factors which influence susceptibility are species, strain, growth conditions, cell age, the nature of the growth medium, and the conditions of freezing, storage, and thawing.

Substantial research has been done to determine the optimum conditions for the maintenance of maximum activity in frozen cultures. Several general principles have emerged from this research:

- ✘ Cell death increases with extended storage time.
- ✘ Lower storage temperatures reduce cell death rates.
- ✘ Higher cell concentrations show more resistance to freeze-injury.
- ✘ Cells in stationary-phase survive freezing better than log-phase cells.
- ✘ Cryoprotective agents provide protection against freeze-thaw injury.
- ✘ Rapid freezing rates (such as in liquid nitrogen) produce small ice crystals which result in less cell damage.
- ✘ Storage temperatures at or above -20°C result in marked decreases in cell viability and activity.
- ✘ Optimal storage temperatures are -40°C or below.

Starter cultures should arrive at your plant hard frozen and packed with excess dry ice, usually at a temperature of -78.5°C (-108.4°F). Prior to shipment, these cultures were most likely frozen in liquid nitrogen at -210°C (-346°F) and stored in freezers at -85°C (-122°F) until shipped. Upon arrival, the insulated packing box should contain residual dry ice and the culture cans should be frozen hard. Properly frozen cans should make a slight ringing sound when they are struck together.

Starter cultures are perishable and have a finite shelf-life!

Starter cultures are perishable and have a finite shelf-life! When they arrive it is important to unpack the cultures quickly and transfer them to a freezer set at a temperature of -40°C (-40°F) or colder. An ideal storage temperature for cultures is -75 to -80°C (-103 to -121°F). This temperature gives maximum culture stability and shelf-life. Separate older lots of cultures from the fresh cultures just received, the older cultures should be used up first, much the same as you rotate food in your home.

Figure 1. shows a desirable storage temperature profile for cultures from manufacture to arrival and storage at your plant. Temperatures should be held as constant as possible. Avoid temperature fluctuations. Cultures should be transferred to a -75°C, or lower, freezer as soon as they arrive, so that no freeze-thaw damage occurs, and culture activity will remain optimal.

Fluctuating temperatures cause problems

Temperature fluctuations are very detrimental to starter cultures. These fluctuations cause intracellular ice crystals to grow in size by recrystallization. As ice crystals increase in size they can physically damage cell membranes, as well as intracellular structures. As more intracellular water is frozen, the cell cytoplasm dehydrates and solutes are concentrated inside the cell. Highly concentrated solutes can denature intracellular enzyme systems. Cultures do not have to thaw completely to sustain freeze-thaw damage. Even small temperature fluctuations can cause problems, if they occur frequently.

What's Inside:

Frozen Culture Handling and Storage	1
Inventing a New Niche Product, 10	3
News from CDR	9
Curd Clinic	10
Calendar	Back Page

continued on page 2

Figure 1. Desirable Culture Storage Profile

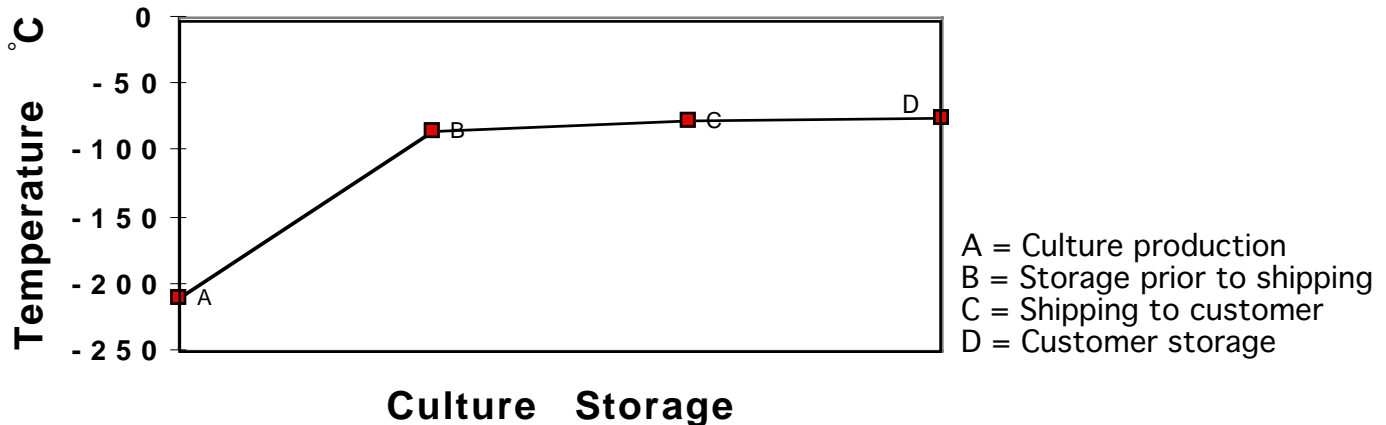
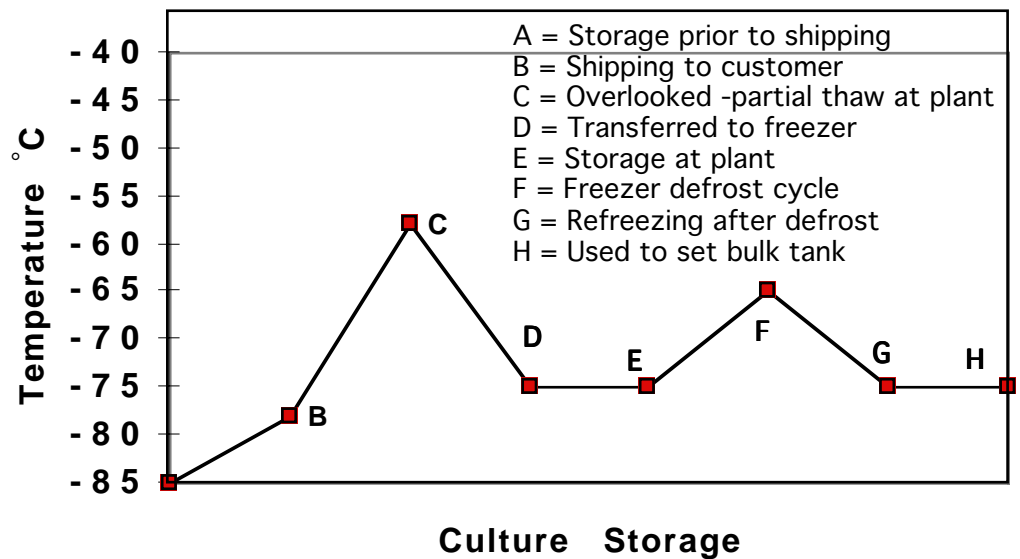


Figure 2. Improper Culture Storage Conditions

Figure 2. shows an example of improper culture storage conditions. Cultures were overlooked when they arrived and partially thawed. Once they were discovered, they were transferred to a -75°C freezer, where ice recrystallization during re-freezing caused cellular damage. The cultures were stored in a freezer with an automatic defrost cycle which raised the temperature inside the freezer during defrosting, and partially thawed the cultures. After defrosting, cultures were refrozen causing further recrystallization and cellular damage to the starter bacteria.



It's important to note that chest-type freezers maintain temperature better than upright freezers, especially when freezer doors are open for prolonged periods of time.

There is a direct correlation between freezer temperature and maximum length of culture storage. Lower storage temperatures allow longer culture storage times. Table 1 illustrates this principle.

Table 1. Reliable storage times for bulk and DVS cultures held at different frozen temperatures*.

	-20°C	-40°-45°C	-75°C (or lower)
Reliable Storage Time	5-10 days	3-6 months	12 months

* Freeze-dried cultures can be stored at 4°C for longer than 12 months.

next page

Inventing a New Niche Product, Part 10

Paul Scharfman, Specialty Cheese Company and Wisconsin Specialty Cheese Institute

Finally, new Wisconsin Traditions brand Aged Cheddar was ready for market! After two years of effort, the Reenap Company was about to introduce their new cheese product.

The Reenap Company planned to position the new brand as offering “the taste of Cheddar the way it used to be” because market research suggested this concept was persuasive – and their product delivered on the concept’s promise. They were happy with the new label, which pictured a cheesemaker over an open vat. Since their product is a new concept that will increase consumption, the sell sheet stressed how it would build total category sales of Cheddar – rather than simply take share from an existing brand.

“I feel like I should be very excited, but I’m frankly more nervous than I’ve been in months” said Don, the New Product Development Team leader. “I guess I’ve gotten comfortable being in a ‘laboratory’ setting. Now that it’s time to go out into the real world I’m not sure what to do.”

Marketing plans

Don’s dilemma is common. All too often, promising new products are introduced to the marketplace with little thought to pricing, promotion, or distributor/broker plans. The early strategic work that created the concept is ignored while the product is hastily pushed into broad distribution with little

continued on page 4

Frozen Culture Handling and Storage *continued from page 2*

Some of the symptoms of improper culture storage include:


- ✘ The need for additional cans of culture to achieve normal bulk starter fermentation times.
- ✘ A longer lag period before injections begin (external pH controls), or the pH of the starter medium begins to drop (conventional or internal pH control).
- ✘ Longer incubation times (External pH control injections will also be drawn out and last longer).
- ✘ A decrease in starter activity.
- ✘ The need for additional starter amounts in the vat.
- ✘ Strain imbalance, which can affect acid production rates and phage susceptibility.

Frozen culture cans should be thawed in cool to luke warm chlorinated water (~100 ppm). Avoid using hot water to thaw cans. Allow the cultures to partially thaw until the culture can be easily poured into the starter tank. It is not necessary to completely thaw the can before adding it to the starter tank. Sanitize hands before handling or opening cans. Make sure the starter medium is at incubation temperature before inoculation. Open the can to the side of the starter tank opening to avoid dropping the lid into the starter tank. Quickly pour the contents of the can into the starter tank. Don’t worry about the small amount of residual culture in the can, it won’t affect growth times or cell numbers. Don’t risk contaminating the starter by rinsing the can in the pasteurized starter medium.

Agitator speeds should be set to the lowest setting during incubation to ensure that oxygen is not entrained in the starter medium. Starter bacteria do not grow well in the presence of incorporated air, and will produce lethal by-products (e.g. hydrogen peroxide) when grown in the presence of oxygen. These by-products will severely reduce starter activity in the vat!

Following the suggestions outlined above will help assure that healthy, active starters are produced daily resulting in consistent cheesemaking.

Selected References

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promotional support. Not a pretty sight and not very effective either!

“Don, let’s put together a marketing plan.” That was Sara, often the cool-headed Team member. “Let’s remember that we originally targeted this concept to Seniors and later expanded it to upscale consumers and white tablecloth restaurants. We have a lot of information about those markets that we could use to put together a marketing plan.”

The purpose of a marketing plan is to plot a course of action that details exactly how word of your new product will reach your targeted markets. That means a marketing plan must answer the following questions:

1. How will you get your products from your factory to the ultimate consumer’s plate? This is your “chain of distribution.”
2. How will you promote your product so your buyers will notice it, understand it, and will be motivated to buy it?
3. How will you price your product so it offers all the buyers in your proposed chain of distribution a good value?

“Let’s set up a grid to answer these questions for each target market,” suggested Jim. He quickly sketched out what he had in mind.

Marketing Plan Summary Grid

Channel	Package Size/Pack	Distributor	Broker	Advertising and Promotion
Retail —Grocery	16/6 oz.	Direct Store	Yes	ad/demo
Fancy Food	16/6 oz.	UPS	Yes	trade ad/publicity
Direct Mail	16/6 oz.	Direct Ship	No	ad/internet
Foodservice				
White Table	2/5 lb	Spec Distrib	Yes	samples/shows
Casual Theme	8/5 lb	Spec Distrib	Yes	samples/sales calls
Airline	64/1 oz.	Direct Ship	Yes	samples/sales calls
Industrial				
Frozen Foods	1/40 lb	Direct Ship	No	sales calls

Drafting a trial generating plan

The Team studied Jim’s grid and then began to fill it in. Pragmatically, they knew that using store-door distributors and brokers for most accounts would be the best approach for their new product. The Reenap Company would need them to help shelve, rotate stock, and work with individual store and restaurant managers.

They also recognized that their small company could not afford media advertising for their new product’s introduction. Instead, they wanted to focus on gaining trial through in-store activities such as demos, feature advertising and displays. For foodservice, the Team recognized that trial build would be slow because it would depend on enthusiastic brokers and distributor sales people personally selling to chefs.

It didn’t take the Team long to fill out most of their marketing plan grid. They quickly realized that the tactics necessary to gain awareness and trial would be different for different target markets.

How can we pay for it — Setting your price and priorities

Don knew that pricing would be critical to the success of the fledgling Wisconsin Traditions brand. Setting the price too high would prevent trial. Setting the price too low would mean the Reenap Company could not afford the expense of building trial and awareness.

“You know, it just doesn’t seem fair,” Don muttered. “Why can’t we just sell the product to distributors and supermarkets and have them take care of selling to the consumer?”

“If only it was that easy,” replied Jim. “Come on, Don. We both know that the distributors and retailers are flooded with so many new products that all they can do with a new product is give us

space on their shelves. Selling Wisconsin Traditions will be up to us. That’s why we have to build margin into our price for brokers, trade shows, coupons, demos and so on.”

“But that means we’ll be much higher priced than most Cheddar!”

“True. But how else do specialty foods survive? We offer a better product with a persuasive concept. It’s expensive to build the Cheddar category by developing new products like ours.

And, it’s even more expensive to gain trial and awareness of them.”

“Well, let’s take a look at the pricing we’ll need for each of our new items.”

The New Product Development Team gathered the following day to set pricing. First, they reviewed the costs of Wisconsin Traditions brand. To begin, they figured that the cheese would be aged six months and that it had a 10% yield. They guesstimated that the cost of milk over the coming year would be \$15 per cwt.

Consequently, they could estimate that each pound of cheese would cost them about \$1.50 for milk alone. Next, the Team added the costs of making the cheese into 40 pound blocks (labor, rennet, utilities, etc.) plus the cost of aging the cheese (interest on the money tied up in inventory plus cold storage costs). They figured those costs added up to 43 cents per pound of cheese.

The Team then called several cut and wrap operations near their factory to learn the costs of packaging their smaller size packages. They also asked their local broker for help in estimating the costs they could expect to pay for brokerage in the channels where they planned to use brokers.

Finally, the Team planned their introductory promotion tactics. They figured that the cost of these tactics should be spread out over their first year's volume, as follows:

Year I Introductory Promotional Plan

Channel	Promotional Tactics Year 1	Cost Per lb of Yr 1 Promotion
Grocery	3 feature ads, 1 demo per "A" store	.50¢
Fancy Food	sampling allowance, trade ads, case cards	.50¢
Direct Mail	ads in catalogs, internet, Trade shows	.50¢
White Table	table cards, Trade shows	.25¢
Casual Theme	table cards, recipe contest	.20¢
Airline	miniature parchment brochure	.20¢
Frozen Foods	samples for testing suggested recipes	.05¢

Based on their figures, the Team then constructed a cost matrix:

Total Cost for Each Proposed Channel

Channel	Package Size/Pack	Cost/Lb.of 40 lb Block	Cut, Wrap Pkg. Cost/lb	Cost/lb of Promotions	Cost/lb of Broker	Total Cost
Grocery	16/6 oz.	\$1.93	.75¢	.50¢	.08¢	3.26/lb
Fancy Food	16/6 oz.	\$1.93	.75¢	.50¢	.09¢	3.27/lb
Direct Mail	16/6 oz.	\$1.93	.75¢	.50¢	0	3.18/lb
White Table	2/5 lb	\$1.93	.09¢	.25¢	.05¢	2.32/lb
Casual Theme	8/5 lb	\$1.93	.07¢	.20¢	.03¢	2.23/lb
Airline	64/1 oz.	\$1.93	\$1.30	.20¢	.03¢	3.46/lb
Frozen Foods	1/40 lb	\$1.93	.02¢	.05¢	.02¢	2.02/lb

"Wait a minute! We forgot profit!"

"Right. Not such a little problem. What do you think? Should we add a nickel a pound?"

"No way. This product is new, it's a big risk for us, and it tastes great. Either we make our planned 25¢ per pound or we don't do it!"

"What about the competitive pricing survey we did? Has anyone looked at that?"

As the team looked they saw that they could not afford to charge so much for their foodservice products—the competition was too low priced. On the other hand, they found that the retail price of premium Cheddar was high enough that they could enhance their planned margins slightly.

After making these decisions the Team could put together their pricing plan. Equally important, they could make a priority listing of their target markets – based on their potential profitability. For the Reenap Company, a small manufacturer with

next page

limited volume capacity, higher profit margin meant higher priority— the company was simply too small to focus on markets which could only be profitable with very large volumes.

“How can we charge a different amount to different customers for the same item? Isn't that what we're proposing with the 16/6 oz. item?”

“You're right, Don” said Sara. “Those prices are all pretty close. Let's simplify the price so we have only one price per item.”



Let's simplify the price so we have only one price per item.

Preliminary Price List and Priority Ranking

Priority/Channel	Package Size/Pack	Total Cost/lb	Profit Margin	Selling Price/Case F.O.B. Reenap
Direct Mail	16/6 oz.	3.18/lb	35 ¢/lb	\$21.18/Case
Grocery	16/6 oz.	3.26/lb	30 ¢/lb	\$21.36/Case
Fancy Food	16/6 oz.	3.27/lb	30¢ /lb	\$21.42/Case
Airline	64/1 oz.	3.46/lb	25 ¢/lb	\$14.84/Case
White Table	2/5lb	2.32/lb	20¢ /lb	\$2.52/lb
Casual Theme	8/5lb	2.23/lb	15¢ /lb	\$2.38/lb
Frozen Foods	1/40lb	2.02/lb	10¢ /lb	\$2.12/lb

Wisconsin Traditions Brand Final Price List

Package Size/Pack	Selling Price/Case F.O.B. Reenap
64/1 oz.	\$14.84/lb
16/6 oz.	\$21.50/lb
2/5 lb	\$2.52/lb
8/5 lb	\$2.38/lb
1/40 lb	\$2.12/lb

“Look, we've come this far on our own. Let's try to set up our own sales and marketing system. If we want to keep developing new products we'll need a tighter connection to the marketplace.”

“Sounds right to me. Which cities should we start with?” wondered Don. He and the Team knew they couldn't immediately introduce their new product throughout the nation – they simply didn't have enough personnel or funds for marketing investment.

“Let's fish where the fish are” suggested Jim. “By that I mean, let's find out where the market for upscale Cheddar is already large and start introducing our cheese in those cities.”

Selecting distributors and brokers

The New Product Team was ready to approach the market place. They had product, pricing, and marketing plans. Now they needed to find people who could bring their product from their factory to consumers.

The Team recognized that contracting with a marketing company or master broker to sell their new products nationally would be the simplest option. This way Wisconsin Traditions could easily tap into established broker and distributor networks. The disadvantage was cost and loss of control over their brand's marketing.

There are no simple rules for deciding whether to use a master broker or develop your own broker and distributor network. For small companies, whose energies are consumed with manufacturing excellent products, using a master broker or marketing agent is appropriate. For firms that want to control the marketing of their products directly, this arrangement won't work.

Introductory markets

The Team turned to the Wisconsin Milk Marketing Board for help to determine which cities had the most developed upscale Cheddar markets. Within a week they were able to choose their introductory markets. Using the Yellow Pages from those cities, Team members started calling the firms listed under “Food Broker.”

To their chagrin, many of the Team's initial calls were greeted with little enthusiasm. Many brokers asked for a monthly fee to “pioneer” a new product. After all, the brokers said, “It costs me money to visit buyers and try to sell your line – and there won't be much in the way of commissions coming in for many months.”

Store door distributors, too, were often frosty in their reception. “Not different enough from the other premium Cheddars,” Way

next page

too pricey,” and “Not enough introductory spending planned” were some of the comments the Team heard.

“I’m discouraged,” said Jim to Don after two weeks of cold calls. “What are we doing wrong?”

“Let’s ask our local broker for advice,” Don replied.

Selecting brokers and distributors

That afternoon Don and Jim learned some of the fundamentals of selecting brokers and distributors. They listened carefully as their broker spoke.

“First, you need to understand the difference between brokers and distributors. A broker’s job is to sell. He, or she, needs to know each of the buyers in their city. In addition, a retail broker should know many of the store managers and a food service broker should know many of the local chefs. The broker needs to convince the buyers that they need your product. He, or she, also needs to convince the retail store managers to help move your product with good rotation, shelf position, sampling, and so on. A foodservice broker needs to have the skills to demonstrate to local chefs – in their kitchen – exactly how to use and store your product.”

“A distributor has a different job. His job is to physically bring your product. Often a distributor will have sales people on their staff. Be wary, however, of using these people as your sole selling resource for new products. A distributor’s salesperson often has to take orders and build volume for thousands of items that the distributor has in the warehouse. These salespeople lead harried, frantic lives responding to customers’ calls to eliminate out-of-stocks, replace faulty product, etc. Given a few minutes of time with a customer, a distributor’s salesperson is much more likely to try to build volume on items that he is already selling than try to pitch a new but unknown item.”

“The key to selecting a broker and/or distributor in each city is to find the ones who are already visiting the buyers you want to see and already are carrying products similar to yours. That way your new brokers and distributors have to do a minimal amount of work to start to work with your new line. For example, if you want your cheese to be sold as an upscale item in supermarket “cheese shops” you should find brokers who know the “cheese shop/deli” buyers – not ones who specialize in the “dairy section” – where the commodity cheeses, milk and eggs are shelved. The same goes for distributors. Don’t ask a meat distributor to handle upscale cheeses!”

Don and Jim stared at each other. During the past two weeks of calls, they had broken every piece of the advice their broker had just given them. Now they could make progress!

Again, they relied on the Wisconsin Milk Marketing Board for help. By asking their Regional Managers, the Team was able to secure a list of brokers and specialty distributors who work in their target areas. They called these firms and asked for

references from their current principals. To their surprise, the Team members found that many of the references were other small cheese companies! They also found that in most cities they needed different brokers and distributors for foodservice than for retail. By networking with other small cheese companies and listening carefully to the references supplied by the distributors and brokers they called, the Team established a short list of broker and distributor candidates in each of their priority markets.


“Well, I guess it’s time to get on a plane,” said Jim.

“What?! Why don’t we just choose a broker and a distributor over the phone?”

“No way. We’ve got to spend the time to visit each market, to learn about the stores, restaurants and chains, and to motivate our future marketing partners. If we’re going to launch Wisconsin Traditions we need to learn about the markets and our representatives personally.”

One year later


“You know, the thing that amazes me most is that we thought we had finished our work after the product test came back successfully.” Sara laughed as she spoke. “Then, we thought we were really done with our work after we had labels and sell sheets printed. The truth is that all added up to about half the battle. Actually selling the product is the other half – developing marketing plans, selecting brokers and distributors, and visiting buyers was just as critical to the ultimate success of Wisconsin Traditions.”

“That paints too grim a picture for a company just getting started in new product development,” said Don. “Remember the first stage of development was the hardest simply because we had no successes to build on. Each stage certainly presented its challenges but, as we overcame hurdles, the New Product Development Process started to have a life of its own. At the beginning we had a lot of people questioning our sanity. By the time we were introducing the product into the marketplace, we had many people willing to help. My advice to a small company considering broadening their product line by developing new products is simple: Get started!” 



Introducing a New Whey Short Course

A new Whey and Whey Utilization Short Course will be held April 8-9, 1997 at the University of Wisconsin campus in Madison. This two-day course will survey the potential for maximizing returns on whey for both the cheesemaker and whey processor. This course is also one of the elective short courses for the Wisconsin Master Cheese Makers Program. Dr. Bill Wendorff of the UW Food Science Dept. and Jim Path of the Center for Dairy Research are coordinating the short course. For further information on the Whey and Whey Utilization Short Course, please contact Bill Wendorff at (608) 263-2015 or Jim Path at (608) 262-2253.

Due to the impending environmental regulations on chlorides and phosphorus in Wisconsin, we are holding the Dairy Plant Water & Waste Management Short Course on May 6-7, 1997 on the Madison campus. First introduced in May 1996, this short course covers all aspects of regulation and management of water and wastewater within dairy plants. This year the new chloride regulation will be discussed, along with some new information on savings by minimizing waste. Call Bill Wendorff at (608) 263-2015 for further information on this short course offering. 

Annual Wisconsin Dairy Field Reps Conference February 4-5, 1997 Holiday Inn - Madison East

Tuesday, Feb. 4 Morning, Quality Milk Components

Moderator - Norm Kedrowski

10:00 Milk Component Pricing - One Year Later
- Myron McKinley

10:30 Feeding for Milk Components
- Randy Shaver

11:10 Use of Milk Urea Nitrogen for Efficiency
- Glenn Broderick

11:30 Quality Attributes in Raw Milk
- Bill Wendorff

12:00 Lunch

Afternoon: Quality Issues at the Farm, Moderator - Dan Belk

1:15 Using Bulk Tank Milk Cultures in Quality Management
- Dave Linn, D.V.M.

1:55 Stray Voltage and Cleaning After Extended Runs
- Doug Reinemann

2:25 Recruitment of Western Farmers
- Debbie Crave

2:45 Break

Management and Resources Moderator - Jerry Krueger

3:10 Field Reps on the Internet
- Terry Smith

3:35 Computers in the Parlor
- Russ Kolstad

4:00 What Happens When Disaster Strikes?
- Richard Wagner

4:30 Business Meeting

5:30 Social Conference

Wednesday, Feb. 5, Morning

7:30-8:30 Breakfast

Critical Regulatory Issues for Quality Milk Moderator - Bob Bradley

9:00 New IMS Rating Procedures
- Randy Daggs

9:30 Current Concerns from WDATCP
- Tom Leitzke

10:30 Summary


Adjournment

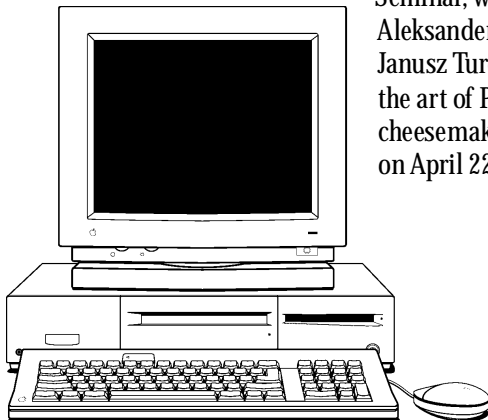
News from CDR

CDR has a new computer network. Unfortunately, that means we all have new e-mail addresses, listed on the right. You can also contact us via our web site: <http://www.cdr.wisc.edu/> The web site has built in e-mail links to all CDR staff.

Sarah Quinones, an 8 year veteran at CDR, has moved on to pursue new ventures. Congratulations Sarah!

Concerned about managing salt in your plant? Bill Wendorff has put together a UW Dairy Alert covering "Good Salt Management in Cheese Plants." If you would like a copy of his report, contact CDR at (608) 262-5970.

Jim Path, CDR's cheese ambassador, is at it again –traveling to Europe in November. He started in Pamplona, Spain, at the European Alliance of Dairy Teachers Conference. While in Spain, Jim traveled with Andrew Lamberton, instructor at the English Cheese Seminar held in September, 1995. After Spain, Jim went to the Institute of Dairy Technology at the University of Agriculture and Technology in Olsztyń, Poland. He arranged the next Artisan Seminar, which will feature Aleksander Surazynski and Janusz Turowski teaching the art of Polish cheesemaking at the CDR on April 22-24, 1997. 




CDR E-mail addresses (12-96)

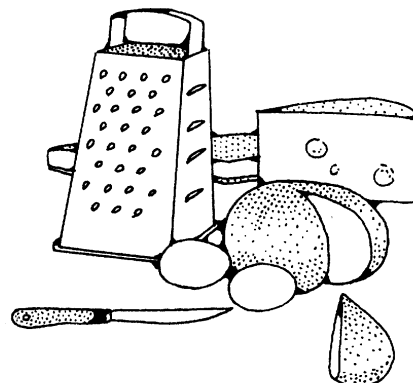
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Mike Payne	PAYNE@CDR.WISC.EDU
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Calendar, continued

Apr. 22-24 Polish Cheese Artisan Course, Madison, WI. Call Jim Path at (608) 262-2253.

May 6-7 Dairy Plant Water & Waste Management Short Course, Madison, WI. Call Bill Wendorff at (608) 263-2015.

May 21-22 Applied Dairy Chemistry Short Course, Madison, WI. Call Bill Wendorff at (608) 263-2015. 



Curd Clinic

Q Recently I attended a Cheese Grading Short Course at the University of Wisconsin in Madison. I was surprised to learn that industry graders and regulatory graders have different criteria when grading cheese, particularly when considering flavor and age. I find this confusing, can you clarify it for me?

A. You're right, this is a confusing issue – for buyers, sellers, and even graders. Let's sort through some of the factors that influence how we interpret cheese grades.

We need to go back to the early part of this century, when manufacturing American Cheddar cheese was less uniform and more diverse. Commercial inspections were based on the personal preference and experience of the inspector, along with the special preferences of the inspector's cheese market. In 1923, the Department of Agriculture recognized the need for both a grading system and national grading standards. Fryhofer and Potts (1) developed grade standards that evaluated quality based on definition and classified cheese based on age, flavor, texture and color. After lengthy reviews, the grading standards were revised in 1956 to make them more complete, more specific and more informative. These changes established the four grades used today – U.S. Grade AA, U.S. Grade A, U.S. Grade B, and U.S. Grade C. Along with flavor, body and texture, finish and appearance, and color, the revised standards classify characteristics or defects, including the intensity of flavor. USDA regulations are not mandatory, this system of user friendly grading is done by request.

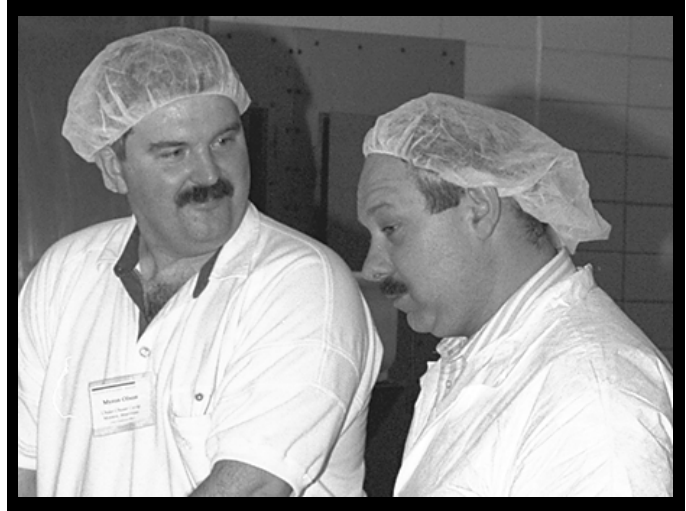
Buyer specification grading vs. regulatory grading

USDA regulations were set up to meet specific, uniform national standards, based on the standards of identity. They were not designed to address consumer flavor preferences. This is also true for Wisconsin grade standards – the only state that has grade standards. All other states follow the USDA regulations.

Buyer specifications may or may not match regulatory standards. Instead, they are set up to meet individual customer needs and they are designed to address consumer preferences. This is best illustrated when you look at varying consumer preferences in different parts of the country. Californians generally prefer a mild flavored Cheddar, Southerners like a slight rancid flavor, East Coast residents go for the sulfur notes and here in the Midwest we like a very slight acid flavor in our Cheddar. Flavor attributes of aged Cheddar cheese, while considered a defect in some regions of the country, may be acceptable, or even desired in other regions. Thus, if the aged Cheddar has an intense sulfur flavor, the Wisconsin Grade A standard might score it "definite" sulfide. On the East coast, sulfide flavor is a desirable attribute. Industry graders for companies buying cheese for the East coast would grade this cheese differently, it may be "slight." (See Table 1) Thus, understanding customer needs becomes a very important factor when selecting cheese.

Grading for flavor vs. for age

Many cheese buyers select cheese aged for a specified time, although age does not always correlate with flavor intensity – 8 months old may be sharp, 4 months medium, or perhaps 6 months is sharp and 3 months medium. You'll also hear this cheese called calendar cheese. If you want to be even more thorough, it is really Julian calendar cheese, which refers to the Julian calendar that lists January 1 as day one, February 1 as day 32,



Curd Clinic doctor is Terry Lensmire, right, Chief Grader at Land O' Lakes, pictured here with Myron Olson, left, at a CDR Master Cheesemaker Seminar.

Questions for the Curd Clinic?

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Table 1. Classifying Cheddar flavor according to degree of curing

Flavor Characteristics	AA			A			B			C		
	Fresh	Medium	Aged	Fresh	Medium	Aged	Fresh	Medium	Aged	Fresh	Medium	Aged
Feed	VS	VS	VS	S	S	S	D	D	D	P	P	P
Acid				VS	S	S	S	D	D	D	P	P
Flat				-	-	-	S	S	S	D	D	D
Bitter				-	VS	S	S	D	D	D	P	P
Fruity							S	D	D	D	P	P
Utensil							S	D	D	D	P	P
Metallic							-	-	-	S	D	D
Sour							-	-	-	S	D	D
Whey Taint							S	D	D	D	P	P
Yeasty							S	S	S	D	D	D
Malty							S	S	S	D	D	D
Old Milk							S	S	S	D	D	D
Weedy							S	S	S	D	D	D
Onion							VS	VS	VS	S	S	S
Barny							S	S	S	D	D	D
Lipase							S	S	S	D	D	D
Sulfide							-	-	S	-	S	D

VS = Very Slight S = Slight D = Definite P = Pronounced
 From: U.S. Standards for Grades of Cheddar Cheese, Subpart K,
 Section 58.2501, 1956

etc. According to this calendar, 100 day old Cheddar is close to 3 month old Cheddar.

Cheese buyers who select calendar cheese want to supply a customer with cheese at a certain time and probably from the same supplier. This way, their customer becomes accustomed to a particular flavor from a particular supplier.

Grading for flavor

Because of the regional variation in consumer taste, cheese graders employed by cheese plants are under a lot of pressure when they grade ten day old Cheddar. This is the point where they assess body and flavor and use the results to decide where the cheese will go. For example, they can target an East coast vs. West coast market. They can also store the cheese for aging, repack it, or use it for shreds, slices, or as an ingredient.

If the manufacturer wants to produce Cheddar with a particular flavor profile, they can do it by the conventional route – using time to develop flavor. Or they can take the nontraditional route. Nontraditional methods include flavor adjuncts, starter cultures,

and elevated curing temperatures. Using these methods independently, or combining them, can produce a particular flavor in a shorter time frame by accelerating the cheese ripening process.

Impact of different standards

Over the years, diverging regional preferences for Cheddar flavor have made cheese production more complicated. Production plants often need to match manufacture with customers or modify make procedures to meet different customer demands.

References

1. Small, Edward. History of USDA Standardization, Inspection and Grading Services, 1979. 

UW DAIRY PIPELINE

Calendar

Jan. 6-9 Milk Pasteurization and Process Control School. Madison, WI. Call Bob Bradley at (608) 263-2007 for information, or the CALS Conference Office (608) 263-1672 to register.

Jan. 13-17 Ice Cream Makers Short Course. Madison, WI. Call Bob Bradley at (608) 263-2007 for information, or the CALS Conference Office (608) 263-1672 to register.

Jan 22 Basic milking systems: an introduction to milking machine function and design. Contact CALS conference office at (608) 263-1672 or Doug Reinemann 608-262-0223 for more information.

Jan 23 Basic Cleaning Systems: an introduction to milking machine cleaning and sanitation. Contact CALS conference office at (608) 263-1672 or Doug Reinemann 608-262-0223 for more information.

Feb. 4-5 Wisconsin Dairy Field Reps Conference. Madison, WI. Call Bill Wendorff at (608) 263-2015.

Feb. 20-21 Market Planning Program for Cheesemakers. Madison, WI. For information, call Joan Gillman at (608) 262-9982.

Feb. 25-26 Wisconsin Process Cheese Short Course. Madison, WI. Call Jim Path at (608) 262-2253 or Bill Wendorff at (608) 263-2015 for more details.

Mar. 17-21 Wisconsin Cheese Technology Short Course, Madison, WI Call Bill Wendorff at (608) 263-2015.

Mar. 25 Wisconsin CIP Workshop, Madison, WI. Call Bill Wendorff at (608) 263-2015.

Apr. 2-3 Wisconsin Cheese Industry Conference, Green Bay, WI. For information, call Judy Keller at (608) 255-2027.

Apr. 8-9 Whey and Whey Utilization Short Course, Madison, WI. Call Bill Wendorff at (608) 263-2015 or Jim Path at (608) 262-2253.

continued on page 8

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