

DAIRY PIPELINE

The dairy industry steps towards sustainability

High prices for energy, disappearing ocean fisheries, contaminated ground water, and climate change. You may have read about these issues in newspapers or blogs, or perhaps watched a documentary on television. Earth's problems can seem insurmountable, the answers both discouraging and slow in coming. Perhaps that is why the concept of sustainability is gaining recognition, it suggests a path, a method, an option we can start to implement.

In a 1987 United Nations report, Norwegian prime minister Gro Harlem Brundtland defined sustainability as "meeting the needs of the present without compromising the ability of future generations to meet their own needs." Back in 1971, economist Nicholas Georgescu-Roegen offered some sustainable daily rules; "Renewable resources such as fish, soil, and groundwater must be used no faster than the rate at which they regenerate. Non-renewable resources such as minerals, and fossil fuels, must be used no faster than renewable substitutes for them can be put in place. And, pollution and wastes must be emitted no faster than natural systems can absorb them, recycle them, or render them harmless."

Rising energy costs and increasing levels of green house gasses like carbon dioxide (CO₂) have influenced today's increasing interest in sustainability. What will this mean for the dairy industry? We don't know yet, but we have a few ideas.

The first Sustainability Summit for U.S. Dairy gathered in June at the Applied Sustainability Center at the University of Arkansas in Rogers, Arkansas. Around 250 industry leaders met to identify common



What's Inside:

The dairy industry steps towards sustainability	1
Milk markets and more	4
Skimming the Shelf	7
News from CDR	8
Curd Clinic	10

interests and issues and recommend an action plan to increase operational efficiencies while reducing green house gasses. Dairy organizations, including National Milk Producers Federation, Dairy Management Inc., and the International Dairy Foods Association will follow up by analyzing the carbon footprint of milk. They will look at milk production, beginning at the farm and ending with the consumer, and eventually publishing their results to help the dairy industry identify ways to reduce energy use while increasing sales.

Continued on page 2

Continued from page 1

As stewards of the land, dairy farmers have always paid attention to soil conservation, water use and manure management. In the future managing green house gasses, like the methane produced by ruminant animals, will be added to the list. Some farmers are already using anaerobic digesters, which not only take care of waste but also provide power.

Australian dairy leaders, struggling with the worst drought in Australian history, embraced the sustainability concept several years ago. With an environment manager in every plant, they have reduced both water and energy usage while analyzing the carbon footprint of raw milk processing.

Here in the U.S., the packaging story of the year involves a square milk jug. Developed by Superior Dairy of Canton, Ohio back in 1998, using this jug eliminates the need for those ubiquitous plastic milk crates. That in turn saves water, labor and transportation costs since fewer trips are needed to deliver the stacked, shrink-wrapped pallet of jugs. Sam's Club has adopted the new style, passing the savings of 10 to 20 cents on to the customers.

As we all continue to drive less, dial down our thermostats, evaluate our own water use, and reuse and recycle our household goods watch for more innovation on the sustainability front in food production, packaging and transport.

Resources

<http://www.packworld.com/casestudy-14588>

<http://www.nmpf.org/node/389>

<http://www.packagingdigest.com> 

Welcome Milani to UW Food Science

Dr. Franco Milani has joined the Department of Food Science-Extension as an Assistant Professor, replacing Bill Wendorff. If you sign on for a short course, like the upcoming Cheese Technology course, you will get a chance to meet him. For now, this introduction will have to do.

Dr. Milani brings over twenty years of experience in dairy processing, including the last thirteen years as a research and development scientist. He has worked on product development, experimental design and statistical analysis, as well as nutritional labeling and regulatory standards of dairy foods. A new pursuit for Dr. Milani is the issue of sustainability, specifically in dairy processing. Here are some of his thoughts.

What does the dairy industry need to focus on to be more sustainable?

Agricultural practices that put more gaseous nitrogen oxide into the air will certainly be getting more attention. That's because adding chemical fertilizers to crops is not very efficient. Also, the process of nitrogen fixation is inefficient and some of the nitrogen turns to nitrogen oxide gas, a very potent green house gas.

And then we have a huge issue with methane. Ruminants, which include dairy cows and cattle, produce methane as a byproduct of digestion. Feeder cows raised for meat put out more methane, because of the sugars in the feed. Some European researchers are looking at feeding studies to reduce methane emissions in cattle, but my view is we'll find it is easier to reduce some industrial sources of green house gasses than the methane produced by cows.

Manure management is the second half of the methane issue, since settling pools produce a lot of methane, which goes out in the air. Landfills have the same issue and now some of them are capturing the methane. Dairy farmers are starting to harness methane and other green house gases using digesters. These sealed tanks use bacteria to break down the waste and produce bio-gas. When the captured gas is burned it can produce electricity and heat.

What is left after digesting ?

First, the methane may be used to produce electricity and heat, then the liquid portion, which contains minerals and dissolved nutrients can be used for fertilizer. And finally, the solids, which are undigested cellulose from grasses, are used for bedding.

Tell me about sustainability at the cheese plant.

The big issue here is energy use. This comes down to engineering projects and paybacks. Most businesses want a payback within 4 years, but right now alternative energy has a payback of 7 to 11 years. Current systems have infrastructure in place; newer systems

would need new infrastructure. Right now, what is out there is relatively new and will need to be monitored and tweaked as you go along, so there is a high level of risk with these technologies.

Currently, it appears to be cheaper to do nothing in the short term. In the future the inefficiencies might be worked out and then the decision will be easier. Other manufacturers, outside of the food industry, and with a higher profit margin may need to go first because they can afford it easier than the food industry. There are always a few folks out there who are early adopters to new technology. A good example of a sustainable company is the New Belgium Brewery in Fort Collins, Colorado. They have a zero sum footprint at their business, using both wind power and biodigesters. It all came with a price, but it does add value to their product. For more info, look them up at <http://www.newbelgium.com>

How does food fit into the big picture?

Twenty five percent of green house gasses are the result of human activity producing, refrigerating, storing and moving food. Think about it, information is moved electronically, but food and building materials are heavy and still need to be moved.

The solutions are going to vary, because one size doesn't fit all. In manufacturing there are always more efficiencies you can find, and the difference today is that an evaluation of efficiency will

also include analyzing the supply chain. An example is moving milk around. In Wisconsin we have incredible depth and knowledge of cheesemaking. Sometimes local manufacturers can't always keep up with the demand for milk and will bring milk from out of state. To be efficient, we need to find ways to get more supply here.

What can Wisconsin food producers and processors do now?

Look at the low hanging fruit; for example, work with local officials to see how you can lower wastewater and sewer costs. If you are updating equipment, like coolers, consider adding more insulation to cooler walls. By adjusting the equation for capital costs up front you may save on energy costs in the long run.

You can be part of the sustainability movement by sharing your efforts. Is there something you changed in your plant that brought a big pay back in energy costs? Is there something that you thought would work but it failed? Failures are just as important as successes because what you learn is valuable. Dr. Milani would like to hear from you, at milani@wisc.edu or (608) 890-2640.



Dr. Franco Milani has joined the Department of Food Science-Extension as an Assistant Professor

Milk Markets and More

by Brian W. Gould, Associate Professor, Agricultural and Applied Economics University of Wisconsin—Madison

Have We Entered a New Paradigm for Dairy Exports?

Anyone familiar with the U.S. dairy industry should be aware of the increasing importance of international markets for our manufactured dairy products. Let's look at the numbers. We can estimate the average value of U.S. net dairy exports (i.e. export value – import value) using the 2-digit Harmonized Schedule (HS) trade code for "Dairy Products." For the 1999-2005 period, the average value was negative, implying that the value of dairy imports exceeded exports.¹ This deficit averaged -\$383.8 million annually. However, beginning in 2006, we have witnessed a dramatic turnaround with the dairy trade deficit. In 2006 the deficit was -\$130.8 million and it then turned positive in 2007, with a net export value of \$768.3 million. For the first 6 months of 2008, we estimate the U.S. net exports of dairy products at \$972.8 million.

A number of reasons for the dramatic turn-around in exports have been cited. First, the dramatic weakening of the U.S. dollar makes our exports relatively inexpensive. In addition, lingering drought reduced the supply of manufactured products available for export from Oceania. Finally, dairy export subsidies in the European Union were eliminated while international dairy product prices increased more than domestic prices.

Figure 1 represents the growth in U.S. dairy exports between 1999 and 2008. In terms of total volume, non-fat dry milk (NFD) and dry whey products far exceed the amount of cheese and butter exports, illustrating the very strong export market these two products have had in recent history. To place it in perspective, we divide quarterly production of dry whey by the quantity exported during that quarter. For 1999-2004, dry whey quarterly exports were approximately 16% of production and for NFD, 9% of production. Since 2004, these percentages have increased to 31.0% and 23.5%, respectively.

¹ The 2-digit Dairy Products HS code is 04. The use of this code in the determination of the net value of exports excludes dairy products included in the "food preps" category, some dairy protein products, lactose and significant casein imports.

Figure 1.

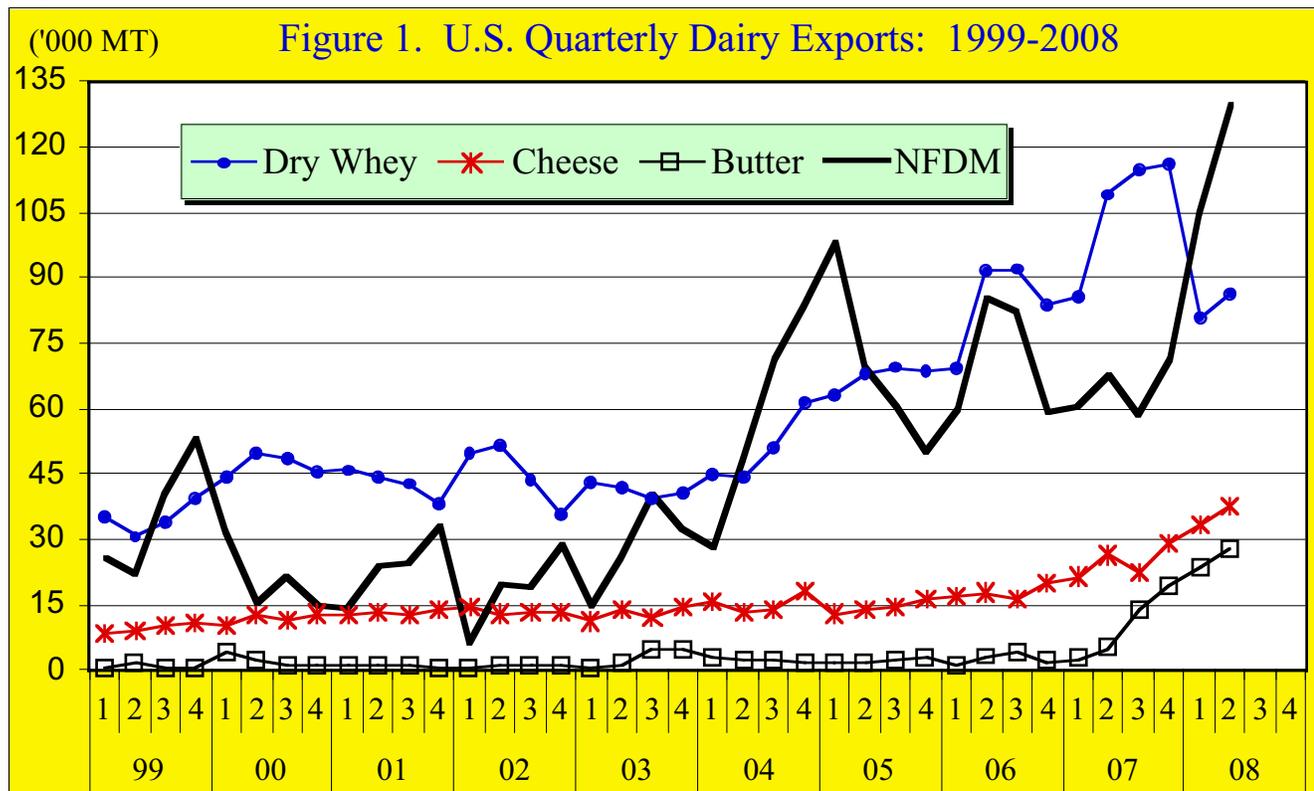
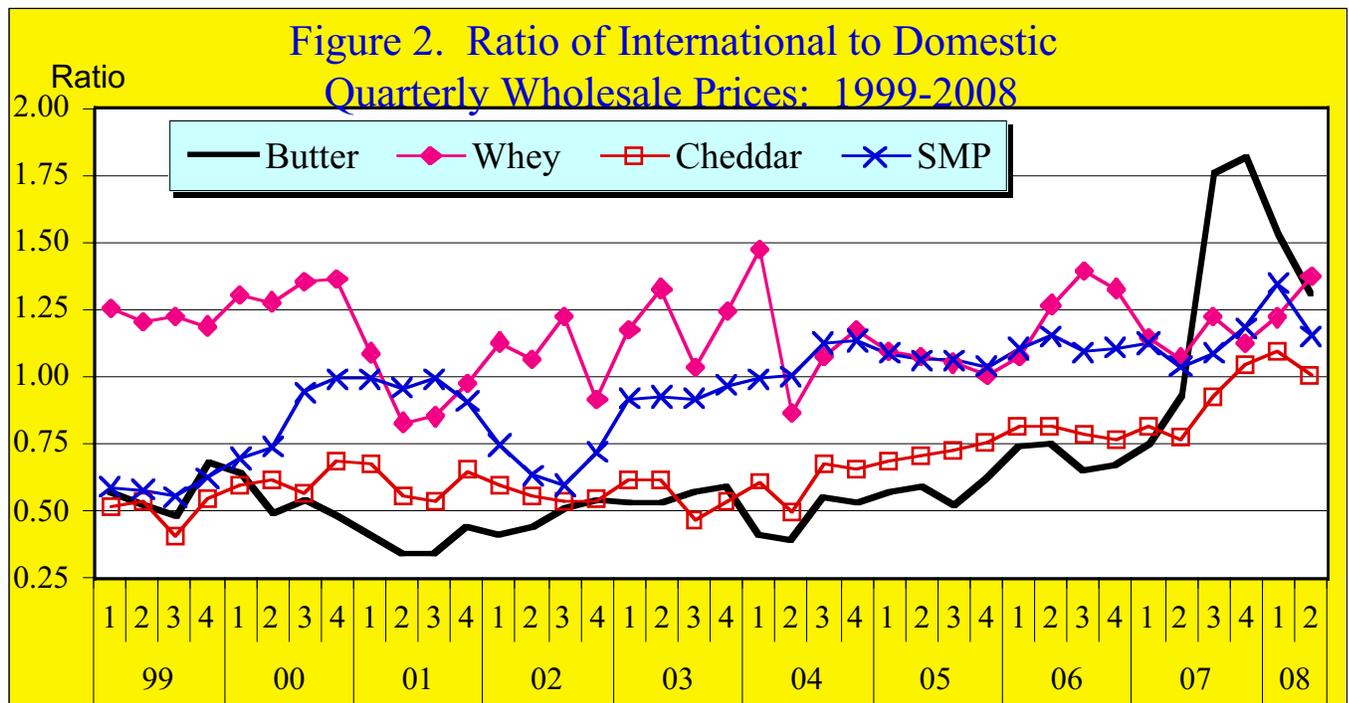


Figure 2.



Historically, (i.e., 1993-1995), we have seen periods where significant quantities of butter were exported, although since 1999 the U.S. has exported very little butter. However, beginning in 2007, butter exports have increased dramatically. Relative to quarterly production, quarterly butter exports have increased from 0.8% of in the first quarter of 2007 to 7.0% during the 2nd quarter of 2008.

Following the pattern of butter, quarterly cheese exports have increased by more than 250% since the middle of 2006. Even with these higher levels, exports still represent less than 1.5% of quarterly cheese production.

As noted above, one possible reason for increasing dairy exports may be the increase in foreign, relative to domestic, dairy product prices. Figure 2 shows the ratio of average quarterly foreign to domestic dairy product prices.² Starting in 2006, the relative prices of U.S. cheddar and butter decreased significantly. During the 3rd quarter of 2006, the butter and cheddar cheese

² Quarterly average foreign product prices are calculated as the average of the associated biweekly foreign prices, FOB port as reported by USDA's Agricultural Marketing Service, Dairy Division. For Butter and Dry Whey, Northern European prices are used. Oceania prices are used to obtain average Cheddar Cheese and Skim Milk Powder prices. The following domestic prices are used: butter - monthly CME Spot, dry whey - Wholesale Western whey powder, cheddar cheese - Wholesale Western 40 lb. block, NFDM - Western low/medium heat NFDM.

Do our higher dairy exports represent a permanent shift in the international demand for U.S. dairy products?

ratios were at 0.65 and 0.79 indicating relatively high U.S. product prices (i.e. ratio less than 1.0). During the 4th quarter of 2007, the butter price ratio reached its peak at 1.81. During 2008 this ratio has averaged 1.42 indicating that world butter prices have been more than 40% greater. The ratio for cheddar cheese reached its peak during the 1st quarter of 2008 with a value of 1.09. During 2007 this ratio averaged 0.89 while in 2008 this value averaged 1.05, indicating a relative decrease in domestic cheese prices.

continued on page 6

Continued from page 5

In terms of relative prices for dry whey, Figure 2 shows that this product has been relatively inexpensive when compared to foreign sources. You can see this by looking at the frequency that the quarterly price ratios exceeded 1.0 during the 1999-2008 period. This trend contrasts with the pattern observed for NFD prices — only since 2004 have domestic prices been significantly less than international SMP price levels.³

Do our higher dairy exports represent a permanent shift in the international demand for U.S. dairy products? There is no doubt that we have developed trading relationships and the necessary logistical infrastructure to facilitate this trade. We don't know how sensitive these trading patterns are to relative domestic dairy product prices, the value of the U.S. dollar and the pace of economic development in our customer nations. However, I do think the future looks bright for continued growth in the demand for our high quality, increasingly diverse dairy products.



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For More Information:

If you would like to access USDA's Foreign Agricultural Service's *U.S. Trade Internet System* point your browser to the following URL: <http://www.fas.usda.gov/ustrade/>.

For access to predefined U.S. dairy export and import data refer to the trade section of the University of Wisconsin *Understanding Dairy Markets* website: <http://future.aae.wisc.edu/fatus> .

For more information concerning the efforts of the U.S. dairy industry to increase its international presence, access the U.S. Dairy Export Council's website: <http://www.usdec.org/home.cfm> .



Skimming the Shelf—



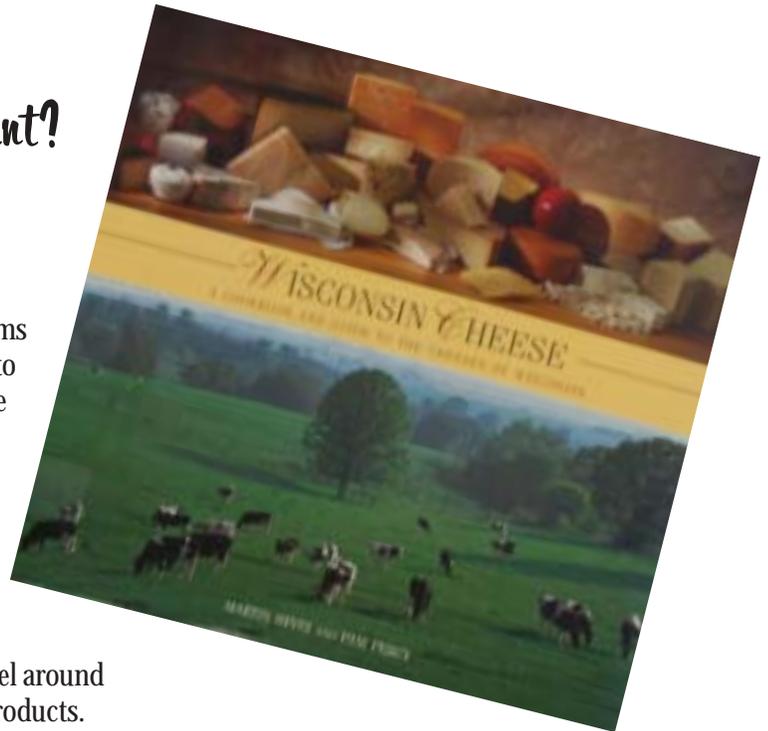
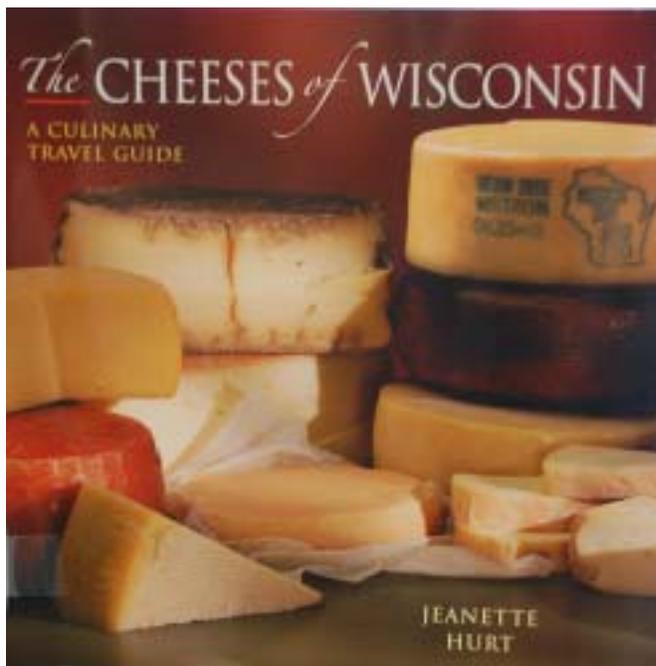
What's New in Print?

Many of us are redoing our budgets and looking for places to cut costs as price of almost everything seems to be rising and the state of the economy continues to generate anxiety and worry. I suspect that means the holiday season will usher in a era of practical gift giving. And I have a few ideas for you.

The Cheeses of Wisconsin

A culinary travel guide by Jeanette Hurd

This is a practical book for anyone who loves to travel around Wisconsin while sampling cheese and other dairy products. Profiles and photos of cheese makers, milk processors, ice cream and yogurt makers fill the pages following an introduction to the artisanal cheese movement. Hurd has organized her book by region, allowing tourists to focus on different areas of the state. She also provides information about cheese factories that are open to visitors along with contact information and the hours they are open.



Wisconsin Cheese

A cookbook and guide to the cheeses of Wisconsin

By Martin Hintz and Pam Percy

Don't pick this book up when you are hungry—the recipes won't allow you to think of anything but food. Many of them are calling to me, from Milk Chocolate Cheesecake to Fontiago Polenta with Tomato Basil Concasse. Hintz and Percy organized the book by types of cheese, including cheddar, blue, French, Italian and a separate chapter on artisan and farmhouse cheeses. You can read about specialty cheese plants like Bass Lake, Henning's cheese, Hook's cheese, Widmer's cheese and more. Individual cheese chapters include tips for working with that cheese, for example they suggest slow cooking when making a blue cheese sauce to avoid graininess. I can't imagine any cheese loving cook who wouldn't be pleased with this book. Put it in a gift basket with one of the featured cheeses and you might be rewarded with a reciprocal gift of food from the cook!



News from CDR

Dried Dairy Ingredients handbook available

If you want to know more about converting milk and whey into dried dairy ingredients then this is the resource for you. Written by Karen Smith, PH.D., dairy process technologist at CDR, the handbook describes commonly used dairy terms and discusses manufacturing and processing technology. The 60- page document includes graphs and tables comparing product composition as well as flow charts outlining the process of drying milk. To view or download a copy, visit the CDR website at www.cdr.wisc.edu. For more information, or to request a spiral bound hardcopy, contact Karen Smith at smith@cdr.wisc.edu.

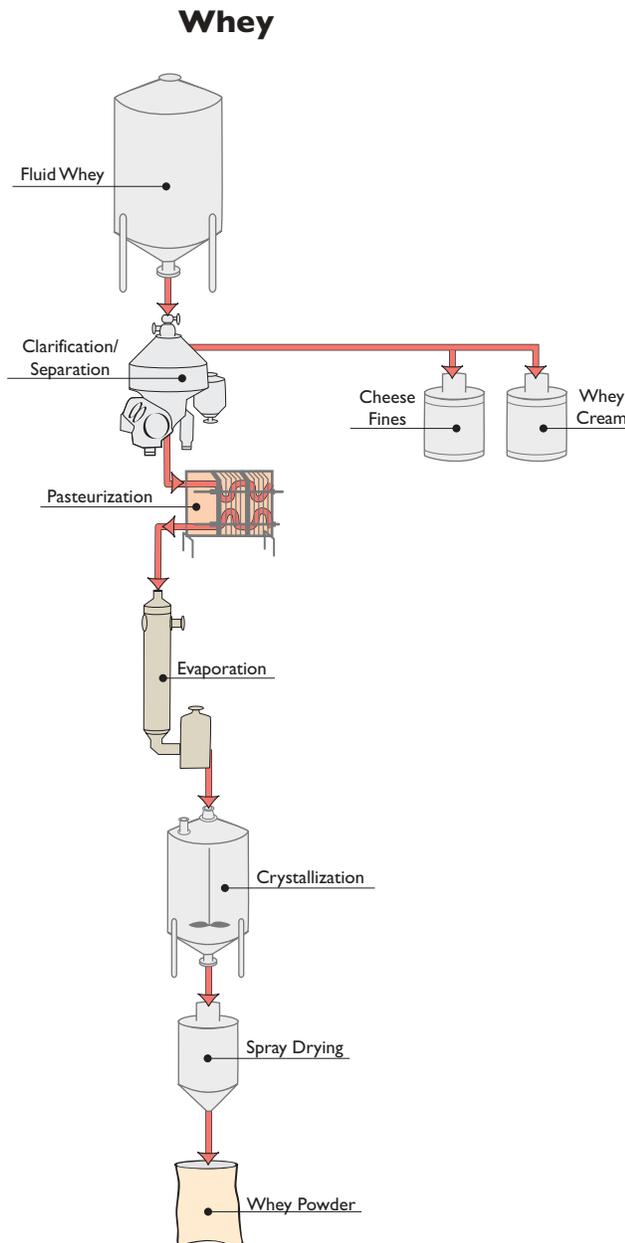
University of Idaho dairy workshops

If you plan to attend the cheese or whey workshops offered by University of Idaho then it is likely you'll be meeting up with someone from CDR. Mark Johnson and Dean Sommer will be handling the cheese workshop and Karen Smith leads the whey processing workshop.



Dried Dairy Ingredients

Types of milk, whey and permeate • Dried dairy ingredients • Dairy ingredients from milk • Dairy ingredients from whey



American Cheese Society celebrates 25th

ACS gathered in Chicago from July 23 to 26th, celebrating 25 years of growth. This years contest drew over 1100 entries from 30 states and 3 Canadian provinces. Wisconsin had a good showing—over 90 total awards— led by Sid Cook of Carr Valley who captured two of the three best of show awards.



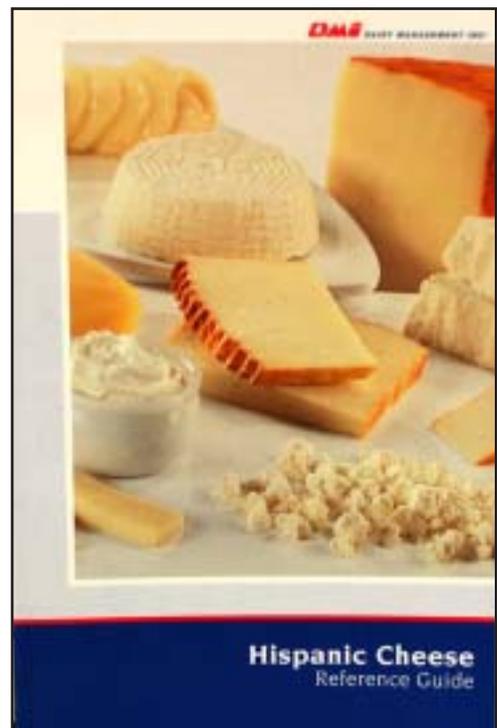
Meet the experts at ACS

As the American Cheese Society has grown and matured education and training take on more prominence at annual conferences. Here is Alyce Birchenough of Sweet Home Farm talking cheese with Mark Johnson at a “Meet the Experts” session.



Hispanic cheese reference guide

Even people who have tried the cheeses in Mexico and South America can still be confused by difference between queso blanco and queso fresco. Dairy Management Inc. has come to the rescue with reference guide that describes the flavor, composition, and production of dozens of cheeses from Puerto Rico to Chile. If you would like a copy of this 53 page booklet contact Dean Sommer, at dsommer@cdr.wisc.edu or (608) 265-6469.



Curd Clinic

Curd clinic doc for this issue is John Jaeggi, CDR

Q. I recently purchased a piece of French port salut cheese that is tasty but not all that remarkable. I suspect it is an industrial recipe and am especially curious about the rind, which is bright orange, I presume to look like a *B. linens* rind, though there is no *B. linens* flavor. The ingredients list gives a clue, listing annatto extract, despite the p,te itself being quite pale. The rind peels off like a thin, stretchy film and doesn't appear to be part of the cheese. What exactly is this stuff?



This is a polymeric petroleum based product, in its container it looks a bit like white glue.

A. It sounds like you are describing a cheese coated with Poly Coat, also called food plast or plastic coat. This is a polymeric petroleum based product, in its container it looks a bit like white glue. You can apply it to cheese by brushing, rubbing or spraying and once it dries it is clear unless, like the cheese you sampled, a colorant is added. The dried coating is not harmful, but you shouldn't eat it.

Why use a food plast?

Cheesemakers apply plastic coat to cheese to slow down the growth of mold or other organisms on the surface of the cheese. In addition, these types of coatings are applied to cheeses like gouda to protect the cheese surface while allowing moisture reduction in the cheese. The plastic coat also allows a nice, smooth surface. This is important since the cheesemaker often applies a coat of wax when the cheese hits the target moisture level to stop moisture loss while the cheese continues aging.

When using a plastic coat, make sure that the surface of the cheese is dry, clean and free of cracks. The ripening room and shelves should also be clean and free of mold. When you are ready to use plastic coat consider adding an antimycotic to it, which helps prevent mold contamination on the cheese surface.

One side of the cheese is coated and allowed to dry before the cheese is turned to coat the second side. If you don't let it dry completely you can get ridges or imperfections and this uneven surface affects waxing the cheese since it allows mold to penetrate and grow under the wax surface. Then you are facing quality issues, including separation of the wax from the plastic coating. In the case of gouda, two to three applications are recommended, depending on the how long you plan to store the cheese. As for your example of port salut, the plastic coat can be diluted with water to leave the very thin, stretchy film you described. It is important to monitor your humidity because your cheese will crack if it dries too quickly, again allowing mold to penetrate your cheese.

Inspect and turn the cheese

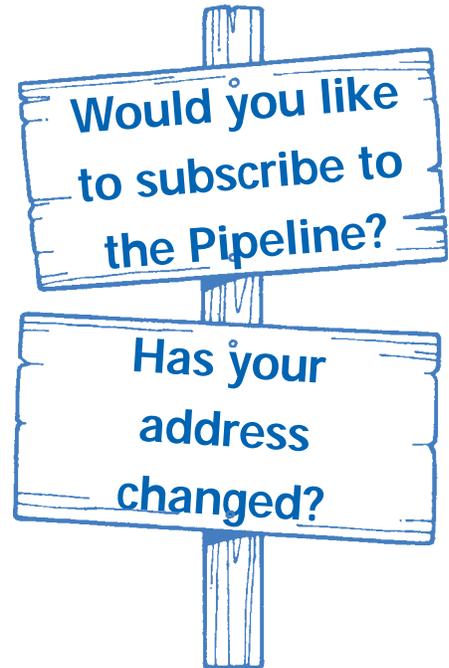
Plastic coating is not something you can just apply to the cheese and then ignore. You still have to periodically inspect and turn the cheese wheels to prevent mold growth. Occasionally you will need to re-wash the surface of your cheese with salt water and then reapply plastic coat. Never apply plastic coat over a moldy, dirty surface. And, of course, follow Good Manufacturing Practices (GMP's) in your ripening room.

Another advantage of plasticoat is that it allows you to easily affix labels to cheese.



Steve Stettler of Decatur Dairy moving a wheel of Swiss at the World Championship Cheese Contest in 2006, Madison, WI.

Another advantage of plasticoat is that it allows you to easily affix labels to cheese. The labels on these Swiss wheels are made of a very thin paper which is applied after the first layer of plasticoat has dried. Then another layer is applied over the label, making sure it is spread evenly and not tearing the paper. When it dries you have a transparent coating that protects the label.



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

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

Calendar

Oct. 28-29 Dairy Ingredient Manufacturing Workshop, Madison, WI. Call Karen Smith at (608) 265-9605.

Oct. 30-Nov. 1 Great Lakes Dairy Sheep Symposium. Maryville, TN. For information, contact the Dairy Sheep Assoc. of North America at (608) 826-4047 or e-mail at: mikolyunas@wisc.edu.

Nov. 4-5 Cheese Grading and Evaluation Short Course. Madison, WI. Call Scott Rankin at (608) 263-2008.

Dec. 3-4 Ice Cream Makers Short Course, Madison, WI. Call Scott Rankin at (608) 263-2008.

Jan. 6-7 Milk Pasteurization and Process Control School, Madison, WI. Call Scott Rankin at (608) 263-2008.

Jan. 22-23 Producing Safe Dairy Products. River Falls, WI. Call Rane May at (715) 425-3704 for information.

Feb. 3-4 Quality Milk Conference (WI Dairy Field Reps). Madison, WI. Call Scott Rankin at (608) 263-2008.

Feb. 24-25 Wisconsin Process Cheese Short Course. Madison, WI. Call Bill Wendorff at (608) 263-2015 or John Jaeggi at (608) 262-2264 for more details.

Mar. 23-27 Cheese Technology Short Course, Madison, WI. Call Mark Johnson at (608) 262-0275 or Bill Wendorff at (608) 263-2015.



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