

Heading for HACCP?

No doubt you've heard about HACCP, or Hazard Analysis Critical Control Points. Like Tang™, cordless drills, and biomedical lasers, the HACCP system got its start in the space program. The U. S. Army Natick Laboratories, along with NASA (National Aeronautics and Space Administration) and the Pillsbury Company, designed the HACCP system to produce safe foods for the astronauts. They didn't start out to develop a new system, initially they focused on 100% assurance of safe foods. Once they realized standard quality control methods wouldn't be enough, this group developed a logical system focused on identifying and controlling potential hazards to prevent food-borne disease. Within two years of the 1969 Apollo missions, Pillsbury began to apply HACCP in plants producing food for the rest of us. Since then, HACCP has gone international – from Europe to the far East, HACCP is recognized as an effective tool to produce the safest food possible.

Your customers might be asking if you have a HACCP system in place. Your competitors might say yes.

Should you be using HACCP? Creating a HACCP plan takes time, work and commitment. However, done correctly, HACCP is a system that will help prevent food safety problems. In addition, as HACCP spreads through the food industry, your customers might be asking if you have a HACCP system in place. Your competitors might say yes.

As you explore the HACCP system remember that HACCP is a safety program. Keep in mind the distinction between safety and quality and realize that HACCP is one part of your total program. After all, it is possible to produce a very safe product that just doesn't sell.

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Inventing a New Niche Product, Part 9

Paul Scharfman, Specialty Cheese Company and Wisconsin Specialty Cheese Institute

Jim, Don, and Sara set off for their first meeting with a graphic design agency in high spirits. After twenty months, they were energized and ready to discuss the Reenap Company's new product project. It seemed like their company, a small manufacturer of common Cheddar cheese, had embarked on this new product development process a long time ago. Early on, Don, Jim, along with other employees started the process by forming

a New Product Development Team. They assessed the small company's capabilities, researched competitive products, analyzed the needs of their customers and consumers, brainstormed many possible new product ideas, and used consumer feedback to develop and test concept statements for the Team's favorite new product ideas. Most recently, they fielded a "product test" to make sure their new cheese would be well received when they brought it to market.

After all this work, they chose a concept that focused on "aged Cheddar the way it used to be." Their testing reassured them that this concept was both simple and broadly appealing. They summarized it this way:

To people who love Cheddar cheese, new Reenap Real Aged Cheddar offers the taste of Cheddar the way it used to be because it is made in a small factory by cheesemakers who make cheese the old fashioned way – using more flavor producing cheese cultures than you'll find in most commercial Cheddar.

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News from CDR


Milkfat fractionation offers new opportunities for using milkfat in baked goods, dairy products, chocolates and candy. Would you like to know how fractions can enhance your product? The very first Milkfat as a Food Ingredient Short Course still has openings. The course will be held Oct. 22 and 23 in Babcock Hall. Call CALS conference office for registration, (608) 263-1672. For course details, talk to Kerry Kaylegian at (608) 265-3026 or Bill Wendorff at (608) 263-2015.

CDR still has proceedings available from the Maximizing Cheese Yield seminar, part of the LaCrosse Cheesemakers Conference on April 9-11, 1996. Topics in this publication include milk standardization, effect of cutting and coagulation on yield, Mozzarella cheese yield, and standardization and cheese yield. The cost is \$5 each. Call CDR if you are interested in purchasing a copy, at 262-5970.

Awards

Mark Johnson, CDR researcher, was elected to represent the Dairy Foods Division of the American Dairy Science Association (ADSA).

Bill Wendorff, professor, Dept. of Food Science received the Pound Extension Award for excellence in extension/outreach.

Robert Sellars, Robert L. Sellars and Associates, Milwaukee, will be honored by the College of Agricultural and Life Sciences, University of Wisconsin-Madison for his longstanding support of the college. The Honorary Recognition Banquet will take place November 8, 1996 at the UW Memorial Union. 

New Law Amends Delaney Clause

From the IDFA Hotline

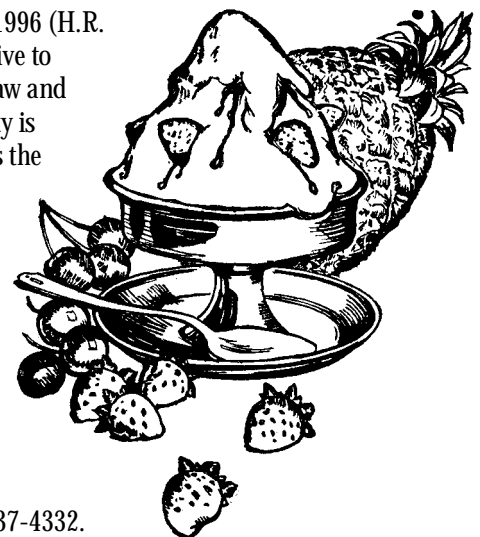
The Delaney Clause was officially amended when the Food Quality Protection Act of 1996 (H.R. 1627) was signed into law on August 3, 1996. This law removes the issue of pesticide residues in processed foods from the umbrella of the Delaney clause, replacing it with a single safety standard for raw and processed food. The changes are primarily concerned with pesticide residues in food products – dairy processors are indirectly affected when they use processed fruits, nuts, and vegetables in ice cream, yogurt, cheese, and other dairy products.

Before this legislation, pesticide residues on foods were treated differently. If the residue was on a raw agricultural product, like fruits or vegetables, then it was regulated under FFDCA §408 which spelled out tolerance levels for residues. If the pesticide residue was found in a processed food, it became a food additive and was regulated under FFDCA §409 (containing the Delaney clause). Carcinogenic pesticides were prohibited at any residue level by the Delaney clause. However, this Act contained a provision that allowed residues in processed food as long as they did not exceed the tolerance levels for the raw agricultural commodity. Sometimes residue levels concentrate in processed food to levels above the tolerance limits. This was acknowledged by the Environmental Protection Agency (EPA) and for years they set separate tolerance limits for processed food. This policy was challenged in court and it didn't hold up; *Les vs. Reilly* instead upheld the zero-risk approach of the Delaney clause.

Changing thresholds

The food industry has long supported the exclusion of pesticide residues from the Delaney clause, which sets the zero-risk standard. In 1958, when the Delaney clause became law, the methods to detect pesticide residues could only detect high concentrations. Now, the methods have been refined and thresholds of detection have changed so dramatically that very small quantities of residues can be measured. This factor has led to general agreement that the Delaney clause has outlived its usefulness.

The Food Quality Protection Act of 1996 (H.R. 1627) has now redefined food additive to exclude pesticide residues in both raw and processed food. (Food additive safety is still governed by §409 which applies the Delaney clause.) Pesticide residues will be regulated under §408, and the EPA will determine safe levels. Along with this change comes several other amendments which modify enforcement methods, increase monitoring of pesticide residues, and provide consumer information. For more information about this legislation, contact Clay Detlefsen at the IDFA office, (202) 737-4332.



Factors Affecting Herd Milk Composition and Milk Plasmin at Four Levels of Somatic Cell Counts

Linda U. Ballou, Marina Pasquini, and Robert D. Bremel, Dept of Dairy Science, University of Wisconsin-Madison, Thomas Everson, Grande Cheese, Dean Sommer, Alto Dairy Cooperative

Milk contains a number of natural enzyme systems that break down proteins and peptides, and the plasmin system is one of the most important. Numerous studies implicate plasmin and its inactive precursor, plasminogen, in degradation of milk proteins. (See the review by Fox and Stepaniak, 7). The plasmin system may have a particularly detrimental effect in dairy manufacturing since the activity of the enzyme continues indefinitely during cold storage. This leads to changes in the coagulation properties of milk (6). Thus, reducing plasmin activity in raw, or incoming milk, is a desirable goal. On the positive side, plasmin may play an important role in ripening some cheeses, and in others it has no effect.

Most previous studies of plasmin have focused on milk from small numbers of individual cows and little information exists on the plasmin and plasminogen contents of bulk tank milk. One recent study (10) indicated that treating cows with bST reduces the plasmin content of the milk from individual cows, suggesting that using bST to increase milk production might have desirable effects on milk processing.

Psychrotrophic bacteria are another factor affecting milk quality. In the dairy industry, we define psychrotrophs as those bacteria capable of growth at $\leq 7^{\circ}\text{C}$. Not only can these bacteria survive the pasteurization process, but their optimal survival temperature is low. This means that psychrotrophic bacteria continue to grow during refrigeration of milk. In addition, they produce and secrete proteolytic enzymes that biochemically alter the milk and have been associated with a large number of defects in dairy products. The defects include proteolysis in stored milk, bitter tastes of liquid milk, reduced shelf-life, reduced quality and yield of cottage cheese, and increased rennet coagulation time. Again, information regarding these organisms in bulk tank milk are limited. Testing bulk tank milk for plasmin and psychrotrophic bacteria might help to determine milk quality. We surveyed bulk tank milk to evaluate the relationships between concentrations of plasmin, plasminogen, casein, and casein number and SCC and psychrotrophic bacteria count (PBC).

Materials and Methods

We included two hundred farms associated with two Wisconsin dairies (Alto Dairy Cooperative, Waupun and Grande Cheese Company, Brownsville) in this 12 month study. We collected 2424 duplicate samples of

bulk tank milk, and the dairies analyzed one set for fat, protein, lactose, and SCC using standard methodology. Alto Dairy performed the psychrotrophic bacteria count (PBC) and The Dairy Science Lab at the University of Wisconsin-Madison analyzed plasmin and plasminogen activities. We used the Van Slyke formula and AOAC formula to predict cheese yield.

Results and Discussion

As expected, we found that the lactose, fat, protein, and casein contents of milk changed throughout the year. We grouped herds by SCC to test the effect of SCC on lactose, PBC, and milk protein content. (Listed in Table 1.)

Group A herd results were significantly ($p < .05$) different from all other groups only for casein percentage and casein number. These results agree with previous research (2, 8, 11, 12) that showed that milk with low SCC had higher protein and casein percentages and higher casein number. The reduced protein quantity and quality in combination with increasing SCC led to reductions in predicted cheese yields, confirming results from previous studies on relationships between high SCC milk, such as loss in curd firmness and reduced heat stability during cheese manufacturing (1, 3, 4, 5, 12,).

We used the Van Slyke formula and the AOAC casein formula jointly because divergence between the results may indicate problems in the measurement system and the need for monitoring the cheese-making process. We found small discrepancies between the two groups of results that may be due to overestimating the cheese yield derived from the Van Slyke formula compared with estimating from the AOAC formula.

Table 1. Categories for each factor used in statistical analysis.

Subclass	SCC	PBC
A	<100,000	<100
B	100,000 - 200,000	100 - 500
C	200,000 - 400,000	500 - 1000
D	>400,000	>1000

SCC : Somatic Cell Count
 PBC: Psychrotrophic Bacteria Count

The predicted cheese yield estimated with the AOAC formula and analyzed according to SCC group showed a difference in cheese yield of .25 kg/100kg between SCC group A and group D (9.69kg/100kg vs. 9.44 kg/100kg.) In this study, where the statistical design was intended to give equal numbers of herds in various SCC groups, the magnitude of the SCC on predicted cheese yield was not large. The differences seen between groups A and D may, in fact, be due to the elevated overall protein content found in milk with low SCC. The analysis of variance results suggests that a very small fraction of the variation is attributable to the SCC.

When we analyzed the predicted cheese yield according to PBC group, we found the trend was similar to that of the SCC analysis ($P=.09$ vs. $P=.194$). The SCC and PBC analyses were not significant, but the same trends were observed for cheese yield. The difference of .3 kg/100kg between PBC groups A and D may indicate that psychrotrophic bacteria are responsible for increases in proteolytic activity and casein degradation, thus reducing cheese yield. Verdi et al, (13) studied a limited number of psychrotrophic bacteria and found no significant conversion of plasminogen to plasmin, suggesting that the psychrotrophs studied did not produce plasminogen activators and that the conversion occurred through other factors. However, a routine PBC test that detects number and different strains of psychrotrophic bacteria may provide better evaluation of milk quality and cheese yield.

Conclusions

Milk from this sampling of contemporary herds shows relatively typical changes in composition by month. The statistical design enabled the association of SCC with other qualitative properties of milk to be determined. Our analysis showed associations between SCC on plasmin activity and association between PBC and SCC. The impact of SCC on milk protein quality was smaller than seen in previous studies. These associations may have important implications for milk quality assessment and should be included in a farm HACCP (Hazard Analysis Critical Control Point) program. Proteolysis is associated with elevated SCC, but there are several contributing factors. Therefore, undue emphasis should not be placed on SCC as the only indicator of milk quality. Psychrotrophic bacteria also affect milk quality by reducing shelf-life and product yield and they may be a source of proteolytic enzymes or plasminogen activators.

At least three potential risk factors have been identified, and one is SCC. Therefore, we suggest that a multivariate approach to defining the quality parameters to base milk payment schemes on. These findings, which are relevant milk quality standards for SCC in cows, may also be applied to other milk-producing animals, such as sheep and goats, which appear to have inherently higher SCC in milk (9). Determining the relationships among SCC, plasmin, and psychrotrophic bacteria may improve quality control systems for milk and dairy products.



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HACCP *continued from page 1*

Several resources are available to help you plan and implement a HACCP plan in your plant. Start with the Dairy Product Safety System, a technical manual published by the International Dairy Foods Association (IDFA). This comprehensive manual will take you from defining HACCP all the way through the steps needed to implement a program, including model programs for dairy plants. A second resource you might consider is CDR's Safety and Quality Applications program. (See sidebar for details.)

Prerequisite programs

Before starting a HACCP program, IDFA suggests that you evaluate and review existing programs. "Prerequisite programs" are the universal procedures, like GMP's (Good Manufacturing Practices) that control environmental conditions in a dairy plant in order to produce safe products. These prerequisite programs are the foundation of a HACCP plan and they are a good place to start. The IDFA manual outlines six prerequisite areas, including details to check and forms you can use to evaluate your program. The prerequisite areas include physical premises, receiving and storage, equipment performance and maintenance, personnel training programs, sanitation, and recall programs.

Once the prerequisite programs are in place you can move on to implementing HACCP. Is management fully committed to using HACCP to assure product safety? This is essential for an effective program, since developing a HACCP system will involve a lot of time and effort. A multi-disciplinary HACCP team, made up of workers from all parts of production, is another essential element. You'll need a team leader, and your HACCP team will need some training before they start. IDFA suggests starting with limited goals if your team is inexperienced, for example begin by considering pathogens in a single dairy product.

With your team in place, start your HACCP plan by describing each product you process.

CDR's Food Safety Applications Program

CDR's food safety applications program offers a helping hand to dairy companies as they develop and evaluate food safety plans. The staff has invaluable regulatory and processing experience which can help your company meet the challenge of continuing to produce pathogen-free, high quality dairy foods.

We can help you in the following ways:

- Plant visits, audits
We can help you organize and implement an audit program for your plant. We'll review your sanitation program and then establish a working team to solve sanitation current problems and prevent future problems.
- Plant sanitation
We can review your plant sanitation, including tearing down individual pieces of equipment for inspection.
- HACCP
If you have a HACCP program, we'll review it for you. If you don't, we can help you design and start one.
- Quality Assurance, Quality Control
We can review your program and, if necessary, recommend changes.
- Regulations
We can meet to explain and discuss government regulations. We can also explain how the regulations relate to your plant and products.
- Analytical testing
When we do on site audits we can also do ATP monitoring and microbiological analysis of dairy products.



Call program coordinator, Marianne Smukowski, for more details.
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Consider composition, structure, processing, packaging systems, storage, required shelf-life and instructions for use in your description. To keep on track, keep asking, "Is this a hazard or a quality issue?" You'll need a separate plan for each final product. Next, identify the intended use of your product, considering the end-user, which may be the general public, another food, or even a nonfood product. Now, you'll need to organize a flow diagram. This is not an engineering feat, instead use words in boxes to illustrate the steps used to produce each product, like the example shown in Figure 1 on page 6.

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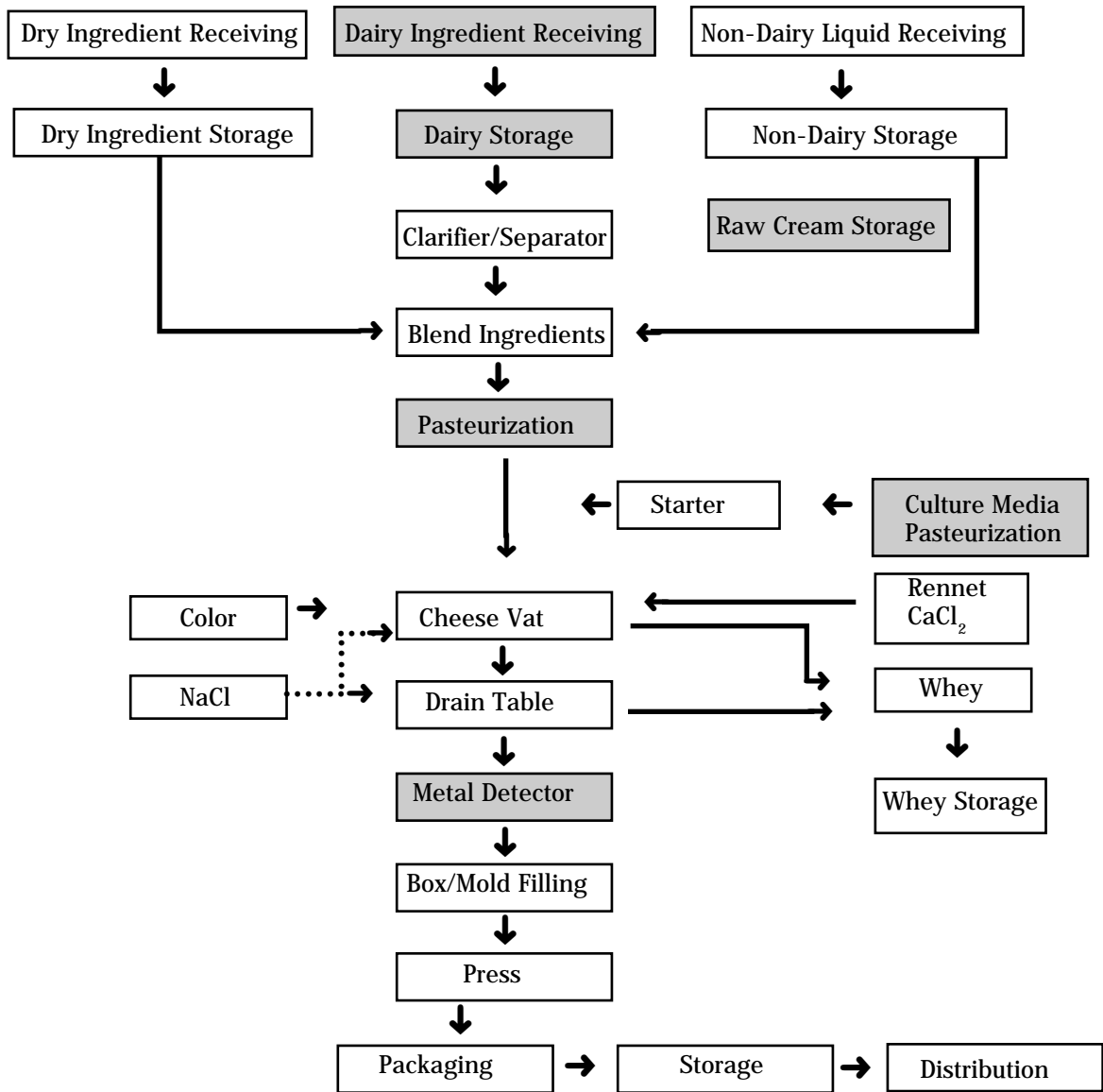


Figure 1. This flow chart of a model HACCP program for Cheddar cheese is from the IDFA manual, "Dairy Product Safety Systems." The shaded boxes are Critical Control Points.

Conducting a hazard analysis

When you have a good, simple flow diagram you are ready to conduct a hazard analysis. Now you are getting to the core of the HACCP experience. For this purpose, a hazard is any microbiological, chemical, or physical property that threatens the safety of your product. Analyzing hazards involves asking a series of questions to get at the varied factors that influence the safety of food. For example, you might ask about the chances that your product could be contaminated with hazardous substances. Or the likelihood that your product will contain viable spore-forming pathogens. The HACCP team also needs to consider what preventive measures, if any, are available. When you are

finished, you should be able to list the significant hazards of each step in the flow chart, along with the severity of the risk and preventive measures.

Next, you can identify critical control points, or CCP's. They originate from the hazard areas you already identified and include things like the temperature of incoming milk, or pasteurization times and temperatures. Many hazard areas may already be controlled by your prerequisite programs, the ones that aren't must be identified as CCP's. The IDFA manual contains a CCP decision tree that you can use to sort through your analysis.

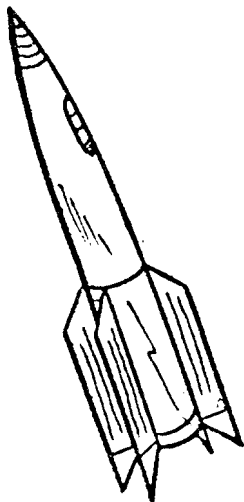
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Now that you have a list of CCP's you need to set some parameters for them. Start by setting critical limits for each CCP, the limit that must be met to assure safety. Use regulatory standards, literature searches, experimental studies and your experiential knowledge to set your critical limits. Monitoring these critical limits is also built into your HACCP plan and you use it to determine and record when a CCP has exceeded the critical limit. Ideally, monitoring should be 100% accurate and quick. That's why physical and chemical methods, like measuring pH and temperature, are more effective tools than microbiological testing.

Documentation and verification are built into HACCP plans. Corrective action plans for dealing with deviations from CCP's need to be documented and recorded. Your documentation should also include all records for CCP's, the monitoring systems, a list of the team, the flow diagram, etc. Don't worry, the IDFA manual will help you with this, too.

Like many other systems and processes, HACCP is really never finished. You should conduct a full review at least annually. In addition, new product development, new hazards, and manufacturing changes are all situations that prompt a HACCP evaluation. Employee training and education is another ongoing process. Your entire staff needs to become familiar with the overall principles of HACCP and their part in the HACCP system.

So ... you made a commitment to HACCP, you've done the research, requested the IDFA manual and you have a HACCP team in place. Go ahead and start – you're ready for Blast Off!



Alto Dairy participates in FDA pilot

The U.S. Food and Drug administration (FDA) is considering proposing regulations that would require food manufacturers to add HACCP principles to food safety programs. To help make this decision, FDA is conducting a pilot program with seven volunteer companies. Alto Dairy in Waupun, Wisconsin is one of them, and Dean Sommer of Alto offered the following HACCP tips:

- It's important to keep HACCP simple as possible. Undue complications will lessen or delay the chances for successfully implementing and continuing the system. Employees are more likely to adopt a system that is clear, simple, straight forward, and manageable.
- Employee training is critical for the success of the system. Not all employees need the same depth of training, for example HACCP team members vs. line workers. However, all employees need HACCP training to understand the goals, the tools, and their role in the HACCP system.
- Sometimes all we can do is reduce a risk to a reasonable level, we can't totally eliminate risks. Metal detectors are a good example – they are just not dependable below a certain limit.

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Seven Principles of HACCP

1. Conduct a hazard analysis associated with growing, harvesting, raw materials, and ingredients, processing, manufacture, distribution, marketing, preparation, and consumption of the dairy food.
2. Identify the Critical Control Points (CCPs) required to control the identified hazards in the process.
3. Establish the critical limits for preventive measures associated with each identified CCP.
4. Establish the critical limits for preventive measures associated with each identified CCP.
5. Establish CCP monitoring requirements. Establish procedures for using the results of monitoring to adjust the process and maintain control.
6. Establish effective record keeping systems to document HACCP plan.
7. Establish procedures to verify that HACCP is working.

Niche *continued from page 1*

The Graphic Design Agency

The theory behind any consumer communication – advertising or packaging design – is simple: give the consumer a *stimulus* that will generate a *response* of “I want to buy this product.” The biggest difficulty is determining what *stimulus* will generate that *response*. It requires both knowledge gained from market research and creative, artistic insight into people’s behavior. Generally, we cheesemakers need to use outside experts for this!

That’s how the Reenap folks found themselves at a design agency. “We figure that the package ought to say something like ‘Great Tasting’ in big letters since that’s the real benefit,” said Don.

The people from the design agency looked at one another. Their account executive cleared her throat and replied, “Don, I’m afraid we don’t agree. If you want your family to be happy do you tell them ‘Be happy!’? Of course not. The same goes for communicating with consumers, in advertising or on package labels. You give the consumer a *stimulus* that will prompt the desired *response*. For your family, perhaps the *stimulus* ‘Let’s go on vacation!’ would make them happy. For consumers of Cheddar cheese you have done a great deal of work to learn that the *stimulus* ‘aged Cheddar the way it used to be’ will prompt a *response* of great tasting. So, let’s make the aged Cheddar phrase stand out on the package label.”

“Does that mean we should name the product something like Old Time Cheddar?”

“I don’t think so, but that’s not such a bad idea. It might work, but ask yourself whether you really think your target market, which seems more educated and wealthier than average, would *respond* to that name. Again, the art in consumer communication involves creating a *stimulus* that will prompt consumers to have the desired *response*.”

What we’re looking for is a name that makes people think of the good old days. For example, a name like Covered Bridge or Golden Clover might convey the image of rural country – pure, and wholesome like our images of yesteryear. These images might be a *stimulus*, when combined with the slogan they may prompt consumers to buy your product.

You see, Don, we believe that selecting a brand name for a new product is both critically important and terribly difficult. For your new product, we need a name that is distinctive compared to other brand names, and one that is both memorable and supports the core promise of the concept. It must serve as part of a stimulus that will prompt the desired response in our targeted consumers. If it is too blatant I’m afraid it will just turn people off. The name you suggested

might work, but I think we’d be better off if we tried for a more subtle stimulus, and one that is more memorable and distinctive.”

Don nodded his head. “That makes sense. The crew at the Reenap Company can dream up some possible names and then we can do a little more testing among consumers who are interested in our concept to find out which names they like the most.”

“Yes, that will help. And, we’d like to suggest some names, too. But, please temper your brand name research results with judgment. Testing names can be very difficult. I’d suggest you do your research, then let your New Product Development Team choose among the top three or four names. If possible, we’d like to offer our thoughts as well since the sketches we develop might work best with some names and not others.”

“Consider it done. But what about the fact that we use more cheese culture?”

“Yes. That could either be a burst on the package front or explained on the package back. It’s not a benefit, it’s a reason for a benefit. First, the package should help consumers understand the benefit of the product, second the package should explain why the benefit is believable. The truth is, most consumers spend so little time looking at each package of food they buy that the benefit statement, sketch and product name will be more important to us in designing the package label than the fact that you use more cheese cultures.”

“So our package will show our brand name in big letters, our consumer promise in almost as big letters, and an explanation about our cheese cultures either in a burst on the front or explained on the back. What else do you suggest?”

“A picture or a sketch. That’s why you’re here after all! Our experience is that a picture is worth a thousand words – even though you couldn’t get that many words on a label! We suggest you let us work on a sketch of some sort that will communicate the essence of our concept. Why don’t we meet again in three weeks.”



By that time you could select a brand name and we can develop some alternative sketches to show you.”

Selecting a Package Structure

For most new products, selecting a package structure is easy. Cereals come in rectangular boxes right? Ice cream comes in tubs, doesn't it? Well, maybe selecting a package structure isn't so easy. Different shapes and varied construction can portray different perceptions. For example, why does Ben & Jerry's come in small tubs and not small rectangular boxes?

The Reenap Company briefly considered putting their product into a resealable package. They hoped consumers would value their package more – enough to offset the higher packaging costs. Unfortunately, the realities of shelf space in the supermarket stopped them. As one buyer said, “That package is great for consumers and lousy for us, it just takes up too much space.”

After a great deal of discussion, the New Product Development Team settled on a skin tight package. They felt that traditional chunk Cheddar cheese suffered from the “ears” on the package and they wanted to project a more upscale, high quality image.

Selecting a Name and a Sketch

Three weeks later the design agency greeted the people from the Reenap Company. Don was anxious to see the sketches the agency had developed. He looked expectantly at the artist.

“I'd be glad to show you our sketches. But it would be nice to know where you came out on your brand name decision, first.”

“Well, as you know, with your help we generated about forty possible names and tested them. We took the top seven names to our attorney and asked him to do a trademark search on them. That eliminated two, so here's a list of the rest. They are the favorites, rated by consumers who were interested in our concept.”

Top Five Possible Brand Names

Clover Meadow
Country Fair
Hardwood Aged
Reenap Farms
Wisconsin Traditions

The design agency staff peered at the list. “You know, some of these names could work really well! I'm not sure about the first three names, though I can see why consumers liked them – they seem quaint and have a nice sound. However, I'm not sure they support your positioning. After all, your positioning is not based on being rural, back-woods, or country and your positioning is certainly not based on being hardwood aged, certainly your

product isn't! From what you told me, the concept behind your product is based on tradition. The name Reenap Farms could work if people are aware that your company has been making fine cheeses for generations. If not, then I'd go with the last name.”

“So you think our new brand name should be ‘Wisconsin Traditions’? That's excellent. Our Team came to the same conclusion.”

“Great. That name really works well with some of the sketches we drew up. Let me show you.”

The agency then showed Don and his Team several sketches. The first sketch used hi-tech photography to show a man in a modern cheese factory. The second depicted a rural Wisconsin scene with cows grazing. The third was a black and white line art sketch of a man in an apron stirring an open small vat.

The conversation centered on the pro's and con's of the different sketches. The first sketch was eliminated based on the lack of traditional feeling in the picture. There was, however, little consensus about the other two sketches. Supporters of each sketch were seated at the conference table. In the end, they decided to ask the design agency to mock up each sketch with the brand name, Wisconsin Traditions and the slogan “aged Cheddar the way it used to be.” The group planned to go back and ask some consumers their opinions of the sketches.

Seek Consumer Opinions of Your Label Designs

Two weeks later the group reconvened. Based on fifteen interviews with consumers who had expressed interest in the concept, Don was able to tell the design agency which sketch they wanted to move ahead.

“Basically,” he said, “the consumer s said that seeing cows made them feel good, but it was a common sight on dairy packages. It did not make them think of cheese, particularly. Showing a cheesemaker over an old, open vat, however, both was intriguing and a mark of craftsmanship. What's more, most people immediately understood that the man was making cheese, not just stirring a pot with something like soup in it!”

A Positioning, A Name, A Sketch ... Let's Go to the Copy Machine!!

There were many more details to decide. Using information from the Dairy Council of Wisconsin, the team needed to finalize nutritional information for the label. They also had to agree on package and case size (they used industry standard 8 ounce packages in small 12 pack cases to show high case turn for retailers). Within four weeks, the New Product Development Team was looking at approved, finished color art work ready to be sent to the printer.

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Curd Clinic

Q. I have concerns about the safety of reduced fat cheese. Since it has a lower salt and higher moisture content it seems like it could be more susceptible to pathogens – what do you think?

A. You certainly aren't the only one with concerns about reduced fat cheese safety. As you noted, reduced fat cheeses are higher in moisture and usually lower in salt content and acidity than full fat cheeses. The moisture increase is due in part to curd pH at drain and mill, curd washing or whey dilution, and the binding of water by fat substitutes. Reducing the fat content of cheese also affects physical properties including firmness, elasticity, and adhesiveness. As a result, certain physical and chemical properties of reduced fat cheese are unique in comparison to their full fat counterparts.

Consumer demand for high quality reduced fat products continues to grow, thus producing reduced fat cheeses holds great promise for the Wisconsin cheese industry. Considerable research has focused on producing reduced fat cheese with satisfactory taste and texture – CDR researchers Mark Johnson and Carol Chen have established manufacturing procedures you can use to produce high quality reduced fat cheese (See Dairy Pipeline, Spring 1995, Vol. 7, No. 2). Recently, we took the next step and evaluated the microbiological safety and quality of reduced fat Cheddar cheese.

Our goals included determining the viability of *Listeria monocytogenes* and *Salmonella* and toxin formation by *Clostridium botulinum* in reduced fat Cheddar cheese. We compared the behavior of these pathogens in reduced fat Cheddar to their conventional full fat Cheddar counterparts.

We also evaluated the ability of natural preservatives including bacteriocins (e.g., pediocins, sakacins, enterocins, nisin), monoglycerides, and lysozyme to control *Listeria monocytogenes*, *Salmonella* spp., *Clostridium botulinum*, and spoilage bacteria in reduced fat cheese.

Preparing the cheese

Reduced fat cheese was prepared using 45.4 kg (100 lb) low fat (1.3% butterfat) milk with a carbohydrate-based fat substitute (4% w/w Stellar, from A.E. Staley Mfg. Co., Decatur, IL). Milk was pasteurized, tempered to 31 °C, and inoculated with strains of each pathogen. After 5 min, antimicrobials were separately added to the milk, and inoculated with 0.015% (vol/vol) DVS (Direct Vat Set) starter culture (Chr. Hansen's Laboratory, Inc. Milwaukee, WI). Milk was incubated for 15 min, and 0.01% chymosin (Chymax-Double strength, Pfizer, Milwaukee, WI) was added to the milk. A standard Cheddar cheese making schedule was carried out. The full fat Cheddar had an average pH of 5.63, 42.9% moisture, 49.5% fat (%FDB) and 1.95% NaCl. Reduced fat Cheddar had an average pH of 5.82, 51.6 % moisture, 26.9% fat (%FDB), and 1.9% NaCl.

Control vats were inoculated with pathogens, but antimicrobials were not added. For wash treatments, most of the whey was withdrawn, and the vat was filled with water at 38°C for 10 min with gentle stirring. After pressing for 16 hr, 100 g portions were vacuum packaged, stored at either 12 or 4 °C, and sampled for botulinal toxin, *Listeria monocytogenes*, and *Salmonella* sp. at 0, 1, 7, 14, 21, 30, 60, 90, and 180 d.

next page



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“... reduced fat cheese seems to actually permit less pathogen survival and toxin production.”

Results and Conclusions

We determined the growth and survival of *Listeria monocytogenes*, and *Salmonella* and toxin production by *Clostridium botulinum* in reduced fat and full fat cheeses, prepared with or without antimicrobials. We found that counts of *Salmonella* decreased 1 to 2 log₁₀ cfu/g and *Listeria monocytogenes* decreased 2 to 3 log₁₀ cfu/g in reduced fat cheese compared to full fat cheese in the absence of antimicrobials. This was true at both 4° and 12°C. Botulinal toxin formation was delayed in reduced fat Cheddar at 4 and 12°C compared to the full fat counterpart.

Antimicrobials affected pathogen survival and botulinal toxin production in reduced fat and full fat cheese at 4° and 12°C. Nisin, enterocin, and monolaurin had the strongest impact on pathogen survival and toxin production. In samples treated with nisin, there was an initial large drop in viability of *L. monocytogenes*, and the drop was greatest in full fat cheese. In full fat, but not in reduced fat cheeses, counts of *L. monocytogenes* eventually increased in number. Nisin did not significantly negate *Salmonella* survival in full-fat or reduced fat cheese. Enterocin promoted inactivation of *L. monocytogenes* and *Salmonella* in reduced fat but not in full fat cheese. Monolaurin promoted inactivation of *Salmonella* and *L. monocytogenes* in reduced fat and full-fat cheeses. Monolaurin also significantly delayed production of botulinal toxin in reduced fat cheese and to a lesser extent in full fat cheese. None of the other antimicrobials tested significantly delayed production of botulinal toxin.

In conclusion, our results suggest you can temper your concerns about reduced fat cheese since it seems to actually permit less pathogen survival and toxin production. The antimicrobials showed the same general pattern in washed-curd cheeses. We don't know how or why this pathogen inhibition occurs, but we are continuing our investigation. 

Niche continued from page 9

"Before we spend the money on printing, let's do a final test of the packaging and product," suggested Sara. "Let's take some color copies of these label proofs, cut and glue them onto packages of our cheese and put them in one or two stores. Then we'll really be sure – before we print all those labels!"

The Final Test – in the Store

"Price is too high. Not competitive. Too expensive." Don was explaining what he had heard in the store test. "We've got to do something."

"Am I glad we didn't print all those labels!!", laughed Sara. "Let's see if we could sell this product in six ounce packages instead of eight ounce. That way we can lower the selling price by almost 25%. And, we can have the pieces cut so we can use the same label size and design. All we have to do is change the label's net weight declaration and make minor changes to the nutritionals. What's more, if we pack the cheese as 16/6oz. we can even keep the same size corrugated cases that we originally planned on."

The decisions were made, the product was store tested, again. This time it was considered a good value versus common eight ounce Cheddar chunks. And, so, finally, the Team decided to print their labels.

What is a Sell Sheet?

A buyer is busy. The average buyer for a retail supermarket is presented with thousands of new items every year. Since they can only afford to spend a few minutes considering each new product your presentation must be clear, concise and persuasive.

That is the definition of a sell sheet. The Reenap Company didn't have \$2000 to spend on thousands of copies of glossy-printed sell sheets, let alone the \$15,000 that many larger firms typically spend on introductory selling brochures for new products.

Let's get some color copies of a photo of our new cheeses – with their new labels, of course. On the back we can print a brief explanation of the concept and why it will help the Trade make money."


"Nice idea, Jim," said Sara, "That shouldn't cost much and I think it will be effective."

"I figure it will cost us about \$25 for me to shoot a roll of film of our cheeses on a nice wooden table and get the best shots blown up to 8x10. Then, we'll need to spend a few bucks for desktop publishing to get the back copy camera ready, and maybe \$100 to make 50 two-sided color copies. We ought to be able to do the whole job for about \$200."

"Who will write the back copy?" asked Don.

"Let's ask our local food broker, one of the folks from the design agency, and maybe you, Sara, to work on the copy together. I'm sure they can simply state why the product will be a benefit to the Trade and how it is different from other cheese products now available."

To Market ...

The Team was almost ready to go to market. In my next, and final, article I will discuss pricing, selecting a broker and distributor network and introductory promotional spending. 

UW DAIRY PIPELINE

Calendar

Oct. 7-11 Wisconsin Cheese Technology Short Course. Madison, WI. Call Bill Wendorff at (608) 263-2015.

Oct. 22-23 Milkfat as an Ingredient Short Course. Madison, WI. Call Kerry Kaylegian at (608) 265-3086.

Oct. 29-31 Producing Safe Dairy Foods. Madison, WI. Call CALS Conference office at (608) 263-1672.

Nov. 6 Eastern Wisconsin Cheesemakers and Buttermakers Assn. Annual Convention. Depere, WI. Call Art Loehr at (414) 999-3895.

Nov. 12-13 Wisconsin Cheese Grading Short Course. Madison, WI. Call Bill Wendorff at (608) 263-2015.

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.

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

Feb. 25-27 Wisconsin Process Cheese Short Course. Madison, WI. Call Jim Path at (608) 262-2253 for more details.

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