Bricks, Shortening Cans, Dented Sinks, and Plastic Caves

Armed with my rudimentary knowledge of cheeses and how they are made, I wanted to start from the bottom, so to speak. I was ready to try making cheese at home. I wanted to share the experiences that have been, and continue to be, familiar to all cheesemakers. And, I hoped, what I would learn along the way would add to my understanding and ultimately to my appreciation of the new and the old worlds of cheese.

I knew now that the preliminary and basic steps in cheesemaking are common to almost all cheeses. It would be fun to see milk turn into curd, but I thought these first steps would be relatively uninteresting, compared to the later steps, such as aging. Later I was to discover that the technically interesting business of aging was in practice rather tedious, compared to the first few intense hours in the process.

As for providing answers to the two big questions—"What is cheese?" and "How is it made?"—all I expected those first steps to teach me was how to progress from milk stage to the rather bland product just beyond the curd stage that is a cheese in name, but that has almost none of the qualities we like about cheese. I knew the initial steps in the cheesemaking process would not let me create the subtle variations that give rise to the many of kinds of cheeses with their myriad flavors.

Although one idea was to start out making the edible kind of cheese curds we favored as children, I did not find a recipe right away. My first adventures began with instructions gotten from an appendix in Edith Stamm's *The History of Cheese Making in New York State*. Contributed by staff at the Genesee County

Cheesemaking materials. *I was able to make my first cheese with items found around the house, including large pots and a candy thermometer. The milks, fabrics, and plastic shortening container were obtained especially for the purpose. Only the rennet tablets could not be obtained locally.*

Museum, the recipe provided an easily accessible way for novices to begin. With one exception, I could obtain locally everything I needed.

I visited the local supermarket with a shopping list in hand that included one pound of store-brand vegetable shortening in a plastic container, two gallons of milk, some buttermilk, a twelve-ounce can of tuna fish, and cheesecloth. Most of these I found easily. I had to look harder for the cheesecloth, which was sold out in the fabric store I visited. Eventually I found it on the supermarket aisle containing cleaning supplies. I also needed unbleached muslin. The fabric store didn't have that either, and of course it was not available (and not expected) in the supermarket. I was impatient, however, and substituted a kitchen towel I found at the market; it looked as if it might have been made of muslin.

I later learned that the kind of cheesecloth I had purchased was not what a real cheesemaker would have used and also that I should have sought out a fabric known as "butter muslin." Neither of the genuine products was available for the first cheese, but I got them from cheesemaking supply houses for my subsequent cheesemaking experiments. The one essential item for the first cheesemaking attempt that I could not obtain locally was the rennet. I sent off an order and waited impatiently for the six-pack of vegetable rennet enzyme tablets.

Of course, the two gallons of milk would provide the basic raw material for the cheese. A very small amount of the buttermilk would be added as the source of live bacteria to initiate fermentation; the rest of it I would use for buttermilk soup, a favorite. Special strains of bacteria to produce various kinds of cheeses are available from suppliers, but most strains are closely related, and it turns out that the bacteria responsible for making cultured buttermilk are perfectly capable of producing cheese.

Following the instructions at hand, I opened and removed the contents from the plastic shortening container, discarding the shortening. I cleaned the container thoroughly and drilled holes in the bottom.

This was to be my cheese mold, or "hoop," in the jargon of cheesemaking. I cut the edges off the rather flimsy top so it would fit inside the mold, and thus it became the "follower," the part that would go on top of the cheese curds and press them down in the mold. The can of tuna fish was to be used unopened to help with pressing duties; it would sit atop the follower and hold the weights that would press down on the cheese. Anytime after the can had completed its duties in cheesemaking, we could open it and eat its contents.

Warming the milk. *Once it reached 90˚F, a small amount of buttermilk was mixed in as a source of bacteria. After an hour, bacteria have reproduced explosively, converted much of the lactose to lactic acid, and begun the process of expulsion of liquid components, collectively known as whey.*

The remainder of my cheesemaking apparatus consisted of everyday items already found around the house. They included a stainless steel stockpot that held slightly more than eight quarts, a 21½ - quart enameled steel canner, a candy thermometer, a large stainless-steel colander, a stainless-steel spatula of the kind used for slicing cakes, and a nylon spoon for a stirrer. The stockpot would receive the milk and serve as my cheese vat. I placed it inside the water-filled canner, which functioned as a water bath, allowing me to gently increase and maintain prescribed temperatures of the milk. To press the cheese in my shortening-can mold, I added weights on top of the tuna can on the follower. I used bricks for pressing weights, as recommended in the instructions, and I wrapped them in plastic to keep dust from contaminating the cheese. The first cheese was to be a "farmer" or "farmhouse cheddar" cheese.

Cut curd. *After the addition of rennet and another period of rest, the curd is a solid mass having the consistency of sour cream. Cutting the curd into small cubes increases the surface area and accelerates the expulsion of whey.*

Over the next twelve months I made eight different cheeses, and as I progressed my equipment and operating procedures became more sophisticated. I substituted an electronic model with an alarm for the candy thermometer used at first, I ordered special bacterial cultures, I got the appropriate kinds of cheesecloth and butter muslin, I acquired a pH meter, and ultimately I opted for a commercial cheese press. Actually, the results of my efforts were not greatly influenced by this increasing sophistication. Some cheeses succeeded, some failed, and none were particularly superior to those first attempts carried out with primitive equipment. Even some early mistakes did not seem to noticeably affect the

Cooking the curd. *A slow increase in temperature to 100˚F and gentle stirring for thirty minutes completes the separation of the solid components of the curd from the liquid whey.*

Draining the curd. *The whey is drained and discarded. It can be used for a variety of purposes, including making of certain kinds of cheeses. When discharged from industrial cheesemaking processes, it can be a significant pollutant. Up to this point, the processes for making most kinds of cheeses are very similar.*

results. On the first attempt I used too much rennet. I also dissolved the rennet tablet in chlorinated water, and later salted the cheese curds with iodized salt. I learned these were no-no's and corrected them in later attempts. Perhaps others would have noticed the results of these mistakes in the cheeses, but I detected only inconsistent differences.

The accompanying series of photos and captions illustrates the making of my first cheeses. Rather than describe the various steps separately, I will just relate what turned out to be the only real frustration. The cheese curds in the plastic mold, the follower and tuna can on top, and the weights used for pressing proved to be quite unstable. Lacking enough weight with the bricks at hand, I got creative and added a weight in the form of a gallon-size can of mushrooms. To this I added the bricks, ultimately four of them. Balancing this tower of weights atop the cheese mold was a challenge. It was possible, however. By carefully shifting the can and each brick, the perfect distribution of weights could be obtained so that all would remain upright and more or less even pressure could be applied to the curds.

Alas, success was short lived. As the curds pressed down and knitted together, slight shifts from side to side were inevitable. Ten or fifteen minutes after seeing that all was aligned and balanced, I would be greeted by a loud crash. Rushing to the kitchen sink, where the pressing was underway, I would find a jumble of cheese mold and weights scattered in the basin. One such crash brought down a brick with enough force to dent the stainless steel sink. In later attempts I placed my cheese press in a more durable fiberglass laundry tub.

Also for a later cheese, I had a flash of inspiration—real creativity this time—and substituted a cast-iron stockpot for the mushroom can. I could set the stockpot upside down, with the tuna can connecting with its inverted bottom, concentrating much of its weight lower and lowering the center of gravity of the weight complex. It worked better but was no panacea; it crashed also, and my continuing problems

with pressing ultimately induced me to procure the commercial press.

I also obtained new instructions. Rikki Carroll's *Home Cheese Making* and Margaret Morris's *The Cheesemaker's Manual* provided me with recipes for different varieties of cheese. They were very helpful in increasing my knowledge of the kinds of cheeses and how differences in manufacture lead to the almost endless range of variation.

With one exception I aged all the cheeses I made for at least 60 days. Even though I used pasteurized milks, the 60-day aging period required by U.S. Department of Agriculture regulations for raw milk cheeses seemed an appropriate benchmark for aging my cheeses.

Finding a suitable environment for aging my cheeses proved to be my second major challenge. In the garage we had an old refrigerator, which was used primarily for beverages and occasional overflow from the refrigerator in the kitchen. I found that by turning the temperature control to its warmest position, I could maintain a temperature within the acceptable range for aging but still colder than the desired 55°F. Nevertheless, in winter when temperatures in the garage sometimes fell below 50° the temperature inside the refrigerator sometimes fell back into the 40s.

Worse, the humidity inside my improvised aging "cave" tended to be far lower than the 65% said to be in the ideal range for aging. I partially solved that problem with a shopping trip for a clear plastic storage box with a lid. I put the cheeses inside the box with an open bowl of water. When I did this, the humidity rapidly shot up to 90%. That was too high, and what followed was a constant tinkering, by wedging little pieces of wood—toothpicks, chopsticks, pencils—under the edge of the inverted storage box, seeking to let just enough outside air in to attain the desired humidity. Of course even when I seemed to have it just right, all might go askew each day when, per the instructions, I opened my little apparatus to turn over the cheeses. I own a wireless weather station

Curds in the mold or "hoop." *In the upper image, the curds have been packed into the shortening container, shown on its side. In the lower, my tuna can and follower are shown in place. They will transfer pressure from weights to the curds, expelling liquid and helping them to knit together.*

Pressing. *The series of images above shows successive attempts to solve the problem of pressing the curds. The first two attempts (top and middle) used combinations of bricks and an unopened large can of mushrooms to press down on the curds in the hoop. Both were highly unstable. The middle image shows an upside-down cast-iron stockpot added weight with a lower center of gravity – better but still unstable. The ultimate solution was purchase of a commercial cheese press (bottom).*

and was able to keep track of the temperature and humidity inside the aging chamber by putting the transmitting unit in with the cheeses. I got readouts on my computer screen and thus was alerted to times when additional adjustments were necessary.

The problem of controlling humidity brought me back to memories of graduate school, where I wanted to control humidity in an experiment in which I was incubating lizard eggs in glass containers. After my first series of cheeses, I remembered the lizard egg problem and hearing at the time of a way to control humidity in a closed container by including an open vessel inside with water and glycerol mixed in prescribed proportions. I never got to try the technique and don't know if any cheesemakers have ever tried it. I will have to look up the instructions and perhaps try it someday.

My first cheese was delightful when we sampled it two months after its production. A critic would have declared it too hard, probably because of my excessive use of rennet, but the flavor was pleasing and we ate the entire cheese, apart from the edges that had hardened excessively. In making the second cheese I followed the same instructions I had used with the first, correcting some of the deficiencies of the first try. With this cheese I may have overcorrected some of the problems encountered with the first, for it seemed to retain too much moisture. Perhaps I had pressed it too little. In any event, it was pleasing to taste, with a creamy, buttery flavor. Like the first, we and our guests eagerly consumed it.

My third and fourth cheeses attempted to improve on the first two. They were based on the same recipe and basically the same utensils, and the fourth differed from the others by being flavored with green peppercorns. For reasons I was unable to determine (perhaps that iodized salt was at fault?), the third was less than fully successful. It was excessively hard and crumbly, had a texture with relatively large crevices, and tasted somewhat acidic. In contrast, cheese #4 had a good texture and a pleasing flavor, although the flavor of the peppercorns may have overpowered any imperfections in the cheese.

In the interlude between my fourth and fifth cheeses, I finally decided to try my hand at cheese curds. I went through an elaborate recipe found on the Internet. It included cheddaring, the traditional process of stacking slabs of the curd after the whey was expelled, and milling the cheddared curd (i.e., cutting it into even-size pieces.) Unfortunately, the product was a disappointment. Although tasty, my cheese curds had the pasty color of cottage cheese and a smooth, slimy texture quite unlike the rubbery, squeaky cheese curds with which we are familiar. By that time I had even purchased a pH meter to help in determining the precise times to take critical steps in preparation, so it was not lack of technical sophistication that doomed this project. It could be that the protein strands in the curd did not knit properly because I performed the cheddaring incorrectly. Perhaps I gave up too soon, but that was my one and only attempt at making cheese curds.

Carroll's and Morris's recipe books gave me the opportunity to try making some different kinds of cheeses, and I next tried a traditional cheddar, made by a process much more involved than the one used for the farmhouse cheddars I had made previously. In succession I made a Colby, a Monterey jack, and a Gouda.

The Colby and Gouda were aged for 60 days, more or less, and were reasonably successful, or so it seemed. At any rate they were remarked upon favorably by guests, perhaps expressing pleasure and perhaps just politeness or kindness.

The traditional cheddar and the Monterey jack I tried aging for a full year, with poor results. The longer they aged, the more opportunity there was for something to go wrong. In both cases, the wax covering on them was insufficient to prevent the invasion of molds. The cheddar was partly salvageable and quite tasty, but the Monterey jack had spoiled completely.

To make better cheeses and to produce more reliably acceptable products, I need to solve the aging problem. Our ancient refrigerator wasn't suitable and even if modified with one of the available specialized

Out of the press. *After 24 hours of pressing, the curds have knitted into something beginning to look like a cheese.*

Waxing. *Some later cheeses were waxed, unlike the first, which was aged while wrapped in cheesecloth smeared with butter. In the waxing, a home-made double boiler keeps the wax from overheating.*

Aging cave. *My first cheese can be seen in its modified plastic storage box in a spare refrigerator. The thermometer permitted me to keep track of temperature and humidity, although regulating both proved to be a problem. My first cheeses were aged just over sixty days.*

Waxed cheeses. *Later cheeses included several different types, shown here freshly waxed.*

Inconsistent results. *Most of my cheeses were edible, including the cut peppercorn cheese in the upper image, which was quite good. The one below it was attacked by molds and was chalked up as a learning experience rather than a tasting one.*

controls, probably would be unable to overcome the wide variations in temperature in our Florida garage. I thought I could probably do much better with a wine cooler or compact refrigerator that could be kept inside the house. With minor adjustments, I thought I could probably overcome the humidity problem also. As appealing as the idea seemed, I have yet to find what I think will be an appropriate unit. In the meantime, the old garage refrigerator has been abandoned in the name of energy efficiency, and my making of aged cheeses is on hold until I find the right product.

In all these cheesemaking efforts I had wanted to get as complete a picture of its several aspects as I could, so I deliberately chose to make kinds of cheeses that involved all the processes commonly used. Otherwise, starting out with a simpler cheese might have been a better choice. Making fromage blanc, for example, is the essence of simplicity. A gallon of milk, a packet of commercial starter culture, and a stockpot in which to heat the milk are all that is needed. Perhaps a small amount of buttermilk could substitute for the starter culture. (Later I tried this and made not fromage blanc but instead a product very like buttermilk. It is probably worth the expense to purchase the specialized culture.) No cutting of curd, cooking, salting, pressing, or aging are involved. One simply heats the milk to 86°F, mixes in the starter culture, removes the pot from the heat, and lets the covered pot sit at room temperature for twelve hours. It is then drained in butter muslin (surely other fabrics would work) for up to twelve more hours, and voila! a simple fresh cheese is there for your use. I realized I had learned much more by making cheddars and other hard cheeses, but I had never tried making a fresh cheese. Perhaps I had missed something. Making fromage blanc would be a step backward—going from the difficult cheeses to an easy one. However, a minimum of effort would be required, I wouldn't have to solve my aging problem (my cheese aging problem, that is), and some readers might be encouraged by my experiences to try making this simple cheese themselves. It was late in my cheesemaking career, but I decided to give fromage blanc a try.

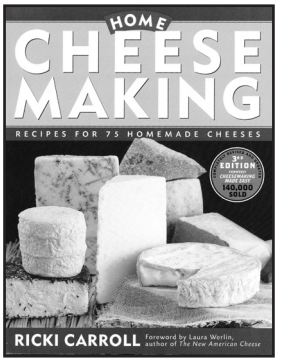
I followed the instructions, planning ahead so I wouldn't have to wake up in the middle of the night to start the draining. This time I tried using the trick we had learned from a would-be artisanal cheesemaker: I made my own nonhomogenized milk by mixing skim milk and heavy cream.

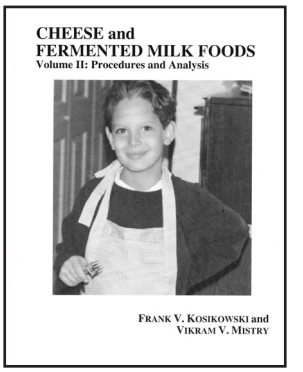
The process was as simple as promised, no glitches developed, and after very little effort and an inconsequential wait, the fromage blanc was ready. I found the hardest part of this cheesemaking exercise to be cleaning up. The product, regrettably but predictably, was not particularly interesting. It tasted like cheese curd—not the rubbery, salty kinds made after cheddaring but rather the pasty and sourish curd reminiscent of the early stages of hard cheesemaking. And now I had three-quarters of a pound of it and didn't know what I would do with it. Ricki Carroll's recipe suggested adding herbs or spices, but nothing came to mind right away. Dill weed? I couldn't decide. I resolved to try mixing some of it with diced green chiles and use it as a filling for enchiladas. If that proved to be edible, maybe some other use would come to mind.

As it turned out, the fromage blanc proved to be an excellent filling for enchiladas. I mixed about a half pound of it with a four-ounce can of chiles, added a bit of juice from pickled jalapeños, rolled the mixture in flour tortillas, and topped all with store-bought enchilada sauce before it went in the oven. The concoction came out great, and we loved it. The remaining cheese we turned into a spread by mixing it with rehydrated sun-dried tomatoes and a bit more of the jalapeño pickling juice. It was good also, and sometime soon we'll probably try making more fromage blanc.

Now I was through with cheesemaking, and it was time to get out of the kitchen again for a while.

Fromage blanc. *The draining curd is shown in the image on the left and the finished cheese is seen on the right on the opened sac of muslin after draining for twelve hours. While arguably a cheese, fromage blanc only barely merits the designation.*





Instructions. *Ricki Carroll's (top), is intended for home cheesemakers, and the two-volume reference by Kosikowski and Mistry (bottom) is focused on industrial cheesemaking.*