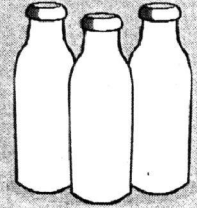


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Cream Line

a new voice for little dairies

Issue No. 5
Spring 2000



Maple View Farm Milk Company

The visitor turns right, cruises up the long, straight driveway bordered by white board fence and green fields. She passes the stately old home with its huge maple trees that have grown with several generations, and parks her car in the lot behind. Stepping out into the warm Carolina breeze, she walks up the steps of an immaculate white-painted block building. There on the porch is a glass-front cooler the size of a large refrigerator. She deposits two empty glass bottles in a waiting crate and an envelope with exact change into the locked box on the cooler's side. Opening the cooler door, the visitor chooses two bottles – a half gallon of skim milk and a quart of buttermilk. As she turns to leave she smiles and greets an employee entering the building, then returns to her car and drives home with her bounty – milk as fresh as it can get, direct from the farm.

The days are forever gone when milk could be ladled out of the cooling tank into the neighbors' Ball jars, but Maple View Farm Milk Company is coming as close to that as they are able, with their self-serve, honor system "store" on the front porch of their new processing building. Roger Nutter, plant manager and co-owner of the milk company, says the on-farm self-service cooler ranks third in sales among the 60-some locations where Maple View milk is marketed, despite the modern world's headlong rush to wherever and eternal demands for convenience.

Located several miles outside the quaint and prospering town of Hillsborough, NC, Maple View Farm retains its rural character but has easy access to the burgeoning markets afforded by the high-tech "Research Triangle" of North Carolina. Two company trucks deliver 5000 gallons a week of fluid milk products and butter to locations within fifty miles of their farm. These outlets include large chain supermarkets and small grocery stores, country stores and restaurants. All of the milk is sold in glass bottles, which can be returned to the stores for deposit or trade. The milk company drivers then pick up the empties when they deliver milk to the stores. Very little Maple View milk, less than 1%, remains unsold despite the

*Maple View
Farm Milk*



**Fresh from the
Farm to You!**

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Do You Know?

How many cheese plants are there currently in the United States?

answer on p. 2

From the Editor



On April 1, the University of Maryland presented a program called "Farmstead Milk Processing" at Dutch's Daughter Conference Center in Frederick, MD. The organizers told us that they initially expected about 20 or 30 people to sign up, but the registration went over 150 attendees! I postponed completing this newsletter because I wanted to pass on to *CreamLine* subscribers some of the information from that program, which was very pertinent to this bottling issue. What we learned at the seminar was sobering – it ain't cheap or easy to get into the bottling business. You might need more money and more human resources than you imagine. Still, it has been done. If you are in the right place and have the right combination of resources, it is possible to escape from the bonds of the co-op and provide a new and different product to a waiting market.

Good news. *CreamLine* has grown by another four pages! It's getting hard to put all the information in 16. Also, with Issue #6, we will begin a new column written by Vermont dairy consultant Peter Dixon. Peter has a great deal of experience in the dairy industry, both in large and small-scale plants. He specializes in helping people get started in on-farm and small-scale processing, designing facilities and creating recipes appropriate to the available milk. Peter will answer technical questions about cheese-making and other dairy processing. Send your questions in via mail or e-mail (addresses on right).

Last issue I published a pertinent letter from Marsha Windisch, who sends me lots of good stuff to look through. (Thanks, Marsha!) She also sent me the following letter after a visit to a small-scale bottler.

9/21/99 Dear Vicki –

In August my mother and I went to spend a few days in Oklahoma with my sister. She's been buying her milk in glass jars at a few selected grocery stores nearby and wanted us to try it, saying, "this is the best milk I've ever tasted." What drew her attention to it was the glass bottling and then after that was the taste, and she was right – it was great-tasting.

So, according to the jars, the name of the dairy is "Star" in Mulhall, Oklahoma – we found it on the map and went for a visit on our way back home. We stopped in and thought nobody was home, but after awhile a man and his young daughter came to the door and said he would give us a tour. He said he has 40 milking cows at present and that he started out with 10 – this December will be his first full year in operation. What I thought was unique was three things: (1) he had an all-Jersey cow herd – he said that was because they give such rich milk. (2) They processed it all there, meaning one barn had the milking port on one side and the milk tank,

Continued on page 13

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Check out our web site at:
www.metalab.unc.edu/creamery

Answer:

According to *Dairy Foods* magazine, there were 398 cheese plants in the U.S. in 1998, down from 839 in 1975.

milk company's preferred short sale period of 10-12 days — a third less than the 16-day industry standard. 100% of the production of the dairy's 125 Holstein cows is now bottled or buttered and sold by the dairy in this way.

It wasn't always so. Just three years ago, Maple View sold all their milk to a dairy cooperative that mixed their milk with that of hundreds of similar dairies and shipped it to parts unknown. The Nutter family was caught in the cost-price squeeze that so many dairies have experienced — high costs for feed, equipment and supplies on one side; low prices paid for their milk on the other. They began investigating on-farm processing and decided to follow the lead of Bergey's Dairy in Chesapeake, VA, one of a very few dairies that had continued bottling on-farm in glass bottles despite the trends toward consolidation, centralization and plastic jugs.

Although the idea was risky, Bergey's success and rising consumer demand for wholesome milk from animals not treated with hormones were encouraging. Although Bergey's did market milk in the Research Triangle area, Leonard Bergey and his family had decided they wanted to keep their business small and manageable, and did not seek to expand further. When it came time to establish markets, out of deference to Bergey's, and in the spirit of cooperation rather than competition, Maple View Farm Milk Company did not approach the stores where Bergey's milk was sold.

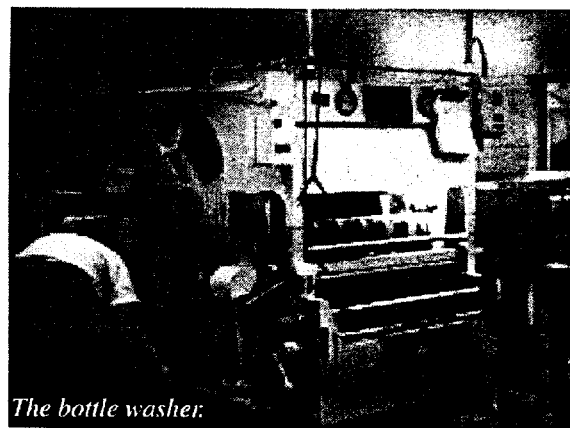
It took a year and a half worth of planning to bring the bottling facility into being, much of that work being done by Roger Nutter and Russ Seibert, farm manager. They involved the state health department from the very beginning. "We didn't want to install everything and then have to change it," says "Muffin" Brosig, Roger's sister and business manager for the dairy. In fact, she says, "we sat down for a whole day with the inspector and the equipment salesman," deciding on layout of the plant. "That day saved a lot of expense and time in the long run," Muffin reflects.

The processing plant is housed in a new 2700 square foot block building next to the milking parlor. "We could use 5000 square feet," Roger says. Storage space was quickly outgrown, and the office/break-room/conference area is too small. They have added a refrigerated trailer as supplemental cooling space. All equipment was purchased used or reconditioned, much of it from a dairy in Pennsylvania. The entire processing facility cost about \$500,000, which they expect to be able to pay back in about ten years.

The Nutter family didn't know much about processing when they embarked on this venture. Leonard Bergey helped a great deal in setting them up. "We got a real break when Pine State Dairy went out of business," Roger recalls. Pine State's production manager, then 63 years old with 38 years' experience, was left without retirement benefits or a job. Maple View hired Floyd Johnson, and Roger and Muffin credit him with moving their dairy quickly along its path, probably jumping over much of the learning curve. "It's been good for him and good for us," Muffin says.

Starting the operation has not been without problems, though. The first year labor was a real problem. People wouldn't stay to do the hard work and turnover was high. Finally, though, they were able to find people with good work ethics who were willing to start with a new company and grow with it. Currently the plant employs ten people pretty much full-time, including processing workers, drivers and office personnel. This does not include the five employees who do the farm work.

Another challenge was what to do about labeling the glass bottles. They tried "paraglazing," a process by which the label is permanently imprinted on each bottle, with a result that looks something like a clear address label. This is a very attractive way of labeling, but very expensive at about 30 cents a bottle. Since only 60% of



The bottle washer.

their bottles are returned, this adds up. Also, it presents a problem in a few cases where other dairies end up with their bottles. Additionally, since Maple View bottles a variety of products — skim, low-fat, chocolate and whole milk, as well as buttermilk and eggnog — sorting the bottles with individual nutritional labels would be a nightmare. The dairy was finally able to obtain an exemption from the nutritional labeling requirements by making available point of sale brochures with this information,

What Do You Need to Get Started in Bottling On-Farm?

The word is out. On-farm processing is hot! Articles have appeared in many publications detailing the success stories of farms that have converted to bottling or some other kind of value-adding, and nothing breeds success like success. Yes, many small dairy farms have greatly increased their income and satisfaction level by marketing their own milk. I could probably sell a lot more newsletters by just telling everyone what a great opportunity there is in on-farm bottling and outlining all those success stories. But there is a lot more to this than building a new silo or lagoon, and there's a lot more to lose. Anyone with the appropriate resources can build a plant. But when you have your first thousand bottles of fresh milk sitting in the walk-in, you've gotta have a place for them to go! You need:

#1 A Market

The dairy processing industry has tried all kinds of schemes to make people consume more milk. Milk mustaches, single-serve containers, and "Got Milk?" can only go so far. If your product is the same milk as that which is on the shelves already, you will have to compete for refrigerated shelf space. On further examination, we find that successful on-farm bottlers – called "juggers" in Pennsylvania – have some kind of market advantage:

- ◆ **Differentiation.** There are a limited number of consumers who are looking for milk with a difference. Some want creamline milk, some want milk with more flavor, some want organic, some want glass bottles, some want goat milk, some want raw milk, some want a guarantee that the cows haven't been treated with rBGH. With new information on conjugated linoleic acid (CLA) and omega fatty acids, there is an increasing market for milk from pastured animals. Home delivery is another (though expensive) option. Most small creameries can fill one or more of these niches, and it is this differentiation that sells the milk. But the vast majority of consumers just want cheap milk, or just don't care one way or the other, and so you have to be:

- ◆ **First on the block.** Or at least second or third. If you are in Wisconsin or Minnesota or another high-producing dairy state, your markets probably already sport at least one locally produced line of dairy products. Two or three 500-cow dairies can glut the health food and BGH-free market in several adjacent states with their production. If you aren't the first in your region to bottle in glass, for example, how will you command shelf space for a similar product? If the others contain Holstein milk and yours is Jersey you might have a chance, but do your homework carefully. If you are the third goat dairy bottling milk in your state, is there room for you? It helps to have:

- ◆ **Proximity to a large population.** Maple View Milk Company (see lead article) is located just outside the high-tech "Research Triangle" of North Carolina, where there are plenty of dollars a-flowing nowadays. This type of area tends to have a high percentage of consumers who are more concerned about the quality of the food than its price. Bergey's Dairy in southeast Virginia is one of the few that continued bottling in glass and home delivery when other dairies progressed to plastic and convenience stores. Their market has literally grown up around their farm, and their on-farm store is very popular as a stop for ice cream and for tourists. Now Bergey's has opened several other stores in the area, while continuing home delivery to suburban residents.

- ◆ **A ready-made market.** One dairy farm I know of is building an expensive processing plant to make milk available to its large number of produce customers, who come to the farm to buy. Another farmer is looking into converting his conventional dairy farm to cheesemaking to add another product to sell at his annual pumpkin festival that attracts thousands of visitors each fall. I recently visited a new plant that will be offering a full line of dairy products in a heavy tourist area in Amish country in Pennsylvania. A farm with a CSA (community supported agriculture) operation is often able to easily sell new products to their subscribers because people appreciate the "one-stop shopping" concept. These markets should not be taken for granted, however, particularly with regard to fluid milk. Some customers who have no problem paying 75 cents for a 12-oz. coke will balk at \$2.00 for a half gallon for milk. Or you might discover that the CSA customers are mostly vegans. Tourists are seasonal – does their presence match your production? Don't assume that if you build it they will come.

#2 A Source of Grade A Milk

This is the easy part for the existing dairy farm. The milking parlor must pass inspection according to your state's regulations. It's wise to contact your regulatory agency even before constructing the parlor to avoid costly mistakes. If you are purchasing milk from someone else you must purchase from a grade A producer and you will be required to have a permit to purchase the milk. The basic requirements for a grade A milking parlor include: walls and floors of impervious material and a dust-tight ceiling; good lighting; sufficient air circulation; not overcrowded; certain provisions for storage of feed. There must be a separate milkhouse or milk room in which milk is stored and cooled. Cooling must be done in approved equipment and containers. Milk must be tested at regular intervals. The few states that allow sales of certified raw milk understandably have very stringent requirements for testing and sanitation.

#3 Someone who has the time to do the processing, marketing, delivery and paperwork.

If you are overworked now, adding a new business to your farmstead is not going to help your sanity. Unless you are bottling on a very small scale (see box on Trail's End Dairy, p. 13), bottling will be an entirely separate full-time job for at least one person. Surprisingly, Maple View Milk Company has ten full-time employees working in their bottling plant for the milk of 125 cows. This seems extreme, but it shows that this is no simple job.

#4 An approved processing area.

The processing area must be separate from the milking parlor and the milkhouse. In general, the processing area must be uncrowded, easy to clean (which usually means concrete painted with epoxy paint, tile, and/or dairy paneling), have a floor drain, appropriate lighting and ventilation, a clean source of water under pressure, sanitary piping and valves, access to a toilet, hand-washing facilities. If you are bottling in glass you will need a separate room for cleaning, draining and storage of the bottles and cases. Again, discuss all the requirements with the appropriate state officials before spending a dime on a facility. This is just a general outline and is not intended to be definitive.

#5 Receiving area

If you buy milk you will need special facilities for receiving the milk; if purchased milk arrives in a bulk tank on a truck, you need additional facilities for cleaning the truck tank.

#6 Loading dock

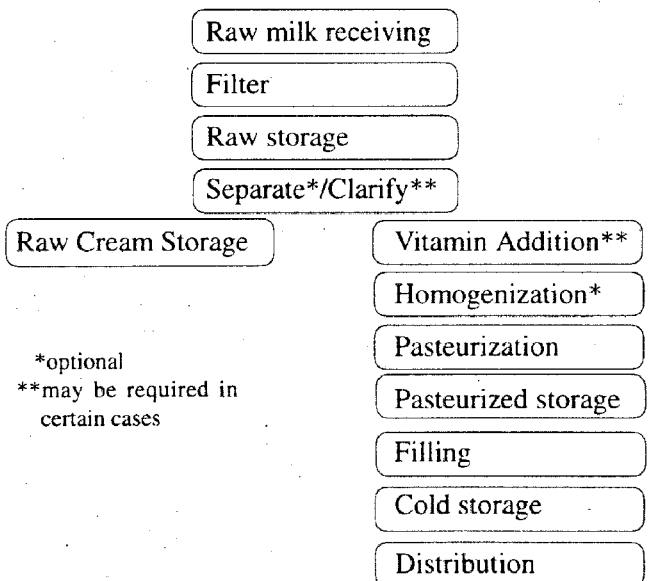
If you make regular deliveries and are on any kind of scale, you will need a dock for loading bottles of milk into a truck.

#7 Storage area

Don't underestimate the amount of storage you will need for bottles or other containers.

#8 Equipment

As with any business, the equipment you need will depend on what you are going to do. In bottling there are fewer options, but you do at least have some choices: whether to separate or not, whether to homogenize or not, and what type of container to put the milk in. At the Maryland Farmstead Milk Processing program, Dr. Scott Rankin gave us the following outline of "unit operations" for fluid milk, which I have modified slightly. Unit operations are the individual things that have to happen to the milk once it gets to the plant, and these determine the size, layout, flow and equipment in your plant.



*optional
**may be required in certain cases

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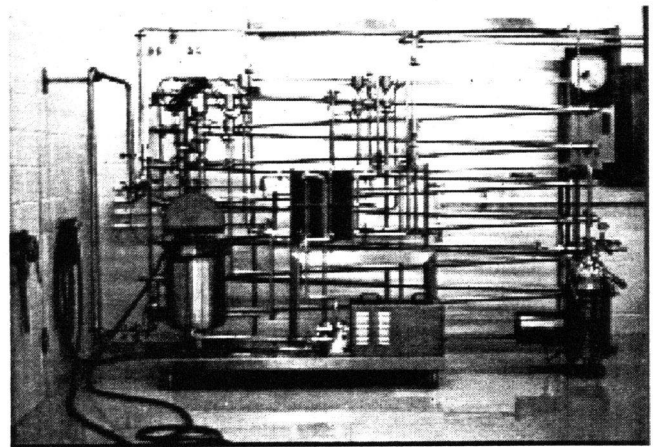
These operations are just the ones that have to do with the milk. Don't forget you also have to have space for storage of dry goods (containers). If you bottle in glass bottles, you also have to include bottle receiving, cleaning and storage. By looking at each unit operation, you can determine your equipment needs.

◆ **Raw milk receiving and storage** – you will require a bulk storage tank for raw milk for holding until it is ready for processing. If you are purchasing milk from other farms, you will have to have facilities for cleaning out the truck tank. The milk must be filtered before going into storage.

◆ If you plan to use cream separately, or to standardize your milk fat content for different products, you need a **cream separator**. Generally antique cream separators are not suitable because the bowls are not stainless steel (and may be rusty) and it's hard to find one in perfect working condition. There is a longer discussion of cream separators in Issue #4 of *CreamLine*. If you separate cream, you will need a place to store the raw cream until it is used.

◆ A **homogenizer** is optional. The homogenizer uses a positive displacement piston pump to force milk through small holes, which causes the fat globules, which start out pretty large in bovine milk, to break up into a smaller size so that they lose their tendency to rise to the top. Goat milk and sheep milk are naturally homogenized (i.e., their fat globules are smaller) and should never require this step. Dr. Rankin says homogenization improves whippability and viscosity for ice cream. But there is mounting evidence that the homogenization process may in fact be the cause of the arteriosclerosis blamed on milk products because of the release of the enzyme xanthine oxidase into the bloodstream. (See Issue #4, page 3.) For this reason, there is a slowly increasing market for unhomogenized milk.

◆ Unless you are bottling milk under very unusual circumstances you will have to have a **pasteurizer**. A few states allow on-farm sales of raw milk, but often in these cases the customer must come to the farm with his or her own container to pick it up. Even fewer states have a certified raw milk dairy program. The pasteurizer is one of the most expensive parts of the plant. See Larry Grabman's article on page 18 for detailed information on pasteurization and pasteurizers, as well as cooling milk following pasteurization.



A small HTST pasteurizer; cream separator is in front, lower right. (Pladot)

◆ In some cases milk can go directly from a batch pasteurizer to the **filler** (with a **cooling unit** in between), but in larger operations there is usually a need for cold storage of pasteurized milk, which must always be kept separate from raw milk. If you have a line of fluid products such as full-fat, 2%, skim and chocolate, you'll need separate bulk storage containers for these, and one for the cream.

◆ The **filler** is another high-priced piece of equipment that must be chosen to match the container sizes you intend to use. In nearly all cases, filling and capping must be done by machine; i.e., no hand-capping is allowed because of the danger of contamination.

◆ In most cases a **walk-in cooler** will be required for storage of bottled milk until it is ready for distribution.

◆ Finally, how will you deliver the products? You'll need at least one **delivery truck**. You might be able to deliver cheese in coolers in the back of your station wagon, but bottled milk is a different beast.

How much will all this cost? Plenty. The lowest-cost system I know of is the one that John and Lois Carroll found — \$5000 for a used batch pasteurizer-cooler-capper combination. They bottle goat milk in relatively small quantities. On the other end of the farmstead spectrum, one of the speakers at the Farmstead Milk Processing meeting said a quarter of a million dollars is required for a small bottling plant. There is a lot of excitement about the new equipment from Israeli companies – Pladot and I.E.C. – that has been engineered for small-scale processing. But Pladot representative Robert Turner estimates a

Continued on page 7

minimum of \$92,000 for their equipment/training package only. You still have to build the building. I.E.C. does sell their equipment by the piece, but you will need experienced technicians to install it to meet the requirements of the Pasteurized Milk Ordinance (PMO). Another option is to contact one of the U.S. dairy equipment dealers that deal in reconditioned equipment. This can save you some money, but again, there will be a sizeable investment. For very small scale, there is the option of the 25-gallon pasteurizer/bottler combination offered by The Small Dairy Project in New Hampshire. Its total cost is around \$16,500. This project also has a pasteurizer lending program. See list of resources on page 9 for contact information.

#9 Bottles

While it's obvious that you have to have bottles or jugs to bottle fluid milk, serious consideration must be given to what type and size of container to put your milk in. If you luck out like John and Lois Carroll did and find a \$5000 machine, then you probably won't care to be too picky. But since the type of bottle may make a difference in how much milk you can sell, weigh the options carefully.

◆ **Glass bottles:** many consumers say that milk tastes better when it comes from a glass bottle. There is also a strong element of nostalgia involved, as well as the appealing ecological strategy of re-use and reduction in the number of containers going into the landfill. On the downside, glass is very expensive compared to the alternatives, and most who bottle in glass require deposits on the bottles. (Leonard Bergey says many customers want to keep some of the cute little bottles as souvenirs.) The retailer must be willing to handle the returned bottles, and the processor has to sort them, clean them and store them. One dairy may get returns from another dairy, which means somehow returning and exchanging bottles. It is estimated that glass bottles are re-used 4-6 times before they are broken or otherwise become unusable. Bottling in glass requires that you purchase a bottle washer, which has to be operated in a room separate from the main processing room. It takes a lot of water to wash bottles (one estimate I heard was 3 gallons/bottle), so adequate clean water supply and waste disposal are necessary. Unfortunately, the high water and waste disposal requirement somewhat dilutes the environmental advan-

tage of re-using glass bottles. Glass is also difficult and expensive to label.

◆ **Returnable plastic bottles:** Tom Perry of PerryDale Farm Dairy in York, PA told me that he uses transparent polycarbonate bottles for the milk sold directly out of his store, and finds them superior to glass in many ways. He says they are reusable many times, and since they are clear they have consumer appeal similar to that of glass. They must be cleaned in a bottle washer the same as glass, but they cost less and last longer. Tom's dairy uses a 64 oz. (half gallon) DairyLite jug with a hand grip (see resource list). These come from a place called Reid in Leetsdale, PA. The caps are unusual - aluminum with a cardboard liner - and have been purchased from a Canadian firm that has recently announced their intention to stop making these caps. Tom says he has heard of another company that makes the caps (Deniseal), which are applied by an old 1930s style capper.

◆ **Non-returnable plastic:** there are many forms of non-returnable jugs made, and in the past few years the options have blossomed. Apparently some law requiring milk to be packaged in certain volumes expired or was repealed, and now there are a slew of sizes and styles to choose from. Translucent HDPE jugs are falling out of favor because of breakdown of vitamins in milk due to exposure to light. Opaque is hot, both in gallon and half-gallon milk jugs and single-serve. PETE is also becoming popular. Although it is totally transparent and thus subject to the same UV problems, some PETE bottles are being bound with a shrink-wrap label that can be as jazzy as anything Coca-Cola puts out. The milk industry in general sees a need to compete for single-serve beverage dollars. New shapes are also on the scene: one new opaque HDPE milk jug looks like a laundry detergent bottle (perhaps not such a wise idea). Another new style is a square-ish shape that is more shelf-friendly and has a better ergonomic feel than the rounded jugs. "Chugs," single-serve disposable bottles, are the new wave for packing in lunches and dispensing in vending machines, and there is even talk of six-packs. It is possible to purchase a machine to make your own plastic jugs on site, which saves storage space.

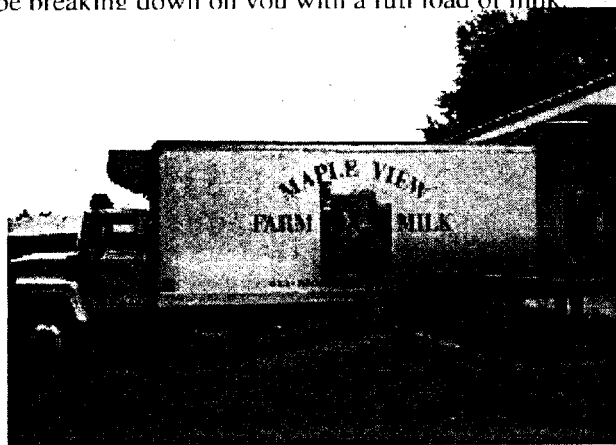


Continued on page 8

◆ **Cardboard cartons:** The good old gable-top carton that has been around since the demise of the milkman may be on the way out. It is not particularly popular with consumers compared to other cartons. It is hard to handle, hard to open and not recyclable (although it is biodegradable). Up to now the advantage of the cardboard carton was that it allowed a company to distinguish itself on the label much more easily than could be done on plastic jugs. The PETE/shrink-wrap option may just deal the final blow to the cardboard milk carton, perhaps with the exception of the aseptic cartons used for ultrapasteurized milk.

#10 Delivery Truck

You will need at least one refrigerated delivery truck. New these are in the range of about \$30,000 and up. Used might be an option, but you don't want a truck that will be breaking down on you with a full load of milk.



Getting started in bottling is significantly more difficult and costly than starting out in cheesemaking, unless you are on the extremely small end. The regs are more restrictive and the market less forgiving. I don't mean to throw a wet blanket on anyone's dreams, but this is a business you must enter with eyes wide open.

I'll close with a note sent by author Andy Lee to the "dairycreamery" e-mail discussion list after the Maryland Farmstead Processing program. Andy had been very close to building his own processing plant in Virginia before attending that meeting. Here were his conclusions:

"Vicki, thanks for pointing out the low cost startups. Both John Carroll and Courtney Haase are pasteurizing and bottling goat milk, which doesn't have to have the cream separated.

"To bottle cow milk the \$15,000 pasteurizer also needs a refrigerated bulk tank, cream separator, holding tanks for skim and 2% and whole, a boiler to heat the milk in the pasteurizer, and water chiller to cool the milk after pasteurizing, a butter churn to turn the cream into a saleable product, lots of stainless steel piping, and a bottle filler and capper.

"Also needs a building that will pass inspection, and a walk in cooler to hold the milk, and a refrigerated truck to deliver the milk. Add in a waste water storage/treatment area, too. And at least two skilled operators. All of that comes to close to \$100,000 plus labor and benefits, according to my latest budget. I think it will probably take \$150,000 to get one one of these small creameries through the first 12 months. However, with that setup you could bottle milk from 100 Jerseys and sell the milk at a premium.

"The suggestion that there is a lot of hype right now concerning on farm processing is correct. This small-scale equipment has only been available for about a year, and it is being presented as a way to make tons of money. And, I believe that the first one or two on farm processors in any state will be able to make a good bit of money doing this. However, there is a very real limit to how much premium milk can be sold in any given area. Just to give an idea, I think 100 Jersey cows could supply all the organic milk to fill the market in Central Virginia. Considering, of course, that the major competition will be Horizon and Organic Valley. I think a local creamery with a creamline product will do well here, but I'm thinking there's only room for one such creamery in all of Central Virginia. If mine got on line first, then I could do okay, but if I came into the market after someone else, then I'd probably not do very well. In that event, I'd have to plan on trucking my milk to a bigger market, such as Washington DC, which is 4-5 hours away.

"Some of these new on farm installations are going into fancy retail sales buildings on tourist routes. No doubt they will get plenty of traffic during the season. However, one such installation I'm familiar with is being planned for a country road miles from nowhere. They are spending 1/2 million dollars to do it, and they may do okay during the summer months, but I cringe to think how they will survive during the winters when people don't eat ice cream or go out to the farm for a visit.

"At least three of the presenters on Saturday suggested that mutual funds would be a better investment, and they could be right. I think what this small-scale on-farm milk processing investment will buy is just a job for the owner, and not something where anybody can plan on getting rich like Ben & Jerry's did."

Thanks,
Andy Lee

Bottling Resources

Below is a list of resources to help in your search for information and equipment. It is by no means exhaustive. There are lots of sources of medium- to large-scale dairy equipment, particularly in the Midwest and dairy states like Pennsylvania. Most will provide facility design, installation and service. For the established dairy with, say, 100 cows or more, having one of these companies help you set up a turnkey operation is probably the safest and surest bet. The new Israeli companies are providing services to somewhat smaller operations, but again are not cheap. At the extremely small-scale end is the Small Dairy Project's 25-gallon pasteurizer/bottler. Your state inspectors will assist you in determining your facility needs, including the building, water supply and wastewater treatment. For more information on packaging, labeling and other details, subscribe to *Dairy Foods* and *Dairy field* magazines and join a dairy processing trade organization. Better yet, make friends with a small-scale processor whose territory you won't threaten. If you are unsure if you can make a profit in the bottling business, there is an Excel spreadsheet that you can download from the University of Wisconsin Web site which will help you make a more educated decision: www.wisc.edu/dairy-profit, then click on "Decision Making Tools," then on "FSTMILKP.xls" (Farmstead Milk Processing).

Agriculture departments

a list of state departments of agriculture is found at:
www.ink.org/public/kda/stateags.html

DairyField magazine

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Dairy Foods magazine

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201 W. Walker St.
Milwaukee, WI 53204
(414) 384-3200

Hamby's Dairy Service (new and used dairy equipment, installation and service)

29197 105th Street
Weatherby Missouri 64497
(660) 749-5503; hds@ccp.com

Hinkel Associates (used equipment)

16 St. Andrews Rd.
Arden, NC 28704
(800) 451-3418; HAEquip@aol.com

I.E.C. (small-scale dairy equipment from Israel, including complete processing lines)

Gerd Stern, U.S. agent
111 Madison Ave.
Cresskill, NJ 07626
(201) 816-9215; www.iec-il.com

Kaestner Company (new and reconditioned equipment)

5401 Pulaski Hwy.
Baltimore, MD 21205
(800) 483-1881

Nelson-Jameson (dairy and lab equipment)

2400 E. 5th St.
Marshfield, WI 54449
(800) 826-8302; www.nelsonjameson.com

Pladot Mini Dairy (small-scale dairy equipment from Israel - complete custom processing lines only)

Robert Turner, U.S. Sales Manager
P.O. Box 1887
Hagerstown, MD 21742-1887
(301) 733-1007; turner.r@erols.com
www.pladot.co.il

Reid (polycarbonate DairyLite bottles)

Leetsdale, PA
(412) 741-1666, FAX 741-8253

Rowlands Sales Co. (new and reconditioned equipment)

P.O. Box 552
Hazleton, PA 18201
(800) 582-6388
www.rowlands.com

Ullmer's Dairy Equipment

2628 Br. Cty. Ln. Rd.
Pulaski, WI 54162
(920) 822-8266

Small Dairy Project

(25-gallon pasteurizer/filler and pasteurizer lending program)
HC 65, Box 45
Bradford, NH 03221
(603) 927-4176
www.haasefam.com/sdp/small.htm

Surge (dairy equipment and supplies)

dealers listed on web site
(800) 323-1667
www.surgedairy.com

Each of these magazines has an annual buyer's guide or resource guide containing many listings for sources of supplies and equipment, as well as trade organizations and services. The publications are free to qualified processors -- excellent resources!



Chef's Corner

with Kelly Shepherd



If there is someone locally producing a few of the more exciting goat cheeses, I really need to meet her (or him). Unfortunately, usually only chèvre types are available in this rural Virginia area. I would go to great lengths to get my hands on a good local Banon, crottin or Chabichou. Other countries have so many varieties of fine goat cheeses. In France, the array is staggering – they come in logs, drums, pyramids or bells; they may be plain, coated with ash, herbs or pepper; they may be wrapped in chestnut leaves and tied with raffia. Alas, knowing that there are so many dairy goats frolicking around in the general vicinity, I despair that we are not awash in these interesting goat cheeses.

Goat cheeses are really versatile in the kitchen. Most people in the U.S. associate them with their use on the fresh cheese plate, but goat cheeses respond well to other treatments. Do try seeking out and cooking with goat cheese. But – no sense in preaching to the choir. Here are some recipes that I hope will stimulate interest in these excellent cheeses. You may have trouble finding the cheeses for the last two recipes if you don't make them yourself, but they are sometimes available in city delis and over the Internet.

Goat Cheese Truffles

1 log of fresh goat cheese (uncoated chèvre)
4 tbsp. finely minced chives
2 tbsp. sweet paprika
4 tbsp. coarse-ground peppercorns
4 tbsp. finely minced fresh herbs
(rosemary, tarragon and savory is a good mix)
olive oil

With wet hands, roll the goat cheese into small balls, less than one inch in diameter. Chill on plate. Place each of the herbs and spices on its own small plate and roll some balls in each to coat. Chill. To serve, drizzle an attractive plate with good olive oil and arrange the truffles on it. Serve with bread.

Baked Banon (serves 6)

6 Banon cheeses, leaves removed
or 6 slices (about 2" thick) of Montrachet
6 tbsp. butter
¼ c. (or to taste) mixed black and white peppercorns, coarsely ground
salad greens for six portions, chilled

Banon (continued)

Preheat oven to 350°. Butter a baking dish with half the butter. Arrange cheese in dish. Top each cheese with some butter and a healthy dose of pepper. Bake the cheeses for 10-12 minutes, or until heated through. Serve at once on top of a bed of chilled greens.

Toasted Crottins with Beet Salad (serves 4)

2 large beets, cooked and peeled
1 celery stalk, chopped
1 small red onion, sliced
4 tbsp. olive oil
3 tbsp. red wine vinegar
1 tbsp. sugar
salt and pepper
4 slices French bread
4 crottins, roughly 2 oz. each

Toss the beets, celery and onion together. Add the dressing ingredients and toss well. Preheat broiler. Toast bread lightly on both sides and remove. Place foil on broiler pan, add the crottins and broil for 3-5 minutes, until they turn golden brown on top and just start to melt. To serve, butter toasted bread, place on serving plates and place a crottin on each one. Accompany each with the beet salad and serve immediately.

What To Do With All That Goat Milk

compiled by Paul Hamby

(reprinted in slightly edited form, with permission from the author)

For hobby or backyard dairies, here are some ways to use your milk to get cash or barter for some of the things that you need. This list was compiled partly from conversations on the various goat lists [e-mail discussion groups] last year. Thank you to everyone who contributed. Any more good ideas? A sign at the local feed store, vet's office, cafe, Wal-Mart, etc will bring customers for some of the following:

Pet milk: Sell your milk to dog kennels, horse stables, llama and alpaca breeders, pet stores, zoos, wildlife rehabs, veterinarians (who also buy colostrum). Some goat dairies sell all their milk this way. Most states have no government rules for milk sold for animal use [*but be sure to check with your department of agriculture*]. People raising high-dollar livestock or dogs will pay top prices for goat milk, "the universal milk replacer."

Colostrum: Goat milk colostrum will also work for many other species. We have used it for calves, lambs, and a colt. Colostrum is worth a lot. Don't be afraid to charge what it is worth.

A more traditional approach is to **raise a few pigs**. You will raise great-tasting pork and can sell a few to help pay the goats way. Free bread from the day-old bread store plus surplus milk [or whey] makes for very cheap pork and you can raise better-tasting, drug-free meat. Just remember, don't name the animals that you plan to eat.

Barter alternative: give your neighbor hog farmer all your excess milk in exchange for a hog ready to butcher. Milk-fed calves traded for hay or butchered ... milk traded for hay ... milk traded for firewood, calves, lambs, hay, farm chores.

Raise calves: One of our neighbor's boys did a project for FFA where he raised three calves on Alpine goat milk and three calves on calf milk replacer. The three on goat milk grew out noticeably faster and bigger.

Like to make cheese or other processed milk products? Give your goat milk products as **gifts**. Many folks really appreciate homemade products. You aren't making any money at this, but you are saving money on gifts and giving something that is uniquely from your home and it is consumable. (How many of us have received gifts that we only wish were consumable?)

Have you got a place to raise some **poultry**? The best young frying chicken I ever had was raised on milk. Same for turkeys; they weighed anywhere from 17 to 30 pounds, all organic and absolutely the best I ever tasted.

Milk-fed meat is ambrosia, the nectar of the gods.

Things you can make to use at home or barter with your neighbors. The average family uses \$1000 to \$3000 worth of dairy goat products in their own home each year. [*Potentially, we presume; this might be more accurately stated as milk products, except for the last. – ed.*]

- ◆ Goat milk (freeze or can to preserve for later)
(Goat milk and Honey Nut Cheerios is a personal favorite of mine)
- ◆ Cheese
- ◆ Farmer's cheese
- ◆ Yogurt
- ◆ Kefir (liquid carbonated cultured milk)

Continued on page 10

Goat Milk -- Continued from page 9

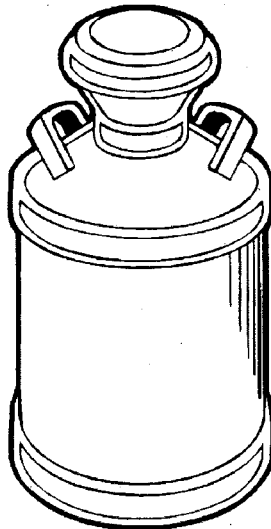
- ◆ Butter (cultured butter)
- ◆ Ice cream
- ◆ Flavored coffee creamers
- ◆ Nutritional drink to replace Ensure
- ◆ Milk shake with fruit added
- ◆ Goat Milk Fudge
- ◆ Goat Milk hand lotion
- ◆ Goat Milk Soap
- ◆ Goat Milk based paint
- ◆ Goat Milk compress to soothe sunburn and rashes
- ◆ Fertilizer — milk or manure

Other money makers from your goats:

- ◆ Rent a buck
- ◆ Sell breeding stock
- ◆ Sell milkers to families or commercial goat dairies
- ◆ Disbudding service
- ◆ Pack goats / cart pullers
- ◆ Meat kids

Paul Hamby operates Hamby's Dairy Service in Weatherby, MO. He sells, installs and services new and used dairy equipment, and offers planning services for setting up new dairies. He does occasionally come across some used processing equipment. Paul raises Alpine goats and plans to build a new micro-dairy for making cheese out of his goat milk. He and his wife Rhonda recently traveled to a number of existing small cheese plants to determine what is required to get started.

To contact Hamby's: phone (660) 749-5503; fax 749-5376. His e-mail is hds@ccp.com. When he is not too busy with his business or new baby, Paul is a regular contributor to the 'Artisan Cheesemakers' e-mail discussion group (see page 17) and several goat groups. He also writes for a publication out of New Zealand, The Goat Farmer, and is writing a book on goat history in America. Paul is seeking input for the book.



Small Dairy Resource Book Updates

Several corrections were sent to the printer before this book was printed, but were not included. Also, there are some recent changes in contact information, especially on the Web. Please correct your copy. There is a page devoted to "book updates" on my Web site at www.metalab.unc.edu/creamery.

Page 18. In the third paragraph, second line, the web page URL should be: www.nal.usda.gov.


Page 47. The address for Stockman Grass Farmer is P.O. Box 2300, Ridgeland, MS 39158. Phone number (800) 748-9808.

Page 50. New e-mail address for Hamby's Dairy Service is hds@ccp.com.

Page 50. New contact information for Pladot Mini-Dairy. Robert Turner, P.O. Box 1887, Hagerstown, MD 21742. Phone: (301) 733-1007. E-mail: turner.r@erols.com

Page 50. An additional used equipment dealer: Midstate Dairy Systems, Bob McDonough, P.O. Box 307, DeRyter, NY 10352. (315) 852-9591.

Page 55. E. Ann Clark home page URL should be: www.oac.uoguelph.ca/CRSC/faculty/eac.htm



Three Ring Farm

Alpine Dairy Goats
ADGA Breed Leaders
Production Bred
Stock for sale

6315 Logsden Rd.
Logsden, OR 97357
(541) 444-1362

threering@Newportnet.com

Continued from page 2

cream separator, pasteurizer and sinks on the other, and a smaller part had the refrigerator and sales type room where customers can come to the barn and pick up milk for sale, and also a bottling room. (3) It all looked like it was something I could do, meaning it wasn't humongous and fancy and beyond reach.

I was truly fascinated by all this and I'm already interested in Jerseys since that is the breed of my milk cow. He said he did not have a dairy background or knew much about cows. He said you just have to do it and learn on the way. I'm guessing he was in his early 20s. He said the reasons why he processed it in jars on the farm is to have more control on pricing and to be unique. He said in the future he plans to add a cheesemaking process to take care of excess milk.

I asked where were all the babies. He said he has a neighbor that takes all the babies at her place and raises for him; in return he gives her all the bull calves. I had my *CreamLine* sample issue and asked him if he's heard of it and he said no, but he would be interested, so I gave him mine. I hope he has written you and would like to see his story in your newsletter. *[Sadly, he hasn't - Vicki]* I am so impressed with your newsletter myself - I'm trying to learn more about what's really available in the dairy world and try not to be overwhelmed with the big guys.

My biggest question right now is how on earth can a regular person get the kind of money it would take to finance a dairy that could work - because the animals and the equipment are expensive. There is so much to learn, but I am so interested. That's what your newsletter has done for me. ... Could I also get three more samples, one for myself and I know two other goat people I'm giving them to. Let me know how much I need to send for these. THANK YOU!

Marsha

Marsha -- thanks so much for your letter. I haven't heard from your friend yet but would love to feature his dairy some day. I tend to do a lot of interviewing on the East coast because that's where I am, but would love to find out what's going on in the rest of the country.

As far as how to get the money to finance an operation - well, it's not an easy thing, especially for bottling. As you will see in this issue, the costs are very high unless

you really start small. A good business plan is a start. A friend of mine has written an excellent summary of pointers for a successful business plan for a cheese plant, and that will be part of the next issue.

I'm happy to send sample issues to other folks to give away to friends or at meetings. Anyone interested should contact me for more information. -- Vicki

Letters continued on page 16.

Trail's End Goat Dairy

John and Lois Carroll keep 300 does (mostly Alpine), milking about 150-200 goats at a time. They modified an old bovine dairy barn to accommodate the goats, and turned one building into a 14' x 20' processing room, where they make fresh and aged cheeses. The Carrolls also bottle some of their goat milk in quarts, as well as a semi-liquid yogurt in pints and half pints, all in returnable glass bottles. They found an old 120-gallon pasteurizer, complete with Cherry-Burrell cooler and filler/capper, for \$5000. The Carrolls bottle about 60 cases of milk and 30-60 cases of yogurt each week, with 12 quarts or pints to a case. Trail's End's goat milk and milk products are sold from Arlington, VA to the Research Triangle of North Carolina under the trade name of "Gourmet Goat." Lois says the web page is still under construction, but will be at www.gourmetgoat.com when it's ready (after kidding).



Lois Carroll flashes a devilish grin as inspector looks over her pasteurizer charts. I caught her on a busy day!

and by printing their address on the bottle caps, which consumers can use to get more information. Muffin says only a few people have called, mostly people with allergies inquiring about such things as the ingredients in the chocolate used to flavor the milk. Stores have implemented look-up numbers at cash registers in lieu of barcodes on the bottles. So far these compromises have worked well.

Rather than having stores set their own original prices for the milk, Maple View sets the retail price for the half gallon, and works back from there to get their wholesale price. This, Roger said, prevents Maple View milk from becoming an exclusive item out of reach of many families. At one time their milk was priced slightly higher than the others on the shelf; however, currently Maple View half gallons may range from five to fifteen cents less than the competition. In exchange for the set price, Maple View guarantees their milk, and the store is not stuck with spoiled or out-of-date product. Nevertheless, as mentioned before, returns are almost nonexistent. And so far there have been no complaints from retailers about handling the glass bottles.

Muffin says a huge challenge has been to educate consumers. "People tend to buy milk as a habit," she says, "and just pick up the same brand week after week without looking to see what else is available." To address this problem, Maple View personnel have done taste sampling, spending 2-3 hours in a store and introducing their milk to customers. The reaction is usually favorable; people often say they "never noticed" Maple View's milk before.

Other sampling events have been less successful. Muffin said they went to the Southern Women's Show, spent \$1000 and four 14-hour days to introduce their milk. This investment was slow to return, although people have told her they remembered the booth. Somewhat better for them have been the "Taste of North Carolina" show and the CFSA (Carolina Farm Stewardship Association) farm tours. Additionally, about 1500 students have also toured the operation. "Our advertising budget is 'zilch,'" Muffin says, so they aren't able to purchase radio or TV spots. However, on a whim, Muffin wrote to Paul Harvey to tell him about their dairy, and he responded within a couple of days. "Everyone in the plant laughed at me for writing to him," she chuckles, but Harvey has talked about Maple View several times on his show. Guess who has the last laugh?

The future of Maple View Farm Milk Company looks bright. Demand already exceeds supply for their

products, and they consider on-farm processing a success after less than two years in operation. Their goals for the future include having an on-farm store and they plan to begin making ice cream in 2000.

Increasing milk supply may be a problem. Their dairy cows are producing at maximum now and there is very little space for more cows. Maple View cows may be outdoors for up to ten hours a day on exercise lots, but spend the rest of their time in the barn. When asked about grazing, Roger worries that variations in pasture may result in loss of quality control in the milk, especially due to off flavors from certain pasture plants. "Whenever we change something in their feed, we can taste a difference in the milk," he remarks. They grow 80% of their feed on-farm and use no synthetic growth hormones. Roger says he is unwilling to buy milk from other farms for a similar reason – loss of quality control. Though their milk is not standardized (blended to give a standard content), it is their own and they know how it is produced. Maple View does its own lab testing for bacteria, antibiotics and butterfat.

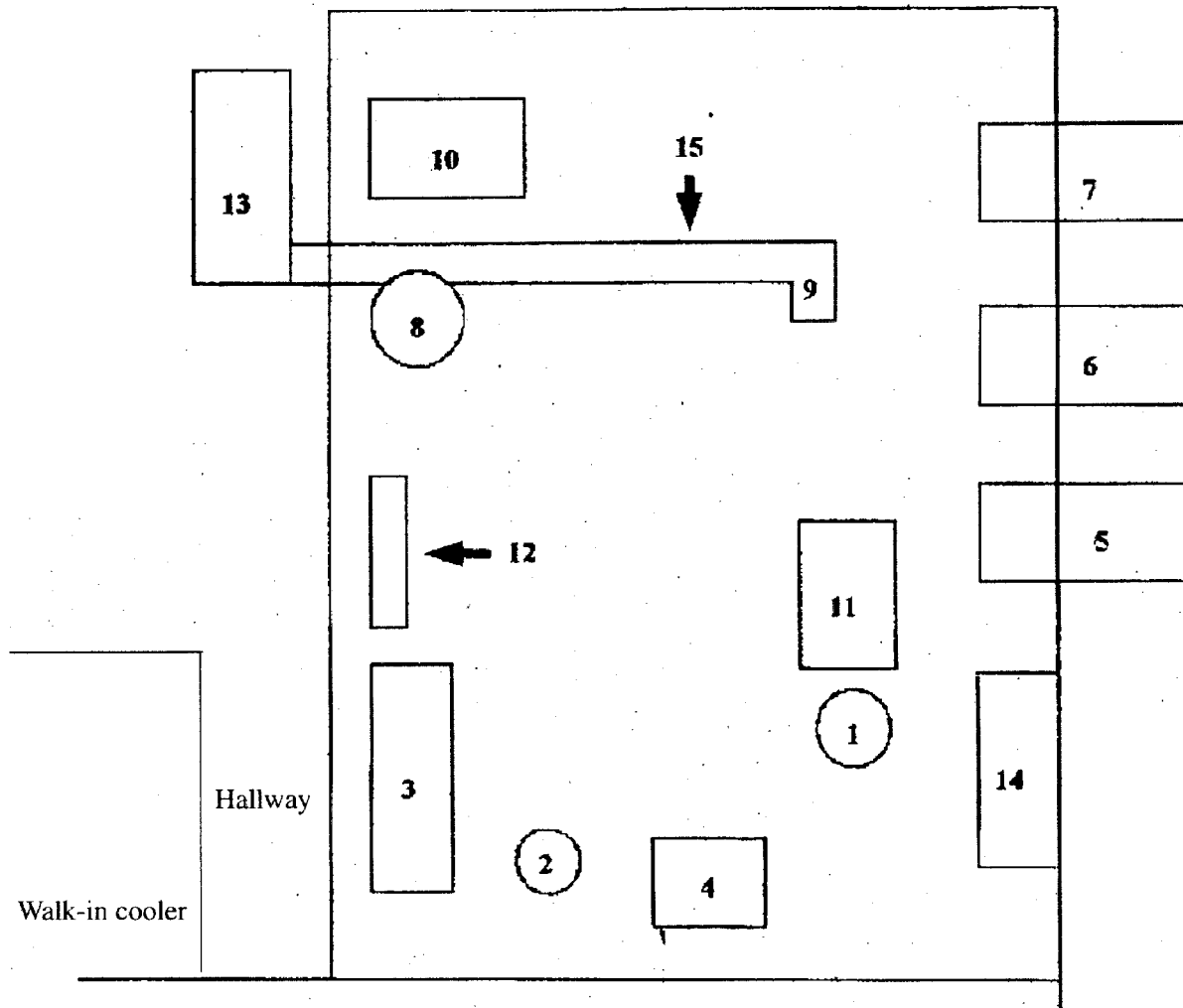
Roger agrees that there is opportunity for other dairies to get into on-farm processing in the region. They have developed a loyal customer base, and have had to short some orders. At the Carolina Farm Stewardship Association (CFSA) conference in November 1998, farm manager Russ Seibert told of an incident at a large grocery store which generally stocks Maple View milk. A store manager called Maple View and related that a woman had gone to the checkout with \$90 worth of groceries and asked where the Maple View milk was. When told there was none available that, she left the cart sitting there and said she was "going someplace else that has it"!

Going from pure production to value-added products is not easy, requires a significant risk, and takes an excellent team of people, as well as commitment to high-quality products. The smiling faces in this bustling little plant are visible testimony to Maple View's success. "Would we do it again?" Muffin asks her own favorite question. "Absolutely."

For more information, contact Roger or Muffin at: (919) 933-3600. The address is Maple View Farm Milk Company, 3109 Dairyland Road, Hillsborough, NC 27278.

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Maple View Farm Milk Company Milk Processing Plant Map



Key:

- | | |
|--|--|
| <ul style="list-style-type: none"> (1) Cream separator (2) Balance tank (holding tank for pasteurizer) (3) HTST pasteurizer (4) Homogenizer (5, 6, 7) Holding tanks for three types of milk - first one emptied then is filled with chocolate milk. (8) Filler (9) Collection table -- filled bottles are gathered to be put into crates. | <ul style="list-style-type: none"> (10) Mixing tank for culturing buttermilk and making butter. (11) Mixing tank for chocolate milk and eggnog. (12) Control panel for temperature recording and pasteurization time. (13) Bottle washer (14) Wash tank for washing parts, etc. (15) Conveyer belt to move bottles from the washer to the filler. Once filled, the bottles move to the collection table. |
|--|--|

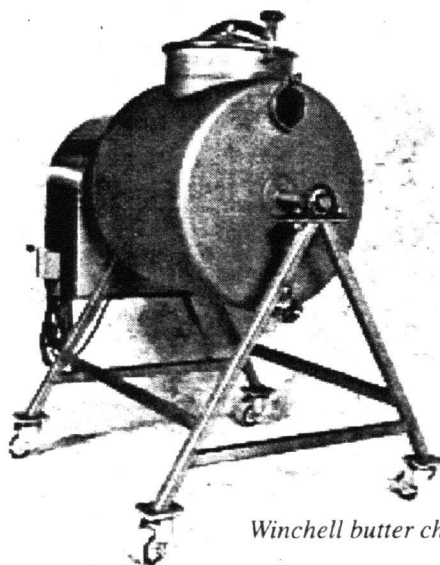
Vicki --

We are interested in producing butter. Would like you to ask your readers for ideas on churns and butter packaging.

Barb Buchmayer

Barb -- I wasn't able to fit anything else in issue 4, but I do have a little bit of information on butter churns. There are very few non-wooden butter churns made on a small scale in the U.S. It is legal to use the glass churns in many states, but they are only good for about a half gallon of cream at a time. As noted in the section on Flossie Howard in Maine (issue 4), it's possible to use a Hobart mixer as a butter churn, which is considerably less expensive than most of the stainless steel butter churns available, but again you will be limited as to the amount of butter you can make at one time. There are occasionally used/reconditioned butter churns available from used equipment dealers, but many of these are continuous churns rather than batch types that would be more appropriate for an on-farm operation.

Both Pladot and I.E.C. make small stainless butter churns. (see page 9 for contact information.) Pladot does not sell individual pieces of equipment. I've located only one company in the U.S. that makes custom stainless butter churns -- Winchell Stainless Processing & Equipment. Their address is P.O. Box 57, Elroy, WI 53929; phone number (608) 462-8456. They seem to be a small company and are very pleasant to speak with. About a year ago, I priced a 50-gallon and a 75-gallon churn, which were approximately \$5000 and \$6000 respectively.



Winchell butter churn

As for packaging -- the most common forms of packaging for country butter seem to be plastic tubs or rolls, or one-pound rounds cut from rolls. The roll butter is wrapped in a waxed paper. Does anyone have anything to add to this? Is anyone out there using wooden prints or molds on a commercial scale? How about small molded pats for single servings? Butter sculptures? -- Vicki

Dear Vicki --

We applaud your work and find the newsletter and Dairy Resource Book a much needed publication for farmstead cheesemakers. Best wishes,

Alyce Birchenough

Alyce -- it is a joy to do this. And speaking of the *Resource Book* ...

The Small Dairy Resource Book is available for \$8 per copy plus shipping and handling. Add \$3.95 s/h for first book and \$0.95 for each additional book up to 9. For 10 copies or more, bulk discounts are available. Call (802)656-0484 or e-mail nesare@zoo.uvm.edu.

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Buy and sell equipment, books, animals, etc. Up to 25 words, \$5 per issue for subscribers; add \$5 for each 25 words thereafter. Non-subscribers add additional \$5 to total.

Display ads -- business card size ad \$10/issue, \$25 for sample issue, for subscribers. Non-subscribers add \$5 extra. For other sizes contact *CreamLine*. See page 2 for contact information.

Used Equipment Dealer in New York

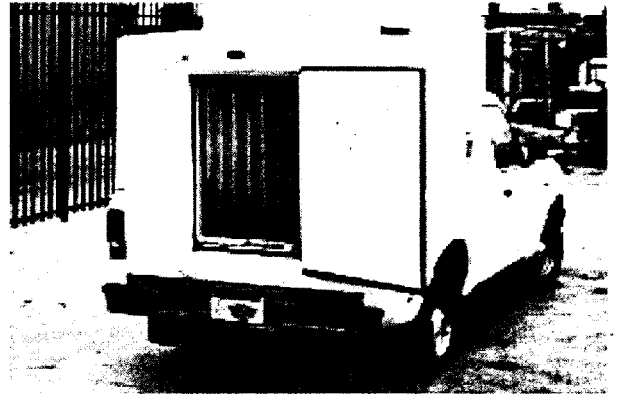
Recently I was contacted by Mr. Bob McDonough of Midstate Dairy Systems in DeRyter, NY. He carries used dairy equipment that may be of interest to *CreamLine* subscribers. He has cheese vats, bulk and HTST pasteurizers, bottling equipment, bulk tanks, and a few can coolers, to mention some of his inventory. In addition, they make an 8-gallon cheese vat with water jacket from a milk dumping station, with mixing valve to connect to a sink. Cost is \$750. Contact Midstate at P.O. Box 307, DeRyter, NY 13052. (315) 852-9591.

The Lactose-Free Dairy Cookbook

Sue Marren, a regular contributor to the Artisan Cheesemakers e-mail discussion group, is lactose intolerant. She requested recipes from the group, and then compiled them and her own into this neat little 75-page book of recipes for those who are unable to digest milk sugars. The book is organized into five chapters – Cream & Butter, Evaporated & Condensed Milks, Sour Cream, Soft Cheeses and Combined Recipes. Each chapter has general information on the products, and then recipes for how to use them.. The book is spiral bound and lays flat (as all cookbooks should). To order, send \$12 + \$2 shipping with your name, address and phone number to: Marren Publications, 503 Fourth St., Riverton, NJ 08077. Or fax your information with a credit card number to: (856) 829-5613.

Small Refrigerator and Freezer Trucks

CMF Corporation in Long Beach, CA makes self-contained “mini-reefers” to fit on the back of a pickup truck, even short-bed mini-pickups for rent or lease. They also make trailers. Mini-reefers keep products cold or frozen for delivery or other transport. This might be a good option for small dairies delivering fresh or frozen products without a huge investment in a truck. Prices start at about \$6000 and there are many models to choose from. Contact CMF at (800) 350-8979 or visit their web site at www.JACK-FROST.com.



Cheesemakers-L Moves to OneList, Metamorphoses into “Artisan Cheesemakers”

The popular on-line e-mail discussion group Cheesemakers-L has moved to OneList because of server problems, and has changed its name to “Artisan Cheesemakers.” To subscribe send an e-mail message to Artisan_Cheesemakers_subscribe@onelist.com.

New Dairy Discussion Group

Also on OneList, there is a new discussion group devoted to small commercial scale dairying. This list is co-moderated by author Andy Lee (*Backyard Market Gardening, Chicken Tractor*) and Vicki Dunaway. To sign on, send an e-mail message to: dairycreamery_subscribe@onelist.com.

Proctor & Gamble Has a Good Idea

Dairies use a lot of single-service towels, and many use paper, rather than laundering lots of cloth towels. In case you haven't looked beyond your “usual” brand, try the Bounty “Select-A-Size” roll, in which the perforations are at about the half-sheet size. Bounty makes an unusually absorbent towel, so half a sheet is often quite enough. I've found that my roll of paper towels lasts a lot longer since I switched to “Select-A-Size.” My absolute preference would be the same option in a recycled paper towel, but so far I haven't found the quality I need – sometimes I have to use 3-4 recycled fiber towels to one standard Bounty, so I've chosen to reduce consumption with half-sheet towels.

BATCH PASTEURIZATION

By: Larry Grabman

The domestication of animals occurred between 6,000 to 10,000 years ago. The oldest written record of the human race is found in the Sanskrit of ancient India, which goes back about 6000 years. These records show that milk had already become an important commodity. In fact, milk was such an important part of their diet that some ancient civilizations worshiped the cow as a 'goddess'. In the Bible over 50 references to the cow and milk are found in the Old Testament, and the Promised Land was described as "a land of milk and honey." The first settlers who came to this country made the mistake of not bringing any cattle with them. As a result of this half of the people that came on the Mayflower, including every child under two years of age, died the first winter. We did find that the first cow came to this country at Jamestown, and the cow found its way west with the pioneers thereafter.

The modern-day dairy industry had its start around 1860 in France when Louis Pasteur developed a heat treatment method for controlling fermentation and preserving liquid products. He found that, by heating wine to a sufficiently high temperature over a period of time, the spoilage-causing organisms were inactivated. Around the turn of the century commercial pasteurization was starting to take place, often done under cover of secrecy. At that time there were a great many objections to pasteurization of milk, because it was generally felt that pasteurization was little more than a substitute for sanitary milk production. Up until the 1920s pasteurization was done by a method called "flash pasteurization," wherein the milk was momentarily heated to a temperature of 155° to 165°. Unfortunately, a few milk-borne disease epidemics were traced to flash pasteurization, which spelled doom for this type of pasteurization. As an alternative a holder pasteurization method was developed, followed by high-temperature, short-time (HTST) method and then by ultrapasteurization.

The holder type of pasteurization is commonly known by three different names: vat pasteurization, batch pasteurization, or low-temperature, long-time (LTLT). Batch operation has been found to be preferable in operations that are too small to justify a continuous flow HTST system. As a rule, if an operation has a flow of 2000 lbs. or under per hour for less than 3 hours, it is best to use the batch method. Assembling, tearing down and cleaning

an HTST system is simply not economical at lower volumes. In the batch method of pasteurization, the milk is heated to 145° and held for 30 minutes. If the product has a butterfat content over 4% and/or contains added sweeteners the pasteurizing temperature is to 150°. It is permissible to use a heat exchanger for heating and cooling of the milk, and the vat for the holding process. It is also possible to make the batch system of pasteurization a continuous one by using a heat exchanger unit and three pasteurizing vats. These vats would need to be filled and emptied at a rate so that one is being filled while the second one is being held for the 30-minute holding period, and the third one is being emptied in the same length of time or less.

During the entire holding process the air space of the product must be maintained at least five degrees higher than minimum legal pasteurizing temperature, and there must be an indicating thermometer in the air space to show the temperature of the space. The bottom of the thermometer's bulb must be at least one inch above the surface of the milk. Each time the vat is used for pasteurization the air space temperature is recorded on the recording thermometer's chart. If the product is pasteurized at an elevated temperature, producing an air space temperature of 5 degrees or more higher than the minimum pasteurizing temperature, then an air space heater is not necessary. Steam may be used to heat this air space by injecting it into the air space as long as the steam is "culinary steam". Culinary steam is steam that is free of any compounds that damage or affect the product. An electrical unit also can be used to heat this air space.

The agitation of the product needs to be done at such a speed that assures the proper mixing of the product without whipping or churning. The agitator should push the product down to the bottom of the vat and sweep it across the heat exchange surface on the bottom and sides of the vat. The agitators can be slow-speed large-diameter propellers, high-speed small-diameter propellers, or oscillating paddles. Agitation of the product should be continuous throughout the heating and holding process to ensure uniformity of the temperature and prevent fat globules from rising. Sometimes the long sweep agitator is driven by a two-speed motor, giving the operator the option of high speed agitation for quick heating and a lower

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speed for the holding period. With this type of agitation the vat must also be equipped with a baffle to break up the sweep of the product so the agitation becomes more vigorous. This type of agitation is more desirable when making ice cream mixes and other products that have a heavier body.

The design of the fill pipes and valves used for filling and emptying the vats must be such that they ensure that there will be no contamination of the product while the holding and the emptying processes are taking place. All of the valves must be of the leak protector type — designed to prevent leakage past the seat in every closed position. Inlet and outlet connections, other than through closed-coupled valves, must not be below the level of the milk. If the inlet line enters the vat above the milk level and is submerged in the milk, the inlet line must be provided with an automatic air-relief or vent located at the valve. The pipeline between the inlet valve and the vat must also be sloped to assure free drainage. The outlet valve is to be closed connected to the vat. A closed connected valve is one in which the seat is either flush with the inner wall of the pasteurizer, or so closely coupled that no milk in the valve inlet is more than 1 degree colder than the milk in the center of the pasteurizer at any time during the holding time. The outlet valve must be closed during the filling and holding periods, and the inlet valve must be closed during the holding and emptying periods.

Certain mechanical requirements of batch pasteurization must be taken into consideration: the amount of steam, refrigeration, and electrical needs. In running a bottling operation a considerable amount of steam is required for processing, cleaning, and heating building space. A pasteurizing operation using the batch method of pasteurizing will require about 1/3 pound of steam per pound of product. The total plant requirements are approximately 7 to 10 hp., or 242 to 345 pounds per hour of steam per 1000 gallons of milk processed daily. It has been found that approximately 112 pounds of steam can be produced per gallon of fuel required as follows: 12 gallons of fuel and 1600 cu. ft. gas (1000 BTU per cu. ft.).

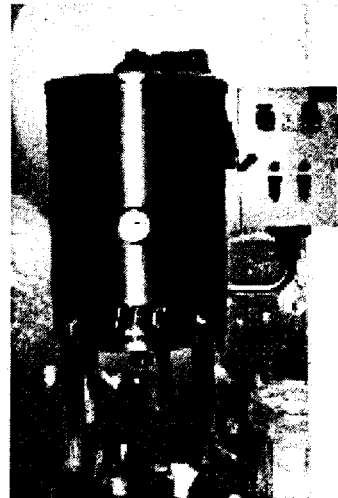
The cost of electricity is based on the cost per kilowatt-hour, demand, and power factor. The entrance requirements can be estimated on the basis of 140 hp-hr. (or kw.hr.) per 1000 gal. of milk that is processed. If you have an operation that operates for 7 hrs. per day, ap-

proximately 20 kw. entrance should be provided per 1000 gallons per day processing. Refrigeration is the biggest user item, requiring about one-third of your kw. entrance.

There are two types of refrigeration used in a bottling operation. These are compression refrigeration, which utilizes ammonia or some other type of a refrigerant; and indirect type, which uses brine water or sweet water to cool the product. The capacity of refrigeration system is designated in tons, with one ton being equivalent to the removal of 12,000 BTU per hr. The size required for a particular operation depends on the number of hours utilized in cooling. An installed refrigeration capacity of 5-8 tons per 1000 gallons per day is needed for processing fluid milk. At the operating temperature for fluid milk processing, approximately 1 hp. is required for each ton of refrigeration. Thus 1 hp.-hr., 1 ton-hr., and 1 kw.-hr. can be approximately equal. The use of an ice builder system will help reduce the amount of energy needed by 1/3 to 1/2 that which is used by a direct expansion system.

The batch method of pasteurization is well suited for small operations and for low volume items. This method helps to maintain the depth of the cream layer, since pasteurization is taking place at a lower temperature. On the downside, this method is inherently slow, although the flow can be made continuous. More attention must be given by the operator to ensure that the

product is not overheated or retained too long in the holding process. Finally, with batch pasteurization it is not possible to take advantage of the regenerative heat exchange in the vat; this is where the heat from the outgoing milk is used to warm the incoming milk. Lack of regeneration makes heating and cooling the product more expensive.



I.E.C. batch pasteurizer

Larry Grabman is a dairy consultant located in Galax, VA. He has 30 years' experience with dairy operations, including the startup of a fluid milk bottling plant in New Jersey. His phone number is (540) 238-1806.

Coming Up in *CreamLine* :

Summer issue feature -- regulations & HACCP

Course Review -- University of Guelph
cheesemaking course

Tarentaise cattle

Sicilian cheesemaking

Writing a small dairy business plan

Mark Your Calendar!

September 20-21, 2000

Profitable Farmstead Cheesemaking

Intensive course at Goat Lady Dairy in Climax, NC, presented by owners Steve and Ginny Tate. Focus on what it takes to get started in a commercial cheese dairy. \$350. More details will be available soon.

September 22, 2000

Advanced Farmstead Cheesemakers' Seminar

Goat Lady Dairy, Climax, NC. A full day with Peter Dixon, a dairy consultant from Vermont who has helped set up a number of small plants, including development of recipes. Problem-solving, fine points of cheesemaking, plant startup, much more depending on group preference. \$100. More details soon.

CreamLine

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Address correction requested

June 3, 2000

Farmstead Cheesemaking with Julia Farmer

This full-day class will take place in Westover, West Virginia (near Morgantown) and is open to all. Julia Farmer is an experience-based cheesemaker who has studied Animal Science at the West Virginia University School of Agriculture, and European-style Artisan Cheesemaking. A capriculturalist for 24 years, she owned and operated a licensed raw milk goat dairy in Pennsylvania. Now the owner/list mom of the Artisan Cheesemakers Internet email list, she supports artisan cheesemaking in whatever way she can, along with making various cheeses for friends and family from the milk of her herd of Nubian dairy goats.

The small class (limited to 20) will make several types of cheese and discuss cheesemaking basics -- sanitation, starter cultures, rennet, acid development, working with different types of milk, rinds, pressing and aging, etc. Cost is \$35, lunch included.

To register, send check or money order to HCR, P.O. Box 186, Willis, VA 24380. For more information contact Vicki Dunaway at (540) 789-7877 (before 9 p.m. Eastern time, please!) or e-mail: ladybug@swva.net.