

Department of Agriculture, Trade and Consumer Protection
Division of Agricultural Development
Agricultural Development & Diversification Program (ADD)
Grant Project Final Report

Contract Number: #19035

Grant Project Title: *Redesigning Affinage Facilities for Wisconsin Specialty Cheeses*

Amount of Funding Awarded: \$28,000

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Please use the following questions as a guide for writing your grant project final report. In your final report, please answer each question as it relates to your grant project.

- 1) What was the original intent of the grant?
 - What did you want to accomplish with the grant?
 - How was it expected to benefit Wisconsin Agriculture?
 - What makes this project work important or significant?
- 2) What steps did you take to reach your goal?
 - What worked?
 - What challenges did you face?
 - What would you do differently?
- 3) What were you able to accomplish?
 - What are the results from this project?
 - Include any analysis of data collected or materials developed through project work.
- 4) What conclusions can you make based on project work the analysis of collected data?
- 5) What do you plan to do in the future as a result of this project?
- 6) What information or additional resources are needed to commercially develop this enterprise?
- 7) How should the agricultural industry use the results from your grant project?

**ADD Grant Final Report
ADD Grant Contract 19035
Crave Brothers Farmstead Cheese
“Re-Designing Affinage Facilities for Wisconsin Specialty Cheeses”
January 31, 2007**

The original intent of this grant was to fund a Discovery Session on cheese “affinage.” It complemented a Babcock study trip to Switzerland in 2004 (report attached) and included a Discovery Session in March 2005 (report attached), as well as the recently completed “The Distinct Appeal of Cellar Aged Cheeses” video/DVD. The intent of the video/DVD is to develop and produce an educational piece that tells the story of cave aged cheeses in general, and Crave Brothers Farmstead Cheese Les Frères/Petit Frère in particular, as well as Roth Kase Gruyere, another cellar aged cheese. This educational piece will be shared with editors, cheese buyers, media, dairy artisans, and prospective dairy manufacturers. It can provide insight about the use and appeal of cellar aged cheeses by chefs. Two different cheeses from different manufacturers are profiled. It is a short synopsis informing the viewer about artisan cheese production, cellar aging and what chefs look for when buying and using cellar aged cheeses.

Steps taken included contracting with a video producer, selecting the cellar aged cheeses, selecting chefs, developing the script, scheduling the filming, finalizing the script and footage. Challenges included scheduling with busy cheesemakers and chefs; ultimately, these were manageable and the video/DVD was completed.

We selected Crave Brothers Farmstead Cheese Les Frères/Petit Frère and Roth Kase Gruyere as the featured cheeses. They are both unique to the U.S. and are cellar aged. The two chefs were selected based on their use and interest in Wisconsin artisan cheeses. Chef Scott Johnson from Canoe Bay, Chetek, WI selects local foods to feature in his nightly menu at the exclusive Relais Chateau property in northern Wisconsin. Chef John Caputo features many American artisan cheeses on his menu and a cheese bar at his Chicago restaurant, Bin 36. Both chefs were filmed and interviewed on location at their place of business.

Crave Brothers Farmstead Cheese plans to use this educational piece with food editors, buyer’s groups and other targeted tour groups that visit the factory. It will be shared with the Wisconsin Department of Agriculture, the Dairy Business Innovation Center, and the Wisconsin Milk Marketing Board.

Please also refer to:

www.dbicusa.org/resources/cravediscoverysessionreportfinal.pdf

**Affinage Discovery Session
Crave Brothers Farmstead Cheese
Waterloo, Wisconsin**

March 9, 2005



Report authored by
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&
Babcock Institute, University of Wisconsin-Madison

Executive Summary

A Discovery Session designed to investigate *affinage* (or cheese aging) principals for Crave Brothers Farmstead Cheese (CBFC) was held March 9, 2005 in Waterloo, Wisconsin. Sponsored by the Agricultural Development and Diversification (ADD) grant program, the one-day session brought together 12 resource people from the cheese community to discuss critical topic areas involved with *affinage*.

The full report provides an extensive summary of the presentations and discussion on topics including construction of aging cells, food safety concerns, design and use of a tasting/conference room, and marketing specialty cheeses. The report appendix also includes slides shown during the session.

Among the key points discussed during the session were as follows: (1) *affinage* is very different than cheesemaking, requiring different facilities and technical/management skill sets to be successful; (2) the internal environments of aging cells are complex relative to humidity, temperature, air exchange, and sanitary conditions, and *affineurs* (the people who guide the *affinage* process) must carefully manage and manipulate conditions for quality and consistency; (3) with *affinage* becoming more popular in the state as a way to add value to specialty cheeses, the State of Wisconsin is working closely with cheese companies to ensure food safety issues are paramount; (4) the construction of aging cells is very different than typical dairy plant construction due to constant high humidity, positive pressure, and ammonia generation, and there appears to be considerable work and research needed on materials and methods; (5) a tasting/conference room could serve as another “salesperson” if designed to be chef and visitor friendly; and (6) the markets for specialty cheese such as CBFC’s Les Frères are developing rapidly, but these cheeses are more suited to specialty retailers and outlets that have both the customer base and the knowledge to handle such cheeses.

CBFC intends to begin expansion of their cheese factory in Summer 2005, and is using the information garnered during the Discovery Session to assist them in the process.

Introduction

Crave Brothers Farmstead Cheese, LLC (CBFC – see <http://www.cravecheese.com/home/index.php>) was founded in 2002 as a complimentary business to Crave Brothers Dairy, LLC. The objective for establishing this new business was to add value to raw milk by producing farmstead fresh, specialty cheeses. Crave Brothers are known as innovators in the Wisconsin dairy industry; their progressive, modern dairy farm is now complemented by the first farmstead cheese factory in the state. Current cheeses produced include Fresh Mozzarella, Mascarpone, Farmer’s Rope® String cheese, Oaxaca, and Les Frères®, an American original, semi-soft washed rind cheese.

Les Frères represents CBFC’s attempt to manufacture a signature farmstead cheese. After researching different alternatives, it was decided that a washed rind would reflect their heritage and offer a unique cheese to the marketplace. CBFC began making Les Frères in small batches in 2002 with the UW-Madison, Center for Dairy Research. George and Debbie Crave traveled to the Auvergne region in France in October 2002 to research similar washed rind cheeses. The cheese was ultimately named “Les Frères” (which means “the brothers” in French) to reflect the Crave Brothers Irish-French heritage.

Les Frères is a rich washed rind cheese with an earthy, fruity flavor. It is usually served on its own, paired with fruit and nuts, or as part of a cheese course. It is currently made as a 2.5 pound random weight wheel. To date, there have been 40+ different makes of Les Frères, and in order to make a consistent product of high quality, CBFC knew that they needed to investigate a range of topics involved with *affinage*, or cheese aging.

ADD and Babcock Institute Grants

CBFC applied for and was awarded an Agriculture Diversification and Development grant from the Wisconsin Department of Agriculture, Trade and Consumer Protection in July 2004 (see <http://datcp.state.wi.us/mktg/business/marketing/val-add/add/>). A parallel grant from the Babcock Institute, University of Wisconsin-Madison provided travel funds to Switzerland for a two-person study tour on *affinage* in October 2004 (see <http://babcock.cals.wisc.edu/artisan/index.en.html>).

The objectives of the ADD grant were:

1. Design and facilitate a two-day Discovery Session which considers all aspects of construction for an *affinage* facility on a farmstead operation.
2. Design an *affinage* facility based on the results of the Discovery Session.
3. Build a cadre of expertise in Wisconsin to promote aged/cured cheese.

4. Provide documentation to the industry on *affinage* facilities.

The study tour of Switzerland and Austria was extremely valuable in coalescing initial ideas for a new *affinage* facility; the results of the study tour are documented in a paper found at <http://babcock.cals.wisc.edu/artisan/crave-report.pdf>. Among the implications for CBFC were the following:

1. The aging “caves” need to be spaces that are technologically sound, controlling temperature and humidity;
2. The most efficient operations were those that had the make room as part of the *affinage* facility;
3. The use of different racking for aging cheeses varied considerably among *affineurs*; and
4. Virtually all small aging rooms were modern facilities with hard metal or plastic walls and floors and technology that closely (within a degree temperature and a percentage relative humidity) controlled the internal environment.

The study tour experience also helped plan the Discovery Session and create initial design ideas for the *affinage* facility. CBFC determined the topic areas that were most important (see below), and subsequently recruited state, national, and international experts to be part of the session in order to explore together various options. The session was changed from two days to one day to accommodate schedules. The original concept of a resource notebook was abandoned in favor of multiple discussions (email and phone) with each invitee in order to assign short presentations as part of individual’s areas of expertise. Finally, CBFC drafted guiding questions (see below) that helped define their interest in each topic area and shared this with the invitees prior to the session.

Discovery Session

The one-day Discovery Session was held March 9, 2005 at the Crave Brothers Farmstead Cheese conference room in Waterloo, Wisconsin. Twelve invitees attended the day-long session and three selected resource people involved with building construction came for lunch and the subsequent session on construction. A complete list of attendees and their organizational affiliation is listed in the appendix.

The Discovery Session followed the eight topic areas determined by George and Debbie Crave; these areas were assumed to be necessary for the successful start-up and operation of their *affinage* facility, and were as follows:

- Topic 1: *Affinage*
- Topic 2: Aging Facilities
- Topic 3: Supporting Infrastructure
- Topic 4: Food Safety
- Topic 5: Construction
- Topic 6: Design and Aesthetics
- Topic 7: Workflow and Personnel
- Topic 8: Product and Marketing

The eight topics focused on the needs of CBFC to produce a quality product and to construct and operate a successful *affinage* facility. The first topic, for instance, was designed to form a general consensus around the *affinage* needs of CBFC to create a unique French style, semi-soft, washed rind cheese. Topics 2-3 focused on the characteristics of the aging cell itself, and the prerequisite building and equipment infrastructure. With *affinage* as a still fairly new topic for Wisconsin cheesemakers, food safety concerns and concepts were assumed to be paramount at the beginning (topic 4). Given the variety of construction techniques noted in Switzerland and in other operations in the United States, construction professionals that assisted in the building of the original CBFC factory were invited to present their ideas (topic 5). Topic six focused specifically on the need for a tasting room as an integral part of the *affinage* facility, and topic seven considered workflow requirements. The final topic considered product and market specifications specifically for Les Frères.

Each topic was organized as a 20-60 minute session, which typically began with slides from the Switzerland study tour and/or a pre-arranged short (3-5 minute) presentation by one of the invitees (see Appendix). Comments were then solicited from the group, and were guided by both the session questions (see below) and the session facilitator. In general, George and Debbie Crave were asked to summarize each of the sessions prior to beginning the next session. Notable also was a walk around the site immediately after lunch so that invitees could clearly understand the implications of adding this new facility onto the existing cheese plant.

Post-Discovery Session and Public Use of this Report

As encouraged by the ADD grant program, the results of these grants are designed to strengthen Wisconsin agriculture. As such, the following report is designed to offer summary information from the Discovery Session that may be of use for other cheese makers as they consider production of cave aged cheeses.

A word of caution for those looking at cave aged cheese and using CBFC as a model for their start-up enterprise: the following is a case study focusing on a very unique dairy and farmstead cheese operation in Wisconsin. It is important that each cheese manufacturer or dairy farm reviewing this report consider their own situation and characteristics before making plans for construction. Also, different cheeses require different cheese production facilities and aging conditions. It is important to consult with

professionals at the UW-Madison Center for Dairy Research, representatives from the Dairy Business Innovation Center, and similar organizations before committing financial and human resources.

Public comments are welcome on this report – they can be addressed to either Mike Bandli, ADD Program, Wisconsin Department of Agriculture, Trade & Consumer Protection (WDATCP) or Debra Crave, Crave Brothers Farmstead Cheese.

Finally, the authors acknowledge the many individuals for their contributions to the Discovery Session and this report. At WDATCP, Mike Bandli, Will Hughes, Secretary Rod Nilsestuen and their staffs provided support throughout the project period. Karen Nielsen at the UW-Madison, Babcock Institute was helpful in facilitating the travel grant. The cheese makers in Austria and Switzerland very candidly provided an incredible amount of information, and Felix and Liv Roth and their family provided unparalleled hospitality during the trip. And finally, a thank you to the extended Crave family for their continued interest support of the next generation of dairy innovation – we can't promise that this will be our last big project.....

Session 1: Affinage

The short overview introductory session underlined the operational definition of *affinage* and included general thoughts emanating from the experience of the invitees. Of note was that the Discovery Session would focus on aging washed rind, French-style cheeses (WRFS) similar to Les Frères.

Guiding Questions:

- Who else in Wisconsin/US is doing washed rind, French style semi-soft (WRFS) cheeses (essentially, what is the market)?
- Are these cheeses cows milk or mixed milk?
- What imported cheeses are washed rind, French style?

Highlights:

1. The general characteristics of Les Frères were shared with the Discovery Session invitees. This washed rind, French-style, semi-soft cheese is washed and aged for 3-8 weeks, and to date there have been 30-40 different makes of the cheese starting in 2003. One of the biggest challenges with Les Frères is to deliver the cheese at an age that the seller/buyer wants.
2. A general discussion of the operation at Artisanal Cheese Center in New York City (Artisanal NY – see <http://www.artisanalcheese.com>) provided some comparison to the current and future Crave operation. At Artisanal NY, four individual aging rooms are reserved for four different kinds of categories of cheeses and treatments/conditions. Versus making the cheese that will be aged on site, Artisanal NY purchases cheeses from around the world (including Canada, Italy, France, and the United States) and then designs a treatment to “finish” the cheeses. The distinct challenge to this approach is that their time in refrigeration prior to the beginning of the *affinage* process can sometime spoil the young unfinished cheeses before they reach the center.
3. One option for developing aged cheeses is to take the cheeses directly from the vat and subdivide them into 3-4 groups. One group can be aged immediately, and others can be refrigerated for 2-3 weeks or more before starting the aging process. This results in different textures, rinds, and tastes, and may give the cheese maker a number of different products from one small vat.
4. Cheesemakers must understand the size of the market, and must pick retailers that can handle the cheese. A product like Les Frères is destined for 1000 consumer and food service markets, not 15,000. Ultimately, it is the responsibility of the cheesemaker and their marketer to instruct and educate a retailer about the cheese; for specialty cheeses such as Les Frères, the optimal retailer is more likely to be someone like Larry’s Market (Brown Deer, WI) than a supermarket chain. With a product like Les Frères that continues to age in the retail cooler, there may ultimately be different customers for each stage of the cheese; a 3-4 week cheese may appeal more generally to current tastes in the

United States, whereas a 6-8 week cheese may appeal to those that are accustomed to stronger European-style cheeses.

5. There must be an appreciation that the *affinage* process, at least in the European tradition, is designed to “finish” the cheese, or to make it better. The *affineur* is an artist that takes a raw product, refines it, and then presents it to the consumers. To be a successful *affineur*, one needs care, passion, a lot of control, manual labor, patience, intelligence, and financing. *Affinage* is a very different reality versus cheesemaking – there are new technical requirements that one needs to learn, and it will take a special person and/or company (especially on a small scale/farmstead level) to be successful.

Session 2: Aging Facilities

The facilities discussion stressed information on the optimal conditions for CBFC cheeses. The overall assumption is that the “caves” need to be modern facilities with sophisticated temperature and humidity control.

The term “cave” was of concern to virtually the entire group. Although there is a romantic marketing notion to “cave-aged cheese”, these specially designed, state-of-the-art rooms are better described as “aging rooms” or “aging cells” (especially if they are smaller sized units).

Appendix 2 shows the slides from the Switzerland trip that were presented at the start of the session. The pictures showed a variety of “cells” that featured different construction and different conditions, and provided a basis for discussion during the session.

Guiding Questions:

- What are optimum temperature and humidity ranges?
- What equipment is needed to control temperature and humidity?
- How important is air flow?
- What wall and floor material optimize WRFS cheese production?
- What size cave is optimal?
- Does the shelving configuration make a difference for aging consistency?
- What automatic systems/sensors are needed to ensure quality control?
- Does lighting affect the process?
- Assume a useful life of 20 years for the cave – does this make a difference in the materials and systems discussed?

Highlights:

1. Of chief concern were the basic principles that should be included in the design and construction of aging rooms or cells. The three principals that dominated discussion and were generally agreed as important were the following: (a) impermeable walls that

will withstand the constant high humidity that is exacerbated by the positive air pressure; (b) an evaporating unit that has a low delta T and is “CIP-able” (cleaned in place); and (c) a commitment by the *affineur* to understand, monitor, and control air movement within the cell to better create the appropriate cheeses.

2. Expanding on the issue of air movement, there are systems that use washable “socks” off of the condenser that help distribute the air and prevent undirected high air velocity. The sock further serves as secondary sanitary tool as it may catch white dust off of cooling coils. Ideally, a system should have no “dead” air spots or high humidity near the floor so that the aging of the cheese is consistent; the alternative here is for the *affineur* to understand the air flow and humidity of their room and then arrange specific cheeses in specific places (done as needed at Artisinal NY). Some systems that feature passive air movement (like silo-shaped caves) have been effective, but would probably be impractical for the Crave *affinage* facility.

3. Regarding room/cell size, an optimal situation would be to have one cell per each day’s production; this would aide in the aging of cheese and would make scheduling the cleaning of the cell much easier. Production of Les Frères and similar washed rind cheeses probably do benefit from smaller cells (e.g., 8’ x 8” and a 7-8’ ceiling) as the environment is easier to control. Cells full of product are also more easily calibrated. Tinkering with temporary room dividers such as shower curtains, plastic sheeting, etc to produce different kinds or ages of cheese are impractical and not acceptable due to food safety issues.

4. Ammonia is a potential problem with aged cheese production. It reacts caustically with certain metals and may damage evaporators, shelving systems, etc after a few years. Some *affineurs* splash the cell floor with water to bring the ammonia level down, but that was not considered to be an optimal method for aging a cheese like Les Frères.

5. With the potential for producing both a large wheel of Les Frères and then individual serving “petit frère”, the issue was raised as to whether the size of the cell would be critical for the size of the final product. Managing the production – humidity, temperature, frequency of washing, etc – was felt to be critical here versus the size of the actual cell.

6. Aging cells, in general, should be seen as very sensitive and complex systems that the *affineur* must understand and control. Artisinal NY has computerized controls for precise temperature and humidity settings, but internal management of the cell is still needed because of the micro-climates. Frequent opening of the cell door or constant lighting will affect the internal climate of the cell. Steel doors with a climate controlled viewing window will allow some perspective on the cell and still maintain the integrity of the internal climate.

7. Finally, there was general agreement that clean systems were critical to success. Cold, moist cells are ideal conditions for bacteria, and the *affineur* needs to have all of

his/her systems washable. One option is to have equipment outside of the cell itself so that it can be easily and frequently cleaned in place. Food safety inspectors generally want to see (a) a well designed cell with no cracks and crevices that are difficult to clean; and (b) systems and processes that insure that health standards are maintained.

Session 3: Supporting Infrastructure

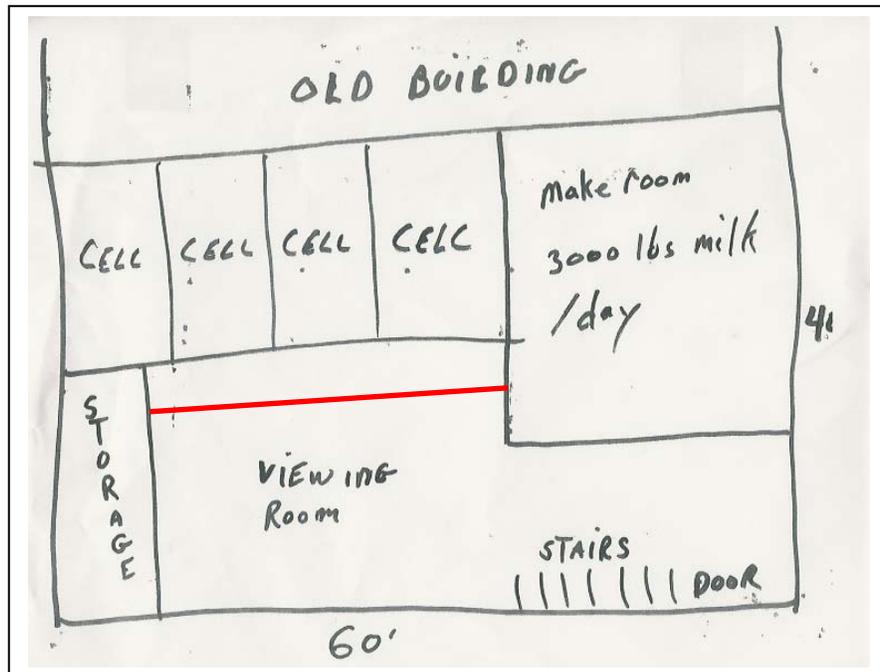
The supporting infrastructure can be defined as both (a) the other facilities around the aging caves that will facilitate the creation of successful products; and (b) the actual equipment used in cheesemaking and aging. The discussion in this section centered on methods and techniques seen in Europe by the Craves and/or were known to invited speakers, and slides from the Switzerland trip (Appendix 2) were again shown as examples.

Guiding Questions:

- Why construct a separate make room for WRFS cheese?
- What are options (& requirements re: OSHA) as to the size and configuration of this facility?
- How can workflow be maximized with judicious equipment and facilities placement?
- What advantage does an initial yeasting room serve versus using the caves only?
- What are the specifications of a cooler for the proposed size of the facility and its use for FSWR aged cheese?
- What is the general configuration of the packing area?
- Is there any storage in the cave complex, or is it all in the dry storage area above?
- What forms are best suited for WRFS cheeses? Are some final product shapes/sizes more marketable than others?
- What mini vat design is best?
- What equipment is suggested for use in the make room? What are other options that will increase productivity and/or ensure quality products?
- What are the optimal shelving systems?
- What is the optimal brining configuration for WRFS cheese?
- What special equipment is needed for the yeast room?
- What packaging equipment is available?

Highlights:

1. George Crave presented the diagram below and introduced it as a starting point for discussion. The *affinage* facility would include a small make room for Les Frères and other WRFS, the cells themselves, a packaging area, and a tasting room. This facility would be partially underground, and a second story would be expanded dry storage for the main factory. The ideal production would be to use 3000 lbs of milk/day, five days per week.
2. The general configuration of the facility was discussed both in terms of logistics and construction. For the latter, constructing a facility partially underground would not necessarily save any energy costs, and may end up to cause problems in the future. In regards to logistics, the movement of containers and other materials down to the *affinage* complex and then the movement of product up to storage and shipping were seen as cumbersome. There was a general consensus that a site west of the current factory – where production and storage would be on one floor -- might be better in the long run even though the “cave” effect of the original design would be lost.
3. From both production and safety standpoints, it was suggested that all visitors be restricted from the make room and the aging cell areas. A glass partition could be constructed (see the red line below on the diagram), and/or video cameras could be strategically stationed to show various parts of the complex on closed circuit televisions placed in the tasting room area.



4. Considerable discussion centered on the need for an appropriate vat for this operation. The vat should be (a) small enough for one person to operate; (b) small enough and designed such that each make was consistent; and (c) an elevated, tip-up vat (no pumping) that would then use movable drain tables.

5. Defining appropriate equipment quickly turned to defining the appropriate cheese to make and then match equipment to that production. Invitees strongly advised that CBFC pick one type of cheese, perfect it, and build a solid reputation.

Session 4: Food Safety

Given the scarcity of aging caves in Wisconsin and the United States in general, inspection and food safety issues need to be addressed as part of the construction of this complex. Glenn Goldschmidt of the Wisconsin Department of Agriculture, Trade, and Consumer Protection, Division of Food Safety, led the food safety discussion.

WDATCP is the regulatory agency that governs virtually all of the food safety processes involved with the proposed *affinage* facility. Internationally, the country receiving the cheese may provide additional or different standards concerning cheese making or product storage.

As a current Wisconsin cheese plant, CBFC does not require another license for its proposed *affinage* facility.

Highlights:

1. Food safety concerns are an integral part of the design and operation of the proposed *affinage* facility. Production efficiency, exemplified by a one-floor complex, makes sense from a food safety point of view. Positive pressure should be highest in the make room, and then second highest in the aging cells to discourage harmful molds and bacteria. Equipment and systems should be designed to be taken apart and cleaned. As noted under Topic 3, if there is a public section to the *affinage* facility (the tasting room), there should be distinct rules on access to production, aging, and storage facilities.

Guiding Questions

- What regulations govern WRFS cheese aging in the Wisconsin? In the US? Internationally?
- Who is the regulatory agency for each?
- What is involved in a cave inspection/audit?
- What food safety (or quality) information must be on a label for aged cheese?
- What aging information is needed in case of recall?
- What facilities safety procedures should be in place to prevent “bad” molds?

2. Producing washed rind cheeses is a battle between “good” and “bad” molds, and there are an estimated 10-12 micro-organisms per gram on the surface of the cheese. It was further noted that there was less mold culture on the surface of the cheese than what is going into the vat. Constant disinfection of all surfaces is discouraged as micro-organisms are needed to make the cheese. There is a higher level of confidence that commercial cultures can now make the process repeatable versus even 10 years ago when cheesemakers would scrape the rind off of an existing piece of cheese for its culture.
3. DATCP conducts a audit or inspection of an aging facility much like it would a factory examination (ATCP 80 and 71), and expects the following: (a) good sanitary practices by employees; (b) good ventilation; (c) appropriate storage rack construction and sanitation; and (d) appropriate wall, floor, and ceiling construction and adequate lighting.
4. There are standards for plastic cheese molds – 3A sanitary standard (20). Certain mold manufacturers have gone through this, and USDA has a list on its website of the approved plastics. Cheesemakers should ask the plastic manufacturer whether they have gone through the USDA approval process.
5. One of the biggest threats to food safety is the retail point of sale. All kinds of foods come together, and there is often little training of retail staff handling cheeses. Cheese makers need to understand that a recall at the plant will happen if contamination is found at retail outlets.
6. It was clearly understood that the proliferation of cheese aging facilities and new techniques were going to challenge current WDATCP rules and standards. An open dialogue between the cheesemaker/*affineur* and state regulators was encouraged, and WDATCP was encourage to publish any/all new regulations as soon as possible to assist innovative cheesemaking in Wisconsin.

Session 5: Construction

The construction discussion emphasized options related to the construction of the aging cells as well as overall construction. The discussion of aging cells in Topic 2 related to the need for impermeable walls made this session increasingly important.

Guiding Questions:

- Where will the cave be built? Is this the optimum location?
- What materials/design will be used to optimize energy efficiency?
- What is the general design of the “second floor” dry storage?
- What are the general specifications re: water, electricity, heat, etc?
- What are the general specifications for waste water and why?
- How are systems in the main cheese factory linked to the cave complex? What systems will be designed to be “stand apart”?
- What firms are suggested as contractors?

Highlights:

1. Interlocking, wood core panels were suggested for the aging cells, with the thickness of the panels to determine the level of insulation. Four layers of sealing caulk and mastic are used between the panels to make sure that no water gets in. The panels have been used for over 40 years in cheese plants, meat packing facilities, etc, and have never exhibited wicking of moisture into the interior wood.
2. CBFC had their current cheese factory built with these dairy board panels. They are washable, and have to date performed well in factory conditions. CBFC did construct the walls on elevated concrete so that the panels did not go to the floor in order to minimize any water seepage into the walls.
3. There was considerable concern over the use of these panels in an aging cell situation. A typical cheese factory using interlocking panels dries out each night; in aging cells, there would be 90-95% constant humidity exacerbated by positive pressure. There was further concern about tightness of seal around doorways and wall/ceiling intersections. There were also questions of how sealants and mastic would perform under heavy concentrations of ammonia. In general, the system seemed to rely more on workmanship (all of the sealants and mastics) than engineering to produce an impermeable surface, and this was clearly unsatisfactory to the majority of the session attendees.

4. The refrigeration system was discussed with the construction professionals, and again it was emphasized that this is a critical hygiene point because it is virtually always moist. It was emphasized that if a sock system of air distribution is used, socks should be removed and cleaned on a weekly basis. Another option is to install a UV light system on the side of the evaporator to kill bacteria. It was thought that the current air handling system was adequate for the *affinage* complex expansion, but it was noted that warm humid air should not be re-circulated as it may be a critical checkpoint for bacteria growth.

5. Each cell should have its determinable drain and should go right out the door. Ideally, a dry floor is desired.

6. It was suggested that (versus vinyl systems that could shrink or expand) fiberglass or concrete cells may be most appropriate. The issue with these systems is often the price, but it was argued that what CBFC needs is the right system and not necessarily the cheapest system. Failure of a cell would result in thousands of dollars worth of spoiled product, so it is worth doing it right the first time. Regarding food safety, it was agreed that the issue of seams inside of an aging cell was valid and important, and it was noted that pre-cast concrete was acceptable if then sealed (not painted). The resultant structure should have no entrance points for moisture but yet still be easily washable.

Session 6: Aesthetics and Design

The *affinage* facility will be equipped with a conference/tasting area capable of hosting professional groups. Obviously, there are many options related to both the interior of this room, and then how it is designed around the production facilities and the entranceway to the complex.

Appendix 2 shows a number of pictures from Switzerland showing how Bregenzerwälder Käsekeller designed their facility in Austria. The external entrance to a cave in France was also shown to provide an Old World perspective. At the conclusion of Session 6, Daphne Zepos showed a number of slides from Artisanal NY and discussed how they have integrated their tasting/ dining space with their production facility.

Guiding Questions:

- What parts of the cave complex will be accessible to all traffic? What are the viewing angles from all windows?
- What signage will assist guests understand the processes in the cave complex?
- What are the design and cost considerations for a stone cave motif ?
- What is the range of activities that will be held in the conference/tasting area, and what furniture and décor best accommodates these activities?
- What additional appliances or facilities will be needed in the conference/tasting area to serve food and drink?
- Are any special licenses required for this purpose?

Highlights:

1. The design and use of the current CBFC conference room has formulated some of the ideas for the conference/tasting room. It cannot be used simultaneously as an employee break room, and its design must help tell the story of CBFC (which is why there are windows showing activity in the factory and windows with views of the farm and fields.) Similarly, the new tasting room should be where invitees can see where the cheese is made and aged, and then sit down and taste the cheeses CBFC has to offer.
2. The tasting room will cater mainly to cheese buyers, food editors, chefs, and other professionals versus school groups and the general public. It was noted that a similar program at Roth Kase for taking customers and chefs through the plant has contributed significantly for establishing that company in the marketplace; the program has functioned like an extra sales person. Think of the tasting room as a silent salesman that you pay for once – and one that needs no benefits.
3. There is a sense that it must have an Old World flavor, from the entrance and then to the tasting room itself. It must include viewing windows, but it might also include works of local artists. CBFC was encouraged to make sure that they tell their story in the design of the room. Signage is important so that visitors can be self-directed around the room.
4. The tour will start when visitors drive up to the cheese factory and therefore some consideration needs to be given to re-design of the eastern part of the complex. One suggestion was to make it “more Wisconsin”. The idea is to have the functionality and efficiency of a cheese plant, with additional design and aesthetics (possibly using some of current gardens on the east side).
5. Arrangement of the room is critical, and there is no time better to show your image equity than when people are there. Face the oven toward the center of the room on an island, and invite chefs to “come and play”. The island should allow the chef to stand, work and talk to a group (think infomercial here, and remember that the height of the island as a work surface is important). Equipment in the kitchen must be industrial grade (Sub-Zero, Wolf, quality countertops, etc) so that the chefs can do quality work.
6. The room needs to be bigger than designed in the original sketch (see session 3). Artisanal NY, for instance, seats 78 people, and a bus tour hosted by WMMB would approach 60 people. The minimum capacity should be 30 and/or accommodate 12 chefs working hands-on. For tables, think of “stations” of four or six people, and design an area where tables and chairs can be stored easily.
7. Cheeses need to be displayed; they need to be available for smelling and tasting at every event.
8. Don’t underestimate an outdoor venue. Summer on the farm could be an excellent venue – think like a restaurateur here.

9. Wisconsin Milk Marketing Board (WMMB) has been very supportive of including Crave Brothers Farmstead Cheese in their tours with food editors, retailers, foodservice, and distributors. A tour of the farm often is included in the stop at CBFC. The Crave Brothers feel it is important to tell the story of modern dairying that emphasizes cow comfort, quality milk, and working in harmony with the land to produce quality milk and award winning cheeses.

10. The issue is whether the expense of a tasting room will be worth it. There is no question that there will be significant upfront costs, but the project could be done in stages.

11. The presentation concerning Artisanal Cheese Center in New York City (see slides in Appendix 3) featured the following: (a) Artisanal NY has a classroom/banquet facility that seats 78 people for dinner; (b) the operation features *affinage* but no make facilities. Cheese is made for them, and then is washed and aged at Artisanal NY through a variety of different methods; (c) the washed rind aging room has a number of challenges, including tile floors that are often slick and a lower shelf that is permanently wet; (d) sections featuring either dampness, quiet pockets, or too much air velocity in the washed rind room have necessitated the placement of certain cheeses in specific parts of the room; (e) the seasonality of cheeses is becoming something that their savvy customers are starting to talk about and look for; (f) the aging rooms have a control panel for temperature and humidity control, doors that close and seal very well, and a heated viewing window (which then has no condensation); and (g) the investment for the aging rooms was maybe \$300K for the production end only, and it was designed by Hughes Refrigeration.

Session 7: Personnel and Workflow Considerations

Workflow considerations in the *affinage* facility will be part of CBFC's total operation, but at issue is how adding such a facility will affect division of labor and/or additional labor, workflow between the main and aging facility, etc. Labor considerations are also important when choosing appropriate equipment and when designing to accommodate food safety regulations.

Guiding Questions:

- What percentage of cheese maker time will be needed daily when the aging facility is in full production?
- What percentage of staff support time will be needed daily when the aging facility is in full production?
- What staffing needs are anticipated under "as needed" (e.g., tasting events)?

Highlights:

1. One person should be in charge of the make process in the new *affinage* facility. This licensed cheesemaker would make Les Frères half time, and then assist CBFC with other tasks for the remainder of the time. The individual would (admittedly) need special skills, and might be asked to do administrative work. With a target 2-3,000 lbs milk/day and the appropriate equipment, this can be a one person job.
2. Part-time workers would be pulled from the factory to assist with washing the cheese and packaging. The design of the shelving system will help determine labor considerations as it was suggested that the vat size should match the shelves, which could then be the size of a pallet unit to be easily packed when ready for cold storage and shipping. Another alternative was to have shelving systems on casters to be easily transported by hand, especially in the beginning. Yet another alternative was to design the shelving system around a small pallet jack; arguments against this approach were that this may be an expensive initial investment, and that the pallet jack may be a source of contamination if not kept exclusively in the *affinage* facility.
3. The single cheesemaker approach may be adequate, but CBFC was encouraged to consider some positive redundancy around this position; if the cheesemaker leaves, there would be considerable hole in the operation. It was noted that this person will also need to keep an eye on monitoring of the aging cells and R&D. Artisinal NY has an internship program designed to have the intern work with the cheesemaker for three months, and they have recently hired a “Cave Manager” to assist with day-to-day operation of the aging facility.

Session 8: Product and Market

As a washed rind, French-style cheese, Les Frères needs to be produced and retailed to niche markets across the United States. Discussing and understanding some of the current market dynamics for cave aged specialty cheeses, and then brainstorming ideas related to marketing this cheese was the general objective of this last session.

As with previous sessions, slides from the Switzerland trip were shown (see Appendix 2).

Guiding Questions:

- What is the current market for WRFS cheese in the US? What percentage is US made? What percentage is imported?
- How much cheese could /should be made if the planned facility is in full production?
- What are the most important packaging and labeling issues for Les Frères and similar cheeses (note that it may be useful to show make date and then a succession of tastes based on the age of the cheese)?
- Are there issues with aging versus curing versus store shelf storage?
- What issues are associated with shelf life and WRFS cheeses?
- In what quantities/lots should Petit Frère be sold (12/box)?
- What are the state, regional, and national marketing opportunities for WRFS cheeses?
- How can WRFS cheeses be developed as year-round cheeses?

Highlights:

1. The market for a specialty cheese such as Les Frères is very different in the United States than in Europe. For the Swiss market, for example, a number of different sizes of the same product are acceptable; in the United States, it is important to create and target one product and be successful with that first.
2. The specialty cheese industry in the United States is healthy; the issue for many cheeses such as washed rind varieties is that it is currently impossible to determine the whole market in the United States (Gruyère as the exception here, where growth has been very good over the last 8-10 years). Choice of food is often generational, and mothers need to put cheeses like Les Frères in front of their families to try. Specialty cheeses have survived well in the recent carb craze, and are being considered more and more for their food service and casual restaurant functionality. As consumers travel abroad and try new cheeses, they come home looking for that same taste and experience. Wisconsin cheeses are well respected nationally, and the work of organizations such as WMMB has helped enhance recognition of Wisconsin cheeses to consumers nationally. One challenge is to target more specialty retailers like Larry's Market (Brown Deer) versus mainstream retail establishments.
3. Although the specialty cheese industry is healthy, there are still substantial issues related to the marketing and use of these cheeses. As noted, there is little data on who is buying these cheeses and why. Even expert chefs often ruin a piece of Gruyère by wrapping it in plastic. Wisconsin is probably still better recognized for Colby and Cheddar versus unique French style cheeses. It may be adventurous males shopping on

the weekend, looking for something different that may be the target market of a cheese like Les Frères. Finally, if consumers try a sample first, they may be more likely to purchase a new cheese like Les Frères, and it is important to find retailers willing to help sample sales.

4. Technomics (including supermarket scanning) is not adequate for tracking trends in specialty cheeses. Using chefs and/or tracing cheese import numbers may provide a better assessment of the market. The difficulty of the assessment is compounded by how the cheeses are classified by many of the professional organizations.
5. The packaging is critical for the success of Les Frères. This is a cheese that continues to age while in the cooler, and so the paper and box packaging must allow/enhance this process while maintaining the integrity of the product; essentially, the cheese needs to breathe. It was agreed that (a) Les Frères should not be inventoried – get it to the retailer as soon as possible; (b) keep it in paper versus plastic; and (c) avoid storage in a cooler for long periods as it dries the cheese out. CBFC was encouraged to “think outside the box” with the packaging, and there may be some newer plastic carton packages that allow the product to keep breathing. Although there is little university research on appropriate packaging, this may be an area that may greatly assist the industry.
6. CBFC was encouraged to continue producing both Les Frères in larger wheels and also a Petit Frère for individual consumption; these two products could be marketed to the bulk cheese counter and the retail shelves, respectively. Most retail shops do not handle bulk cheeses very well.

Session Summary and End Notes

Time restrictions did not allow a formal “next steps” session and so invitees were encouraged to send in comments by email to be included in this document. Selected comments included the following:

1. The discussion of air control systems and the construction of cells could be considered proprietary, and could be a source of income for consultants at the Discovery Session and elsewhere.
2. The process of the workshop was good as a Discovery Session. No one had all of the answers, and there was a fair amount of conversation flow. Having Daphne Zepos of Artisinal NY – an opinion from outside of Wisconsin – was extremely useful and provided a wealth of information.

3. All information from the session should be provided to the public except for the most private details -- such as the construction plans. The final report should be available on the web like the Switzerland trip.
4. Construction issues were the most contentious. There is currently a gap given that there are no “one-stop shop” general contractors that do this. The system presented at the session was criticized primarily because of the unknowns related to construction materials versus humidity/ammonia and the durability of such over the long-term. In the short-term, it may be helpful to collect more options available for construction from all over the world.
5. Increased emphasis is needed on marketing and packaging of the product. Cheesemakers need help on the marketing side as specialty and artisan cheesemakers are much like creative chefs -- they tend to overlook the marketing side of the business. Estimating size of market of Les Frères is very vague as the majority of this type cheese is not sold in conventional stores -- hence the volume and trends information is not readily available.
6. Although the story to the consumer may be old world romance in regard to the production of cheeses like Les Frères, the reality for cheesemakers is that they initially need to worry as much or more about their needs of the labor force, state inspectors, and other business tasks to be successful.
7. The session points to potential controversy around terminology. “Ripening” versus “aging” versus “finishing” were interchanged. Also, “caves” versus “cellars” versus “rooms” versus “cells” may be the same but have different connotations, especially for the consumer.
8. There was very little discussion on manufacturing protocols during this session. The Center for Dairy Research is well equipped to work with cheesemakers to design specific make schedules.
9. There are a number of different formats that the follow-on for this project can take, including creation of an extensive resource notebook and/or follow-on sessions for other cheesemakers. The Crave Brothers Farmstead Cheese example is a very nice case study for any subsequent work.
10. Missing was the financing of the operation, and information on pricing, economics, investment capital needed, cash flow required for long hold cheeses.
11. The right combination of people is needed to make a session like this successful. It is important to note that this was a discovery session, but not a solution session, and more work needs to be done on *affinage* to support Wisconsin cheesemakers.
12. There will be others interested in *affinage* that do not have extensive general cheesemaking experience, and it will be important for them to attend general

manufacturing short courses offered by UW-Madison or UW-River Falls and/or use good reference books outlining manufacture principles (examples include Kosikowski's Dairy Manufacturing and Cheese Manufacture from a Northern European Perspective by Kristensen). Information dealing with sanitation/food safety from milk handling in the plant, regulations on raw versus heat treatment versus pasteurized, plant GMP's, proper brine and ripening room maintenance should also be presented, along with contact information for DATCP, CDR, maybe other organizations who could help in this area. An on-line library of digital pictures from around the world will also be useful for prospective *affineurs*.

13. There should be a "reality checklist" for small companies considering *affinage* so that both the company and supporting agencies do not invest too much time and effort. The checklist may include: what can go wrong; information available and selected short courses; meeting with DBIC to discuss marketing; and an analysis of cash flow if they are considering long hold cheeses. Many have seen the romance of cheesemaking, but they are often blinded from the technical and business realities behind it.

A few final notes from the authors: the invitees to the Discovery Session indeed verified a number of ideas that were brought back from Switzerland, and challenged many more. CBFC realizes that until a facility is created that can be controlled by the cheesemaker/*affineur*, the prospect of making Les Frères as a consistent, quality product is problematic.

As of the writing of this report, CBFC is finalizing the architectural plans for Summer 2005 construction of a two-story addition to their factory. The second story will be fully finished as dry storage, and the first floor will be equipped with sufficient utilities and infrastructure to create an *affinage* complex in the near future. The Discovery Session clearly indicated to CBFC that additional due diligence is needed and that process has begun with cheese industry and construction advisors.

Appendix I: Discovery Session Attendees

Neville McNaughton – President of CheezSorce, and consultant to the Dairy Business Innovation Center (DBIC – see <http://www.dbicusa.org/>).

John Jaeggi – Associate Researcher, UW Center for Dairy Research (see http://www.cdr.wisc.edu/about/staff_pages/John-Jaeggi.shtml).

Dave Leonhardi – Wisconsin Milk Marketing Board (see <http://producer.wisdairy.com/>)

Steve Ehlers – Owner, Larry’s Market, Brown Deer, WI (see <http://www.larrysmarket.com/>)

Steve McKeon – President, Roth Kase (see <http://www.rothkase.com/news.html>).

Regi Hise – Chef and President of Foodtrends.

Felix Roth – Technical Director, Roth Kase (see <http://www.rothkase.com/cheesemanage.html>)

Willi Lerner – Cheesemaker and owner of Bleu Mont Dairy (see http://www.wisconsinartisan.com/bleu_mont.html).

Glenn Goldschmidt – Food Safety Scientist, Division of Food Safety, WDATCP (see <http://www.datcp.state.wi.us>).

Scott Rankin – Assistant Professor, Dept of Food Science, University of Wisconsin-Madison (see <http://www.wisc.edu/foodsci/faculty/rankin/>)

Sid Cook – Master Cheesemaker and President, Carr Valley Cheese (see <http://carrvalleycheese.com/>)

Daphne Zepos – Director of Affinage, Artisanal Cheese Center (see <http://www.artisanalcheese.com/artisanal/index.cfm>)

Lad Dilly - Energy Panel Structures

Scott Foley - Foley Construction

Brad Madigan - Madigan Refrigeration

Specialty Cheese Making and Aging – Switzerland
George and Debbie Crave
Babcock Institute for International Dairy Research and Development

The following report is in fulfillment of the travel grant made by the Babcock Institute for International Dairy Research and Development to Crave Brothers Farmstead Cheese, LLC (CBFC). Although it contains some background information and a complete itinerary, the report is designed to be analytical input for a March 2005 “Discovery Session” designed to help CBFC carefully and comprehensively plan and construct a cheese aging facility as an expansion to their existing farmstead cheese factory.

CBFC sincerely thanks the Institute for its support of this study tour, and intends on using the knowledge and visuals gained during the tour for future presentations.

Study Tour Background and Narrative:

The stated objective of the study tour was “to research and study cheese caves and aging facilities”, and use the trip to identify prospective affinage experts to participate in a proposed “Discovery Session” workshop scheduled for March 2005. The tour was originally scheduled for the eastern part of France, but was changed to Switzerland based on the recommendation of Felix Roth (see below).

George and Debbie Crave, president and vice-president of Crave Brothers Farmstead Cheese, LLC (CBFC), were the recipients of the Babcock Institute grant, and toured a wide range of cheese makers, factories, aging facilities, and farms during the week of October 16-23, 2004. A total of 20 facilities were visited during the tour, nineteen of which were in Switzerland.

Their host for the study tour was Felix Roth, the technical director for Roth- Käse USA, Ltd (Monroe, WI). Given his long-standing reputation in the cheese making community in Switzerland, Mr. Roth was able to arrange a program that was technically comprehensive and personally dynamic. The Craves and Roth were accompanied by grant writing consultant Jim Gage, who is assisting both CBFC and Roth-Käse in planned factory expansions through research and project planning.



Why Switzerland? Switzerland is an ideal study tour locale for learning about cheese making and aging. In many of the small villages, there are still family operations of 2-3 people that make very high quality specialty cheeses. Other larger (10-15 person) operations typically stress a varied product line, with virtually all exhibiting extensive entrepreneurial spirit and business sense. Switzerland is an eclectic combination of older and newer cheese making facilities; hand-packed Mont d'Or in the first floor of a house is not far from several multi-million dollar factories that feature touch-screen technology and modern packaging methods. Cheese aging facilities are similarly varied, with many changes based on the need for EU compliance and/or the need to become economically profitable through technological innovation.

The itinerary of the study tour is presented in the appendix. In five days, the group literally covered Switzerland from the Austrian Alps in the east to the French border in the west. Mr. Roth's linguistic ability and technical expertise afforded the Americans an opportunity to ask very pointed questions in both the French and German Swiss regions, and gain valuable insight into all aspects of each operation's business.



Of parallel interest to CBFC as a farmstead operation was aspects of the dairy industry – this inclusive of cow, sheep, and goat husbandry. The group was able to observe a regional dairy show, and George Crave was able to tour a robotic milking operation on a 100 cow dairy farm. The driving tour of the various regions of Switzerland gave the group an appreciation of farming methods throughout the country, and stimulated further discussion on such issues as summer pasturing, preferences of dairy animals throughout various regions, and so on.

Overall Trends and Topics for Specialty Cheese Making and Affinage

A number of overall trends and topics surfaced repeatedly throughout the week that has implications for both CBFC and other specialty cheese makers in Wisconsin and elsewhere. These general topics will form a number of the critical questions that will be discussed at the Discovery Session in March.

Among these trends and topics are the following:

1. The cheese industry in Switzerland is, like the US, under transition. Austria, for instance, dropped many subsidies for cheese production because of its entry into the European Common Market; the response of the Kasekeller Bregenzerwalder cooperative was to organize a product and marketing approach around their unique mountain cheeses. This included the construction of a new facility (Figure 1) which features a tasting room (and viewing window to the aging room) and robotic rind washing. Affineur Alois Koch of Gonten (Figure 2) will need to

completely revamp his aging facilities by 2007 per EU regulations, replacing concrete side shelves (with stainless steel) and gravel floors (with concrete). Lack of workers and the high cost of labor (\$15-18/hour) in certain areas force cheese makers to adjust their workforce and increase the use of technology (as Felix Roth noted, “If the labor force is available, you’re not forced to do as much innovation). One cheese maker hires only women as they (in his opinion) were more methodical and better suited to the cheese making process.



Figure 1. In response to lower subsidies, the Bregenzerwalder has constructed a state-of-the-art facility and embarked on an aggressive regional marketing of their cheeses.



Figure 2. Alois Koch explains some of the changes needed in his aging facility to bring it up to EU standards.

Three factories that were toured had gone bankrupt and were now under new ownership. All of the new owners benefited from being able to buy equipment at pennies on the dollar (pence on the franc?) and had considerably more working space and facilities than other cheesemakers.

The tour group was impressed by product innovation throughout virtually all of the small factories. Many cheese makers considered different product sizes and/or product variations (Figure 3) based on their assessment of consumer preferences.



Figure 3. Soft goat cheese is machine cut into small disks(bottom left), machine dipped and breaded (top left), and then collected to be packaged (above).

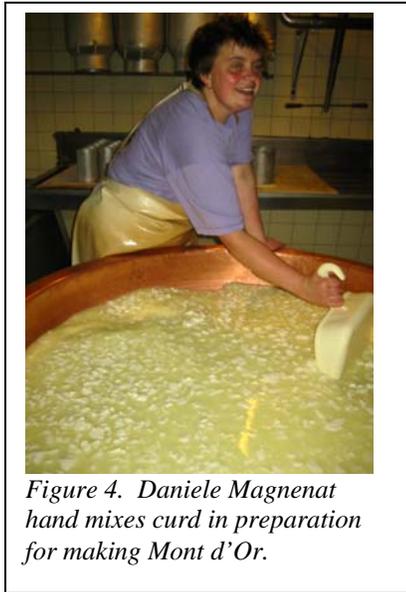


Figure 4. Daniele Magnenat hand mixes curd in preparation for making Mont d'Or.

2. The making of specialty cheese, whether at the artisan or factory level, has a very high level of precision and craftsmanship. Topics of discussion with cheese makers included: the quality of milk (including fat content); the types of vats used (including micro versus cooper, and shape); preparation of the curd (Figure 4); use of citric versus lactic acid, or a combination of both; cheese brining based on the size of the cheese; use of frozen milk versus fresh milk for goat cheese production; size of molds for different final products; pH ranges and changes throughout the production process; and many others. The cheese makers, given

that the tour group was not seen as a market threat, were very frank in their discussions of various methods.

3. The concept of cheese aging, or affinage, for specialty cheeses is equally as important for the quality of the final product as cheese making. Topics of discussion with the affineurs included: optimum humidity and temperature ranges for his particular cheese; length of affinage, often accompanied by a discussion of shelf life; facility used and methods for maintenance; equipment used for



Figure 5. Freshly made Mont d'Or (top) and aged (bottom). Note the spruce wrapping.

optimal affinage environment; shelving (wood versus metal versus plastic were all seen); constituents of the wash (for example, Appenzeller uses a combination of herbs in the wash brine which introduces a distinct flavor, and Mont d'Or is wrapped with a spruce slat (see Figure 5) to help support the soft cheese and provide additional flavor); use of robots for the wash process; packaging; and many others. Although no traditional stone "caves" were seen, the aging rooms ranged from 10'x10' cooler-type rooms to 5000 sq ft climate controlled warehouse-type facilities. One sidelight of most aging facilities from the point of view of Americans – the by-product production of ammonia as part of the aging process is often overwhelmingly pungent.

4. Unlike the US, specialty cheese production has a tradition in Europe and markets are considerably more developed. Cheese “ripens” with age, and Europeans seem to both understand and appreciate this. The remnants of the aforementioned ammonia (often easily solved by allowing the cheese to breathe at room temperature before using) and the lack of shelf life make certain specialty cheeses currently unattractive for the American market. In the US, raw milk cheeses have a certain stigma and are under scrutiny; in Europe, they are universally welcomed for their flavor and character. Even in small towns, an aged cheese such Appenzeller or Emmentaller is cut fresh from large wheels for use in the succeeding 2-3 days; in the US, such cheeses are often cut and packaged inappropriately and lose their unique favors. Market organization around a number of the specialty cheeses and products provide sufficient financial returns to keep artisanal cheese makers profitable.



Figure 6. Marketing product is as varied as the number of cheeses. Clockwise from left: products by F&F Koster come in four different shapes and sizes; the counter at Kasekeller Bregenzeralder features local cheeses and art representing the area; Geissmilchprodukte has a very impressive selection for a small shop; Cheese maker Freddie Neuhus cuts a slab of Appenzeller for customers at the end of the day.

Implications for Crave Brothers Farmstead Cheese:

CBFC is, through the WDATCP Agriculture Development and Diversification (ADD) grant, researching tools and techniques that will be included in the design and construction of a new affinage facility at their factory. A number of the specific implications that this study tour has suggested or confirmed are the following:

1. The Crave cheese “caves” will need to be spaces that are technologically sound. The two most critical components to an aging facility or cheese “cave” are temperature and humidity. A coil (see Figure 7) could provide enough cooling for a small structure versus complex cooling systems seen at many of the larger aging



Figure 7. A cooling coil provides sufficient climate control for a 12'x12' aging room.



Figure 8. Humidity is distributed through the aging cellar via a “sock”, which can easily be removed for cleaning.



Figure 9. Mist is delivered from perforated ceiling pipes in an older facility.

storerooms. For humidity, larger rooms use a “sock” method (see Figure 8) to distribute humidity evenly. An older facility used piping covered with a tarp on the longest walls to ensure climate control, or ceiling pipes are used (Figure 9). One cheese maker also had the brine tank in his aging room to keep the relative humidity in an acceptable range.

With CBFC slated to make “Les Frères” and other French-style, washed-rind cheeses in the aging facility, particular attention needs to be paid to sanitary conditions. One strategy used was to over-pressurize the aging room to essentially keep outside air and stray mold from coming in. There was also discussion on the question of air exchange and the merits of keeping a population of good mold in the cave environment versus having a constant level of fresh air exchange.

A number of facilities had a series of caves or facilities with varied temperatures and humidity levels. Figure 10 shows a cabinet that keeps the cheese in a warm environment the first 24-48 hours to ensure that cultures develop; affineurs would then move the cheese to a different climate controlled environment. Much discussed as part of this aging process was the packaging used and length of time in a cooler before market distribution.



Figure 10. George Crave examines a “warming” chamber, used to promote culture growth during the first 24-48 hours of the aging process.

2. It appeared that some of the most efficient operations were those that had the make room adjacent to the aging facility, and the Craves are now considering the implications of this arrangement. These were often smaller operations, featuring vats of no more than 1000 lbs capacity and/or multiple vats as small as 100 lb capacity (Figure 11). These smaller operations still had the capacity to make a considerable amount of product, often in “petit” sizes suitable for individuals or family single servings.



Figure 11. Choosing a vat depends on the type of production. From clockwise left bottom: large cooper vats are often used for Appenzeller or Gruyere; George Crave examines a 1000lb capacity elevated vat that drains from the bottom; trough type vats on wheels allow the cheese maker flexibility around the make floor; micro-vats as small as 100 lbs allow may be appropriate for trial makes and limited (but high value) markets.

Noted throughout the tour were a number of specialized tools designed to help the cheese maker create the final product. Ueli Moser demonstrated a variety of curd cutters for his small trough vats (Figure 12), and Mathias Koch used a small hand cutter to produce specialty petites of his goat cheese (Figure 13)



Figure 12. Hand-held curd cutters with a variety of configurations are used to create BonCas products



Figure 13. A small hand cutting tool creates petites.

3. The use of different racking for aging cheeses varied considerably among affineurs (Figure 13). Many use spruce boards for longer aged cheeses; after the cheese finishes aging, these boards are thoroughly washed, sterilized, and dried before re-using. Plastic trays and metal racks were often the choice of those making white mold cheeses.



Figure 13. Aging cheese on racks varies from mountain cheese on boards (bottom left), mountain cheese on metal racks (top left); and newly made soft cheese on plastic and metal (top right). Newly cleaned spruce boards dry before next use (right).



4. There was an assumption by CBFC that an aging “cave” needed to closely emulate the traditional French caves of old. What is evident from the study tour is that virtually all small aging rooms were modern facilities with hard metal or plastic walls and floors and technology that closely (within a degree temperature and a percentage relative humidity) controlled the internal environment (Figure 14). The assumption that these caves needed to be large was also unfounded;

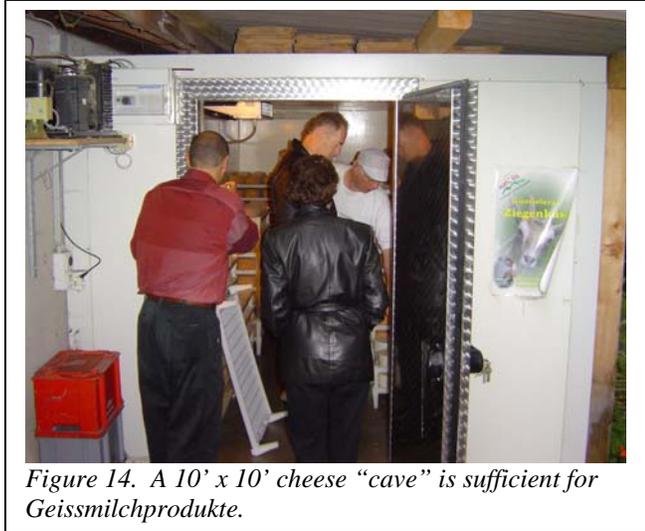


Figure 14. A 10' x 10' cheese “cave” is sufficient for Geissmilchprodukte.

for white mold cheeses that are aged 3-4 weeks, a space (or multiple spaces) of 12' by 12' seemed to be adequate for all of the Swiss factories. Issues of design are important but must consider financial constraints; Kasekeller Bregenzerwalder did consider a stone-faced front for its facility so to be more appealing to tourists, but opted for a more modern, less expensive look in the final design.

Next Steps:

CBFC plans to design and construct an aging facility in 2005. Given the general lack of knowledge of modern “caves” in the US, this undertaking is no small technical matter. It is also anticipated that the cost of construction and equipment will exceed \$100,000, and part of the planning process must include return on investment analyses that show a break even point within 4-5 years.

A comprehensive discussion of planning, construction, and related issues will occur as part of the ADD Discovery Session, scheduled for March 2005. The discovery session was originally designed as an opportunity for CBFC to ask invited resource people a range of questions about construction, equipment, affinage methods, and other subject areas. The Switzerland study tour has provided a very important base of information that will enable CBFC to cover very specific topics needed for their design and construction. CBFC is currently conducting research parallel to the information in this report, and is putting together their final list of invitees to the Discovery Session. The results of the session will be available in summary to other cheesemakers in Wisconsin through UW Center for Dairy Research, Babcock Institute, and the WDATCP.

Appendix: Annotated Itinerary

The following itinerary was prepared for the group by Felix Roth of Roth-Kase. In most locations, photography was allowed, and selected pictures accompany the brief descriptions.

October 18 (Eastern Switzerland and Austria):

1. Roland Egger of Sonneatal at Fischingen makes Brie and other small washed rind, raw milk cheeses. He and another cheese maker make cheese every day, using milk from 18 farms (about 3 million lbs/year). Roland is a Master Cheesemaker-10 years on job – and makes Emmentaller at another factory.



2. Urs Imlig of Kaserei Oberriet at Oberriet makes and ages Raclette. In the aging warehouse, a Mikroklima designed system features robotic washing and turning of wheels. Some 32,000 wheels of cheeses are aged at any one time. A second aging facility using the Mikroklima system and robots is under construction.



3. Dr Elizabeth Wagner-Wehrborn of Kasekeller Bregenzerwalder at Lingenau, Austria guided the group through the cooperative's facility. A tourist tasting room features a floor-to-ceiling glass wall overlooking an aging room. The facility also uses a Mikroklima system, and has three aging cellars with robots. There are some 30 varieties of cheese in Bregenzerwald, from hard mountain cheeses to fresh, creamy cheeses like Bierkase and Camembert.

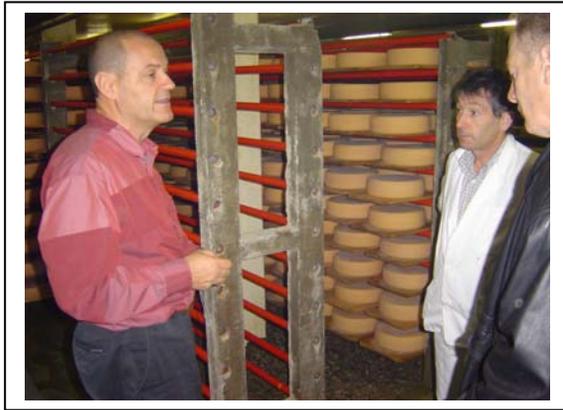


4. Marco & Ralph Rutz at Wittenbach make Appenzeller, Emmentaler, and Raclette; they are one of only seven factories approved to make Appenzeller in this region. They also use a robot and a Mikroklima system, and do sliced packaging for retail markets.

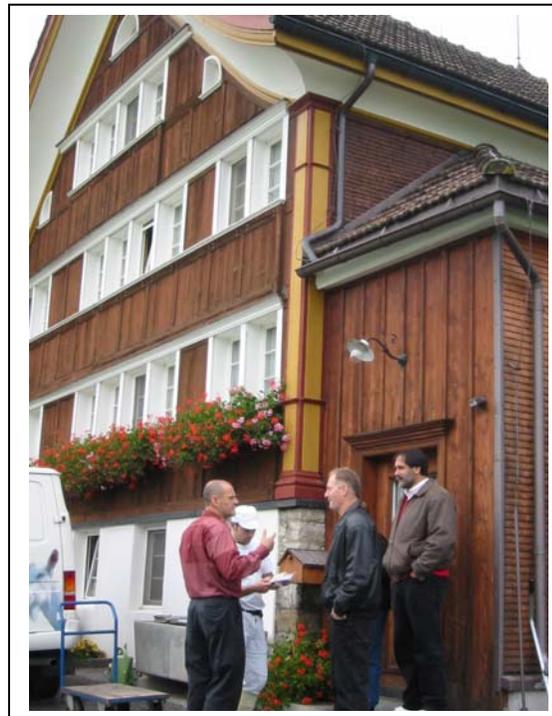


October 19 (Appenzell Valley):

1. Alois Koch of Gonten ages Appenzeller, but by 2007 will have to overhaul his aging room to meet EU standards. The facility produces 1000 wheels per month, with 6 cheese factories supplying to him.



2. Mathias Koch of Gonten is a fresh goat milk cheese maker and milk packager. He freezes some goat milk from the spring “flush” to produce cheese at times of low production. His products are supplied to the large Swiss retail chain Migros.



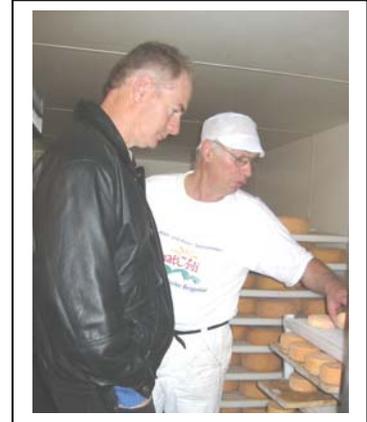
3. Appenzeller Schaukaserei at Stein is a state-of-the-art cheesemaking facility, restaurant, and tourist shop/destination. Onlookers can observe cheese being made in an open double-O cooper kettle, and also have a viewing window to the aging room. The restaurant features Appenzeller recipes like cheese pie, an assortment plate of meats and cheese, macaroni and cheese, etc.



4. Mikroklima at Matzingen is an engineering firm specializing in turnkey operation for cheese production. The firm will develop the entire concept, from curing room and preparation rooms, to shipping and logistics. They have completed 15 completed projects units in last three years in Italy, Germany, Austria, and Switzerland. They specialize in calculating optimal temperature and humidity regimes for cheese production, and then can remotely monitor changes in environment through a sensor system.

October 20 (Central Switzerland)

1. Geissmilchprodukte at Wald is a goat cheese producer with four goats but then gets milk from many other cooperative members. He produces fresh and washed rind cheeses, including petites aged on wood boards and plastic shelving, and experiments with many red smear raw milk and white mold pasteurized milk cheeses. He also sells many of his cheeses on-site in a small store.



2. F&F Koster at Wald produces sheep milk cheese (Brie and Feta) and yogurt. He produces many petites using both pasteurized and raw milk cheeses. Sheep dairy farmers unload milk outside from both traditional milk cans and small containers. He typically makes cheese every other day, and packages it on the off day.



3. In the small town of Hinwil, a regional Brown Swiss dairy show attracted some 80-100 cows and bulls. Of interest was the mix of cows between the more traditional dual-purpose animals and those with improved genetics that were bred from increased milk production.



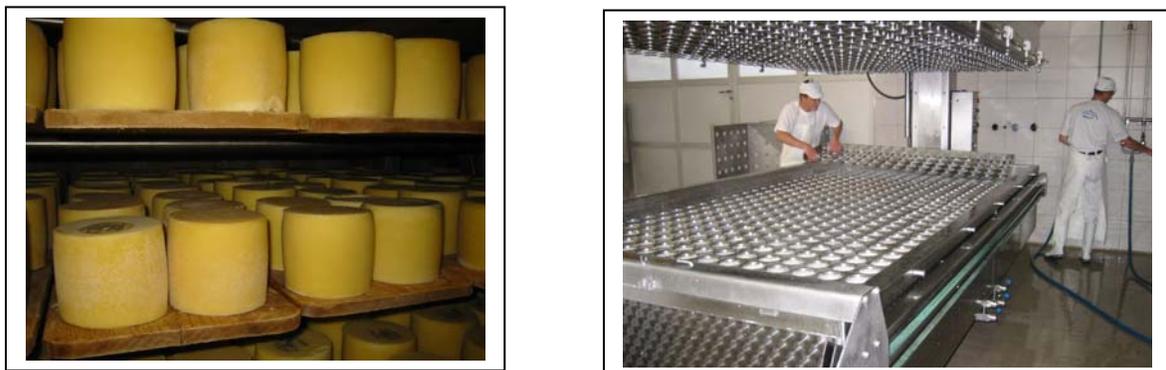
4. Divina at Dietikon was a fresh cheese factory featuring fresh Mozzarella, Ricotta, and other fresh cheeses. It was a very large operation, with most products packaged for the food service industry. Given that the technical components of this operation are similar to that of CBFC, there was substantial discussion between George Crave and the head cheese maker on the make process. The factory has substantial packaging machinery, and makes cheese three days/week, 24 hours in a day to be most efficient with machinery and labor.

October 21 (Central and Western Switzerland)

1. Ueli Moser of BonCas at Dotzigen produces white soft cheeses, 60% organic, using mostly cow (but some sheep) milk. The factory is technically very innovative in its production operations. The product line includes many different sizes of cheese including petites that are produced in small vats. BonCas produces cheese only when they have orders, and does export both to the US and Germany.



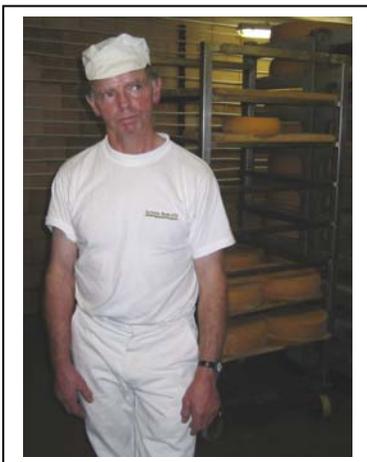
2. Spielhofer at St. Imier specializes in Tete de Moine, but also makes Gruyere and mountain cheese. The factory is a former cheese cooperative factory, with many amenities and large production facilities. The factory purifies its waste water to be re-introduced into the water supply



3. Bettex at Champtauroz produces a range of goat cheese and dairy products. The owner is a very aggressive entrepreneur who has built a 1000+ goat dairy herd in less than eight years. His systematic approach to agricultural development includes the cheese factory, the goat herd, a 30-head beef operation, horses, and a future biodigester on the property.



4. Freddie Neuhus at Arnex makes and ages Mont d'Or & Gruyere from milk he receives twice daily from local farmers. He uses two large cooper kettles for production, ages the cheese on wood, and has a small retail shop.



5. George Crave visited a 100-head dairy farm featuring a robotic milking system.

October 22 (Western Switerland)

1. Bory at Dizy makes tomme vaudois (white cheese) using Chalon Megard equipment. The process included a continuous coagulator, mini basin vats, with the milk intake outside.



2. Daniele Magnenat at Le Lieu Valle du Joux makes Tomme Vaudois raw milk (white), Mont d'Or, and Gruyere cheeses, and supplies them to a nearby aging facility. She works alone in the first floor of her house, and has been a cheese make for fifteen years. She uses both mini basin and cooper kettle vats.



3. Fromalp at Vuisternens en Ogoz ages Gruyere using a robot that washes one wheel at a time. The facility has three aging rooms containing some \$10 million worth of product. He ages cheese both from his own factory and that which is produced by others, but very carefully monitors differences. He exports outside of Switzerland, and has recently been audited to export to Great Britain.



4. Grossrieder les Moleson at Orsonnes produces gruyere and a number of other cheeses. Using Chalon Megard equipment, they have aggressively targeted the retail market by serving as a wholesaler for other cheeses, meat, and dairy products, and distributing products using a fleet of eight trucks.