Wisconsin Center for Dairy Research

# DAIRY PIPELINE

A TECHNICAL RESOURCE FOR DAIRY MANUFACTURERS

VOLUME 21 NUMBER 3, 2009

# Flavored cheeses are here to stay
## Part one: Making them safely and keeping them safe

*by Karen Paulus*

It won't surprise most cheesemakers to know that the amount of flavored cheese available in the marketplace continues to increase every year. According to Matt Mathison of the Wisconsin Milk Marketing Board, flavored cheese sales have risen steadily, gaining 12.5% from 2003 to 2007. This in itself is amazing, but what is truly astounding is the variety seen in flavored cheeses; just look at award winners like Cypress Grove's Purple Haze sprinkled with lavender and fennel pollen and Sid Cook's Cocoa Cardona.

Bill Wendorff, Ph.D., UW–Madison emeritus professor, took the time to compile and sort the types of flavored cheeses in recent cheese contests. (See Table 1.) His table compares flavored cheeses from the American Cheese Society (ACS) contest to those entered in the Wisconsin Cheesemakers (WCMA) World and US contests. In the recent US contests, the vegetable varieties have decreased and fruit has increased, especially in feta, goat and spreadable cheeses. Fruit has also increased due to sweet and hot blended flavors.

Wendorff notes that it is likely the commodity cheeses, including the peppered American type cheeses and the Mediterranean herbed fetas, that influence the US contest. In this contest you will also see more blue cheese used to intensify cheese flavor. On the other hand, the ACS contest has more soft ripened and goat cheeses with lighter herbed and spiced flavors. Beyond those differences, the trends seem to be fairly similar for both the commodity or commercial cheesemakers and the artisan or specialty cheesemakers.

In the future you can expect to see flavored cheese move into the food service arena as well as more flavored cheese in restaurants, topping burgers and sprinkled on salads.

Because of all the growth in this category, CDR introduced a new short course to guide cheesemakers through the process of developing and manufacturing flavored cheese. Making a high quality, safe product emerged as a strong theme; it was mentioned by most speakers and was also the focus of participant's questions.

Gary Griesbach of Garon Foods, a presenter at the short course, reminded the class that the increase in flavored cheese is quite recent. "Most people don't realize that this is a new industry, putting veggies in cheese. The people selling the vegetables are used to selling to companies who do some further processing, for example selling celery to Campbells for soup." In addition, most natural cheeses have a shelf life long enough to allow the growth of bacteria. What if the flavoring

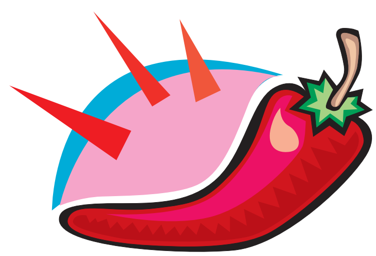
*continued on page 2*

What's Inside:

*Continued from page 1*

**Table 1.**

| Top 20 Flavorings used in recent cheese contests | | | | |
|---|---|---|---|---|
| Rank | Flavoring | % of total flavored entries in contest | | |
| | | 2009 US contest | 2008 ACS contest | 2008 World contest |
| 1 | Hot peppers | 21.4 | 17.4 | 25.6 |
| 2 | Smoke | 12.5 | 13.9 | 11.5 |
| 3 | Other herbs | 7.4 | 13.6 | 8.4 |
| 4 | Other spices | 6.5 | 7.4 | 5.5 |
| 5 | Garlic, onion | 6.0 | 12.8 | 6.8 |
| 6 | Fruit | 4.3 | 5.7 | 5.8 |
| 7 | Dill | 4.3 | 2.2 | 4.9 |
| 8 | Wine, beer | 4.0 | 3.5 | 4.9 |
| 9 | Tomato & basil | 3.7 | 3.5 | 2.6 |
| 10 | Vegetable | 3.7 | 3.5 | 4.2 |
| 11 | Peppercorns | 3.4 | 5.4 | 2.9 |
| 12 | Mediterranean herbs | 3.4 | 0.8 | 1.3 |
| 13 | Meat | 3.1 | 1.3 | 3.1 |
| 14 | Blue cheese | 2.8 | 0.5 | 1.6 |
| 15 | Nuts | 2.3 | 0.8 | 1.3 |
| 16 | Sweet & hot | 2.0 | 1.0 | 0.5 |
| 17 | Horseradish, wasabi | 1.7 | 1.6 | 2.6 |
| 18 | Confectionery | 1.7 | 1.9 | 1.6 |
| 19 | Honey | 1.1 | 1.3 | 0.5 |
| 20 | Other flavors | 4.6 | 4.9 | 8.6 |
| | No. of flavored entries | 351 | 367 | 382 |
| | Flavored as % of total entries in contest | 26% | 32% | 20% |



was contaminated? Griesbach suggests you consider microbiological testing, in addition to a certificate of analysis, or COA.

## Microbiology of natural spices

Bruce Armstrong, Saratoga Foods, spoke to short course attendees about adding herbs and spices to cheese, telling us that, traditionally, spices have been considered a product that inherently has high micro counts. For example, black pepper can plate out between 1 million to 20 million TPC. So how are spices handled? According to Armstrong, irradiation is the most effective treatment for spices because it will lower plate counts to less than 1000. Ethylene oxide treatment is also effective and has been used for many years, lowering TPC to less than 100,000. However, this treatment is not used in Europe or California because of stricter laws governing occupational carcinogens. Steam treatment can be effective, although it works best on hard spices like black pepper, allspice, or nutmeg, rather than herbs.

Another short course speaker emphasizing safety was CDR ingredient specialist Susan Larson, PhD, who took on the challenge of summarizing what we know about adding meat, seafood, and nuts to cheese. Larson's list of factors to consider when you are selecting ingredients to add to cheese includes pH, salt content, shelf life, flavor compatibility, allergen risk, and perhaps most important of all—water activity or $a_w$. Water activity is simply the amount of water available that can take part in a chemical or physical reaction. Water activity is reduced when water is bound tightly to a protein molecule, thus not available for reaction and also not available to support microbial growth. (See Table 2. on page 3.)

Larson noted that it is important to follow good manufacturing practices and handle ingredients to maintain safety. For example, an open bag of walnuts, now exposed to air, might become rancid and the exposure can increase the potential for pathogen growth by affecting the water activity. Adding nuts to cheese will also affect the water activity of the nuts. Why is this important? Because a small change in the moisture content can have a large effect on the water activity of nuts and because controlling water activity is a factor in preservation of nuts (and seafood and preserved meats, too). Increasing the water activity can lower or even remove one of the safety hurdles. For this reason, Larson recommends verifying the shelf life of your flavored cheese.

## Adding beer, wine, or liquor

Adding beer, wine, or liquor to cheese can capitalize on popular pairings as well as exploit a sense of place by incorporating a locally produced product. Dana Wolle, PhD, assistant researcher at CDR has a hand in the vat as well as the brewery—he's an expert on both beer and cheese. He has many tips for cheesemakers who want to experiment (see the next issue for a few of them) and he also has a few safety issues you should keep in mind. Wolle says that allergens are an issue. For example, sulfites in wine can trigger allergies, however they are diluted when added to cheese. Wheat malt contains high levels of gluten, which you might have to note on the label. Another hazard to keep in mind is the issue of glass in your plant. You can buy beer in bulk and bring it to the plant in steel kegs, and you can get some wines in plastic kegs, but if you are working with hard liquor it may not be possible to avoid glass in the manufacturing area of the plant.

Now that you have scoped out the safety issues raised by flavored cheese, we can discuss quality—in the next issue of the Dairy Pipeline.

**Table 2. Water activity of foods**

Table 2. Adapted from P.F. Fox. 2004. Cheese (Vol. 1.) Chemistry, Physics, and Microbiology.3rd Edition.

| $a_w$ | Microorganisms that can grow at this $a_w$ level and above | Food examples |
|---|---|---|
| 0.95 | Pseudomonas, E. coli, Shigella spp., some yeasts | Fresh and canned fruits and vegetables, fresh cheese curd, ricotta, cottage cheese, brie, camembert, fontina, limburger, edam, havarti, cheddar, gorgonzola, gouda, gruyere, manchego |
| 0.94 | Clostridium botulinum, Salmonella spp., Vibrio parahaemolyticus | Mozzarella, stilton, romano |
| 0.92 | Listeria monocytogenes, many molds | Parmesan |
| 0.80 | Most molds, Staphylococcus aureus | Most fruit juice concentrate, condensed milk, syrup, flour, high sugar cakes |
| 0.75 | Mycotoxigenic aspergilli | Jam, marmalade, marshmallows |
| 0.60 | Osmophilic yeasts, few molds | Dried fruits with 15-20% moisture, caramel, toffee, honey |
| 0.50 | | Noodles with 12% moisture, whole egg powder with 5% moisture |
| 0.30 | No microbial growth | Cookies, crackers, dehydrated soups |

Vol. 21 No. 3 2009

# Milk Markets and More
# What a Difference a Year Makes

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

In a previous Milk Markets and More column I wondered if the U.S. dairy industry was facing a new paradigm: one that elevated the U.S. dairy industry to playing a significant role in the international dairy market. At the time, we were riding a wave of month after month record dairy product exports measured in terms of both quantity and total value. What a difference a year makes. After becoming a net dairy exporting country in 2007, we lost those export markets and are now close to becoming a net dairy importing nation once again. This loss in the export market, along with continued increases in domestic milk production, is the primary reason for this disastrous year. For U.S. dairy farmers 2009 was a year with record low farm-level milk prices.

## Exports increased

Prior to 2004, U.S. dairy exports accounted for less than 5% of total U.S. milk solids. In 2004 exports increased to 7.5% of production and moved steadily upward to approximately 11% in 2008. The global economic crisis that began in the fall of 2008 shrunk demand for dairy products world-wide and also dried up credit to finance imports. World prices for dairy products crashed—butter, nonfat dry milk, and cheese prices dropped by at least half between late summer and the end of 2008. Even at these reduced prices, buyers were hard to find and U.S exports (with the exception of whey) fell off sharply. Figure 1 shows the level of net exports (value of U.S. dairy exports – value of U.S. dairy imports) on a quarterly basis from 1998-Q1 to 2009 Q2. Over the 1998-2006 period, the average quarterly U.S. dairy trade deficit (i.e., import value > export value) was $117 million. From 2007-Q1 through 2008-Q3 the average quarterly surplus was $268 million, a $385 million change. During 2008-Q2 the trade surplus reached a record $481 million. By 2008-Q4, this surplus has changed to a deficit of approximately $120 million.

Figure 2 highlights the importance of the export market for specific dairy products, showing the ratio of quarterly production of a variety of dairy products to the quantity exported. For example, between 2002 and 2006 butter exports averaged 1.6% of quarterly production. Between 2007 and 2008 this percentage averaged 9.2% with a maximum percentage of 16.8% in the 3rd quarter of 2008. You can see the rapid loss in export markets, by the 2nd quarter of 2009 butter exports were only 2.8% of butter production.

The export market continues to represent a relatively important market for dry manufactured products. Since 2002, quarterly exports of lactose averaged close to 57% of quarterly lactose production; this value rose more than

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Figure 1. U.S. Net Exports of Dairy Products: 1998-2009

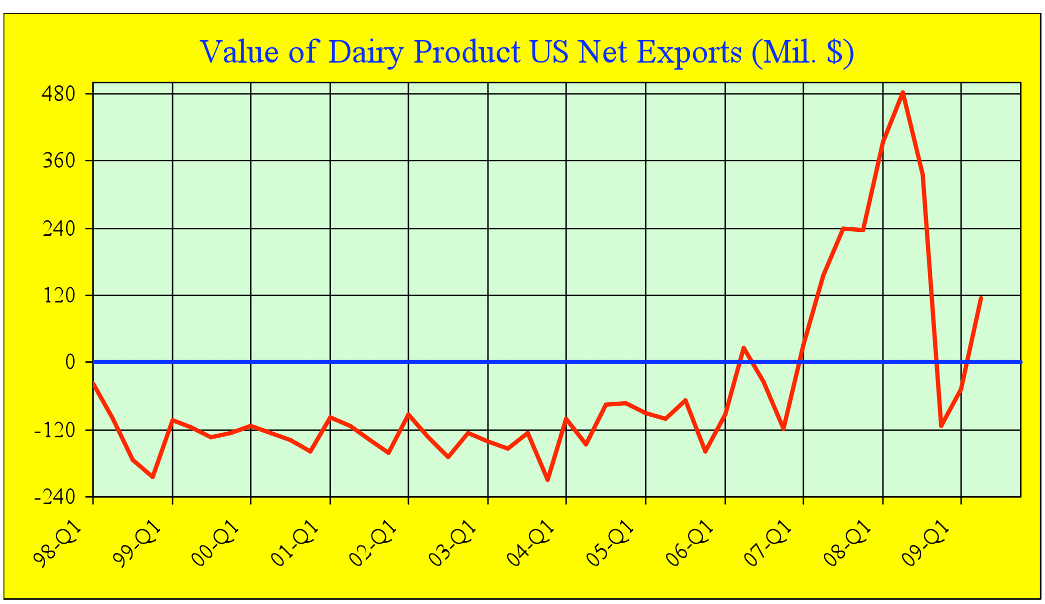


**Figure 2. Ratio of Quarterly U.S. Exports and Production (x 100) for Various Products**

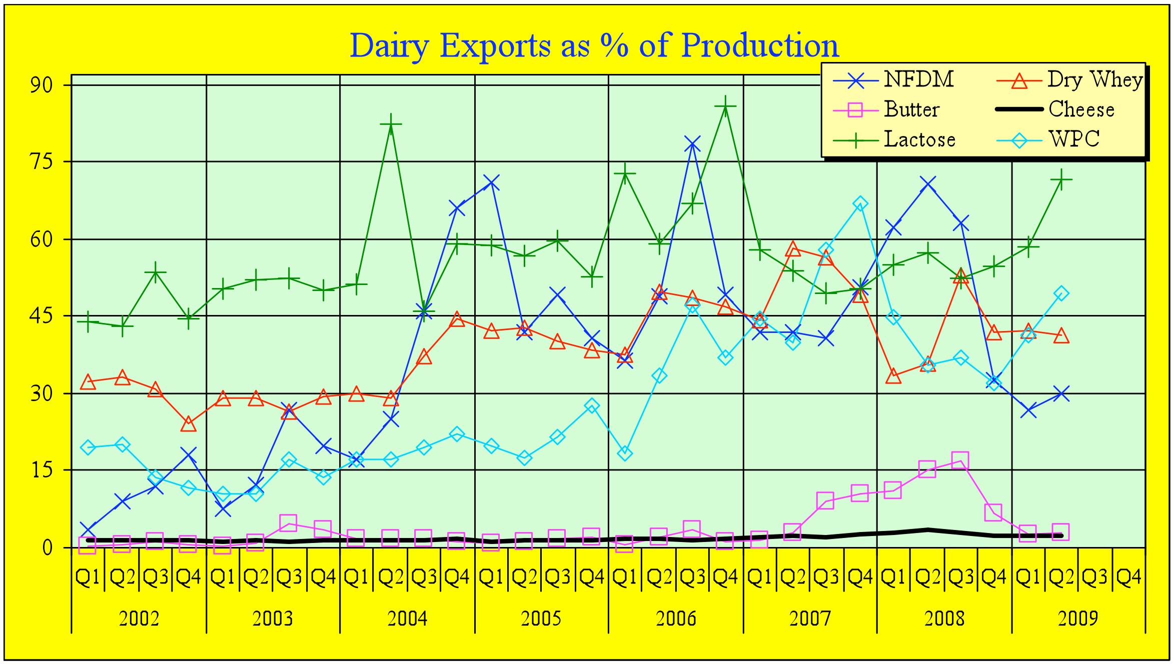



**Table 1. Exports of Nonfat Dry Milk (NDM), 1,000 Metric Tons**

| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009(f) |
|---|---|---|---|---|---|---|
| Canada | 16 | 6 | 13 | 14 | 15 | 13 |
| US | 231 | 277 | 287 | 255 | 391 | 200 |
| **North America** | 247 | 283 | 300 | 269 | 406 | 213 |
| Argentina | 18 | 22 | 21 | 11 | 13 | 17 |
| Brazil | 2 | 3 | 4 | 4 | 1 | 2 |
| **South America** | 20 | 25 | 25 | 15 | 14 | 19 |
| **EU-27** | 277 | 190 | 88 | 202 | 179 | 180 |
| Russia | 20 | 15 | 15 | 15 | 15 | 15 |
| Ukraine | 63 | 57 | 64 | 57 | 40 | 30 |
| **Former Soviet Union** | 83 | 72 | 79 | 72 | 55 | 45 |
| India | 10 | 40 | 50 | 40 | 38 | 38 |
| Other Asia | 30 | 28 | 29 | 27 | 22 | 21 |
| **Asia** | 40 | 68 | 79 | 67 | 60 | 59 |
| Australia | 187 | 141 | 189 | 175 | 120 | 170 |
| New Zealand | 305 | 221 | 243 | 327 | 251 | 310 |
| **Oceania** | 492 | 362 | 432 | 502 | 371 | 480 |
| | | | | | | |
| **Total** | 1159 | 1000 | 1003 | 1127 | 1085 | 996 |

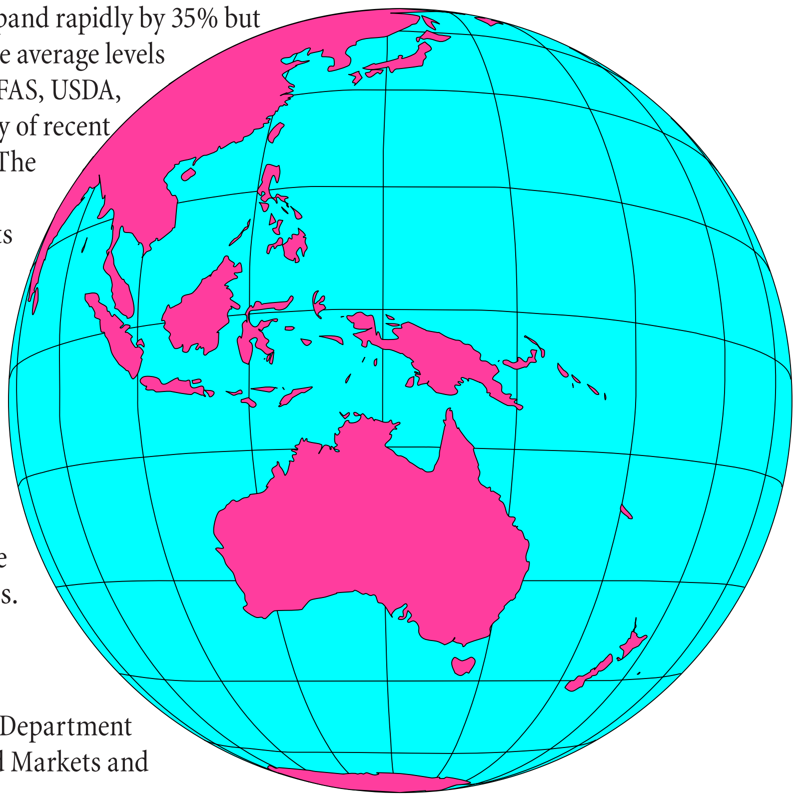
Note: 2009 is a forecast value. Source: Dairy: World Markets and Trade, Foreign Agricultural Service, USDA, Aug. 2009.

80% during some quarters. For dry whey products (not including WPC/WPI) the export-production ratio averages close to 39% with this ratio close to 60% during the 2nd quarter of 2007. In contrast to dry products, the percentage of U.S. quarterly cheese production exported has averaged less than 2%.

## The recent loss in export market share

One of the reasons for the recent loss in export market share is the ability of Oceania to regain their contribution to world dairy exports, lost during the 2008 drought in this region. During the later part of 2007 and in 2008 the U.S. dairy industry filled the gap left by Oceania's drop in export activity. In 2009, Oceania milk output is expected to rise significantly over 2008 levels, with New Zealand milk production increasing by 8%. This year, favorable pasture growing conditions and a record number of cows made increased milk production possible. Australian milk production is expected to expand by 3%, reversing a four year trend, due to improved rainfall and pasture conditions. With increased production, on the trade front, 2009 Oceania exports of butterfat and milk powders are anticipated to expand substantially. New Zealand exports of butterfat and NDM in 2009 are forecast to grow by 10% and 24%, respectively. In Australia, exports of whole milk powder (WMP)are expected to expand rapidly by 35% but nevertheless they remain below the average levels attained between 2004 and 2006 (FAS, USDA, 2009). Table 1 provides a summary of recent and forecast world NDM exports. The dramatic increase in the 2008 U.S. contribution to world NDM exports concurrent with the reduction in Oceania's is obvious.

If the U.S. dairy industry wants to solve the chronic problem of milk (commodity) price variability it will have to resolve the issue of the variability in the role of export markets as a source of demand for U.S. dairy products. What a difference a year makes.



## Reference

Foreign Agricultural Service, U.S. Department of Agriculture, 2009. Dairy: World Markets and Trade, Aug.

University of Wisconsin, Understanding Dairy Markets website, http://future.aae.wisc.edu

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Research Update

One of the earliest cheese making textbooks, published by John Decker in 1895, offers the following advice to anyone siting a new cheese factory:

*"In connection with the factory, there should be what is forgotten in nearly every factory, namely, a proper sewerage system. There should be regular six inch sewer pipe underground, leading to a stream or blind-well, to convey the slops from the building."*

Decker's definition of a 'proper sewerage system' has certainly evolved during the past century, and in fact, it is still evolving. In the article below Bill Wendorff summarizes the results from a survey of Wisconsin licensed cheese plants conducted in 2008. Previous Pipeline articles tracked this issue in Volume 7, Number 4, 1995 and Volume 17, Number 4, 2005. We are making progress but also facing a few challenges.

# Wisconsin Cheese Industry Wastewater Survey 2008

*Prepared by W.L. "Bill" Wendorff – Emeritus Professor*

The last statewide cheese industry wastewater survey was conducted in 1996, just before the chloride source reduction program (NR 106) and after NR 217 (phosphorus limit to surface waters). We conducted this 2008 Wisconsin Cheese Industry Wastewater Survey to determine the impact of the Wisconsin Department of Natural Resources (WDNR) regulations on the Wisconsin cheese industry and to assess the environmental challenges the industry may face in the future. Survey forms were sent out to 122 Wisconsin licensed cheese plants and completed forms were received from 98 plants, for a participation percentage of over 80%. Following is the report on results of that survey.

## Process wastewater

Over 95% of the plants had outfalls from their plants regulated by the Wisconsin Pollution Discharge Elimination System (WPDES) permit program. Plants not covered by WPDES permits were either small farmstead cheese plants or plants that were discharging all process wastewater to land application by contract haulers. Table 1. Lists the current disposal of process wastewater from cheese plants.

**Table 1.**

| Wastewater disposal | % of the plants |
|---|---|
| Own waste treatment system | 38 |
| Municipal POTW | 42 |
| Ridge & furrow | 10 |
| Aerated tanks or lagoons | 19 |
| Landspreading | 71 |
| Other (manure pit) | 3 |

*Percentages exceed 100 percent because plants may dispose of waste in more than one type of system.

Note that over 23% of the plants used landspreading as their sole means of disposing process wastewater while the remaining 48% of the plants land spreading used it to dispose of wastes with higher biological oxygen demand (BOD). Over 29% of the plants were required to pretreat process wastewater before sending it to the final treatment system. Over 61% of those plants were required to equalize pH, 54% were required to lower BOD, 25% were required to reduce total suspended solids (TSS), 29% were required to reduce total phosphorus, 4% were required to reduce chlorides and 4% of the plants were required to reduce fats, oils & grease (FOG) and ammonia nitrogen.

Over 45% of the cheese plants segregate some of their high strength (BOD) wastewater from the rest of their process wastewater to reduce treatment costs. The majority land spread those high BOD wastes but several discharged them to manure pits.

## Whey permeate

Approximately 63% of the cheese plants generate whey permeate in their production process. They handle whey permeate in the methods listed in Table 2. Plants processing whey permeate, or shipping to processors, used that as the primary method of handling permeate. However, they did have to use landspreading if the whey markets were depressed.

*continued on page 8*

## Phosphorus

NR 217 was promulgated in 1992, setting a maximum limit of 1.0 mg/L of total phosphorus in effluent discharged to surface waters in Wisconsin. Wastewater treatment plants with biological removal of phosphorus were able to get a variance to a maximum limit of 2.0-4.0 mg/L of phosphorus. Approximately 31% of Wisconsin cheese plants had to change their process to reduce the level of phosphorus in their process wastewater going to treatment facilities. Over 53% of those plants changed to non-phosphate cleaners, 57% of the plants had to use chemical precipitants, e.g., alum or ferric salts to lower phosphorus levels, 40% initiated biological phosphorus removal processes, and 7% installed dissolved air flotation (DAF) units. Over 15% of the plants have been able to reduce phosphorus levels significantly by segregating and landspreading high strength wastes. Several of the plants that used biological removal of phosphorus were initially given variances (2-4 mg/L) from the NR 217 limit of less than 1 mg of P/L in the treated effluent. However, many of those plants are now facing reductions in the variances within the next 2 years.

## Chlorides (salt)

In 2000, NR106, subchapter IV (Effluent Limitation for Chloride Discharges) was created to regulate the discharge of chloride to surface waters of the state. A three-tiered system of source reduction measures was established for dairies. In some cases, this influenced the way cheese plants dealt with salty whey and spent salt brines. Over 69% of the cheese plants have salty whey, pressings and drippings generated in their process. They use the methods listed in Table 3 to dispose of the salty whey.

**Table 2.**

| Disposal of whey permeate | % of the plants* |
|---|---|
| Further concentrated or processed | 48 |
| Sent to a whey processor | 44 |
| Sent to farms for digester/manure pits | 5 |
| Landspread | 43 |
| Fed to animals | 6 |

*Percentages exceed 100 percent because plants may handle whey permeate in more than one type of system.

Over 55% of the cheese plants have brine systems and 49% of those plants use a membrane system for brine maintenance. In most cases membrane systems have successfully reduced contamination of brines, however some plants still have problems with the increased volume of brine generated from expulsion of whey from cheese into the brine system. This surplus brine, along with spent brines, must be disposed of in an environmentally acceptable manner. Over 18% of cheese plants with brine systems have been able to maintain their brines by presalting the curd, so they did not dispose of brines over the past year. The frequency of brine disposal for the rest of the plants is listed in Table 4. Disposal options for those plants are listed below in Table 5.

Reports from the WDNR indicate only three plants have interim standards on their Tier 2 permits for chlorides, so most cheese plants have successfully dealt with the chloride limits under NR106, subchapter IV (Effluent Limitation for Chloride Discharges) in their first Tier 1 three-year permit.

## Future plans

Approximately one third of Wisconsin cheese plants responding to this survey anticipate new wastewater requirements in their WPDES permit or municipal sewer ordinances within the next two years. Over 38% anticipate decreases in the allowed variance for phosphorus, 22% are facing tighter BOD limits, 12% will have tighter chloride limits, 9% will have tighter ammonia N limits, and

**Table 3.**

| Disposal of salty whey | % of the plants |
|---|---|
| Municipal POTW | 43 |
| Landspread | 55 |
| Further processed | 10 |
| Manure pits | 6 |

**Table 4.**

| Frequency of brine disposal | % of the plants |
|---|---|
| Once a year | 24 |
| Twice a year | 9 |
| Once a quarter | 7 |
| Once a month | 9 |
| Once a week | 33 |

*continued from page 8*

6% will have tighter suspended solids limits. About 20% of the plants will have to reduce volumes sent to POTWs and several others will have to reduce the temperature of discharges to municipal sewer systems. Most plants have been able to meet the chloride discharge limits imposed by NR 106, although several have reported greater difficulty finding municipal POTWs willing to take high chloride wastes.

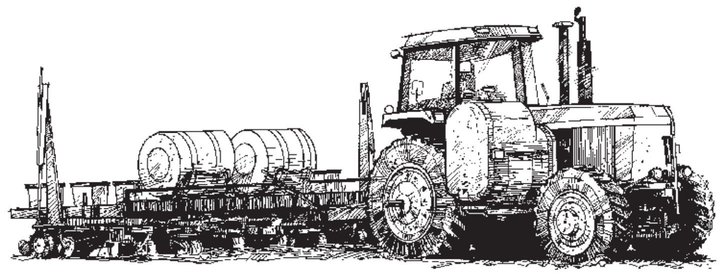
Over 36% of the plants are planning major expenditures for treatment plant upgrades, pretreatment processes or other water-based environmental requirements. The majority will address problems with phosphorus, BOD, and FOGs. It seems that most of the plants do not need to modify their process equipment or membrane systems for brine maintenance or chloride reduction. However, if restriction on chloride discharges going to municipal POTWs change or if land spreading high chloride wastes during winter months are restricted, I suspect additional plants would face high-cost upgrades for brine maintenance equipment. Several plants are interested in an anaerobic digester to treat waste and generate some usable energy. Several others have indicated interest in RO polishers to reclaim rinse water and potential potable water for greater efficiency within the cheese plant.

**Table 5.**

| Disposal options | % of the plants |
|---|---|
| Municipal POTW | 55 |
| Landspread | 22 |
| Manure pits | 18 |
| Other (highway) | 5 |

## Summary

It appears that most plants have been able to effectively address the chloride source reduction requirements of NR 106.90 by separating salty whey and spent brines before transporting them to municipal POTWs, manure pits, or directly landspreading them on agricultural land. It appears that phosphorus limits of NR217 have been a greater challenge for cheese plants. Many plants have already used pretreatment processes to reduce phosphorus loads going to treatment plants. In addition, many plants with their own treatment systems have initiated biological removal of phosphorus and received variances from the 1.0 mg/L limit of NR 217. However, now it appears that some of those variances are expiring and plants will have to improve process efficiency to get closer to the 1.0 mg/L limit. Other waste minimization procedures, like using burst rinses, will be needed to address the increased environmental challenges.



## Acknowlegements

We wish to thank the Wisconsin Cheese Makers Association for financial support to cover the printing and mailing costs for the surveys. We also would like to thank the cheese plant personnel for taking the time to respond to the survey in such thorough fashion. The information provided was very useful in characterizing the current environmental state and future environmental challenges of the Wisconsin cheese industry.

## Abbreviations

| | |
|---|---|
| POTW | Publicly Owned Treatment Works |
| BOD | Biological oxygen demand |
| FOG | Fats, oils & grease |
| TSS | Total suspended solids |
| WDNR | Wisconsin Department of Natural Resources |
| DAF | Dissolved air flotation |
| WPDES | Wisconsin Pollution Discharge Elimination System |

# Curd Clinic

*Curd clinic doc for this issue is William (Bill) Wendorff, Ph.D., emeritus professor of Food Science (Shown on page 11 at a recent CDR Short Course)*

I would like to keep my label simple, do I have to include smoke flavor in the ingredient list ?

**Q.** I am experimenting and making a few new varieties of cheese. I'd like to keep my label simple, so if I make a smoked cheese do I have to include smoke flavor in the ingredient list of my smoked cheese if I use liquid smoke?

**A.** This question is not as simple as it seems. The short answer is that it depends on the method you use to apply or add liquid smoke to your cheese product. USDA Policy Memo 058A is the guideline you need to follow for labeling products prepared with liquid smoke (natural smoke flavoring). Here are the highlights and examples for a hypothetical cheddar cheese.

**Example 1**
Products that have been exposed to smoke generated from burning hardwoods, sawdust, corn cobs, mesquite, etc., may be labeled as "Smoked cheddar" or with terms such as "Natural Smoked Cheddar" to indicate the traditional smoking process was used. In this case, smoke incorporation is part of the smoking process and does not have to be labeled as an ingredient.

**Example 2**
Products may be labeled "Smoked cheddar" if natural liquid smoke flavor is applied by spraying, dipping, liquid flooding or similar processes prior to or during heat processing. In these cases, the heat of processing allows the natural liquid smoke flavoring to react with milk proteins. (With natural cheese products, we recommend heating to a temperature no higher than 95˚F for 1 hour to retard surface drying and potential oiling off.) When you use this application, it is assumed that the smoke flavoring is transformed to the reactive state similar to natural vaporous smoke and thus does not have to be labeled as an ingredient.

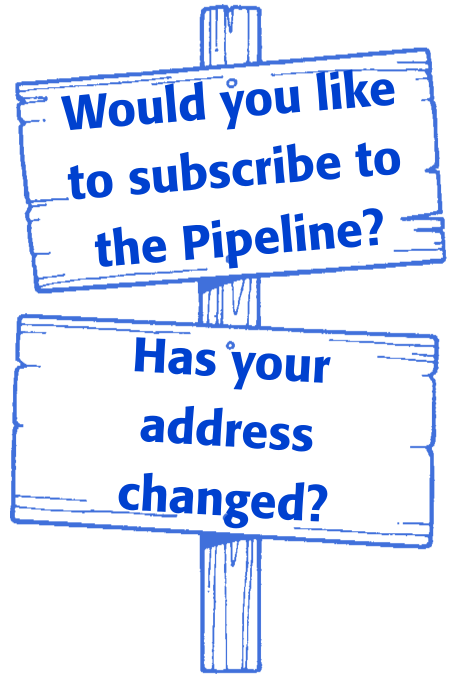
**Example 3**
When you add natural smoke flavor directly by marinating, brining, or injection, or add it to curds or cheese emulsion your label must identify the smoke flavor as part of the product in the ingredient statement. Carriers for dry or oil-based smoke flavorings used in cold pack or process cheese are also required in the ingredient statement.

Both traditional vaporous smoked product and liquid smoke treated product processed according to example 2 can be labeled as "smoked." Both smoked products can also label the species of smoke used e.g., "hickory-smoked cheddar" or "applewood-smoked cheddar." However, only traditionally smoked product can be labeled as "natural hickory-smoked cheddar." On the other hand, natural smoke flavorings (liquid smoke) can be identified as "natural smoke flavor" or "natural hickory smoke flavor" in the ingredient listing of products produced under example 3 and the product is hickory smoke flavored cheese.

FDA has generally accepted the USDA labeling policy as the guideline for smoked food products such as cheese.


## The next short course to consider:

**Milk Pasteurization and Process Control School January 5-6, 2010. Scott Rankin (608) 263-2008**

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Milk Pasteurization and Process Control School
January 5-6, 2010. Scott Rankin (608) 263-2008 or register on-line: www.peopleware.net/2723

Wisconsin Process Cheese Short Course
February 23-24, 2010. John Jaeggi ((608) 262-2264, Franco Milani (608) 890-2640

Wisconsin Cheese Technology Short Course
March 22-26, 2010. Mark Johnson (608) 262-0275 or Scott Rankin (608) 263-2008

World of Cheese from Pasture to Plate
May 2-6, 2010. Dean Sommer (608) 265-6469

Cleaning and Sanitation Workshop
May 11, 2010. Franco Milani (608) 890-2640

Dairy HACCP Workshop
May 12, 2010. Marianne Smukowski (608) 265-6346

Applied Dairy Chemistry Short Course
May 18-19, 2010. Scott Rankin (608) 263-2008