Issue No. 4
Winter 2000

Cream Line

a new voice for little dairies

To Make a Better Butter

For several decades now, butter's status as a valuable food and even an art form has declined. Sally Fallon, author of *Nourishing Traditions*, recently spoke at a small farms conference in the Midwest on the topic, "Why Butter Is Better." She described a ritual performed by the people of an isolated Swiss village in the early 1900s, in which they placed a wick in a bowl of early spring's butter, made from milk produced on fresh green grass. This candle was placed on an altar in recognition of the life-giving properties of this substance. In the U.S. in the early 1900s a "growth-promoting substance" (later known as vitamin A) was known to be present in butter, and the high level of heat (calories) found in butter was highly valued by a population living without central heating systems. Some large grocery stores had entire counters devoted to butter from different farms and small creameries, complete with attendants to help the shopper with his or her selection. Today you are lucky to be able to find the butter in the dairy section, perhaps just left of the "Mooove Over Butter" and "I Can't Believe It's Not Butter." We have been advised to view butter as an evil spirit that causes people to become fat and have heart attacks. *Butter Busters: All the Foods You Love Modified to Low-Fat* is proudly displayed out front at Books-A-Million, but good luck finding a book that tells you how to make excellent butter.

A good fresh butter deserves to have the praise and mystique values put onto cheese and wine. ... The taste of good butter is as exciting to the palate as the taste of a good cheese." — Avice R. Wilson in Forgotten Harvest.

Sally Fallon's theory about the decline of butter is that the makers of the competition (margarine and spreads) have intentionally "demonized" butter in order to sell their vegetable oils and spreads. Butter is expensive to make, so consumers have questioned very little the assertions that this fat (along with beef tallow and lard), which is semi-hard at room temperature, is clogging arteries and turning into tummy pouches. However, recent studies have suggested that the trans fatty acids in the unnatural spreads and oils are actually the culprits in heart disease and other health problems. In a University of Delaware Extension publication, it states that the mechanical homogenization of cow milk is what causes the problems (see box on p. 3). These days it's hard to know what to believe. Science is largely sponsored by large corporations.

Out of all the brouhaha there appears to be a rising interest in butter – and good butter at that. At the health food store (and some chain groceries), one can now find a selection of butters, including imported butter and "European style" butter. According to

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In This Issue:

From the Editor

This issue is about a month late, and I thank all of *CreamLine*'s subscribers for your patience. I needed to concentrate my efforts on finishing the *Small Dairy Resource Book*, the annotated bibliography that is the first major publication of the Hometown Creamery Revival project. The book is currently at the printer and will be released within a couple of weeks. A free copy will be sent to all current *CreamLine* subscribers, in appreciation of your support.

The promised article on the cheesemaking short course at University of Guelph will appear in the next issue (around mid-March). Chase Hubbard, the author, has a new baby, and has been in the process of moving both to a new job and a new home. That his time is limited is understandable. Chase offered an excellent beginning cheesemaking class in December.

Speaking of classes, we have had two very successful cheesemaking classes and a third one comes up January 21. Since winter is such an iffy time to schedule anything, the next classes will be in the spring. *CreamLine* subscribers will receive notification, particularly if anything is scheduled before the next issue. Most exciting – I've found an experienced dairy foods consultant who has help set up lots of small dairies, who is willing to come for an intensive seminar at some point. Stay tuned!

I wish all of you the best for the New Millennium! (No arguments from the peanut gallery, please.) Everywhere I turn I see or hear about more people interested in a revival of small dairies. The big guys are going their own way, but they are leaving a great void in quality and uniqueness that will be filled by people like you. Let's do it!

A Letter to *CreamLine*

Jan 7, 2000 Dear Vicky – I wanted to write to you and let you know of my latest findings.

(1) In a used book store I found a book titled "The Backyard Dairy Book" by Len Street and Andrew Singer, copyright 1975 in the U.K. It has information on goat and cow, what you'll need, how to milk, dairy products, cream production, butter making, cheese production, yogurt production. It has the neatest old pictures of dairy stuff, like "interior of a Dutch dairy," "working the butter," "butter worker," "curing-house, Whitesboro Cheese Factory," "Cheshire cheese-press." Anyway I had never heard of a butter worker until this book and found it fascinating to learn about. Guess what? I found one at an antique shop not too far away, so I put it on lay-away and now it's in my house – the butter worker is dated 1875. Some day when I

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See page 15 for information on classifed ads.

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

Moving our site has allowed us to make our own updates,which are much more frequent than before.

Buttermaking *-- Continued from page 1*

the Web site of Plugrá/Keller's European Style butter, "European style" refers to butter with higher butterfat (82%) and lower moisture than American style butter. Visit www.butterisbest.com. This web site has lots of interesting information and butter recipes. Keller's also makes butter sculptures and other specialty butter products that are beginning to show up in the dairy case. A few companies are beginning to make cultured or sour cream butter.

> The natural homogenization of goat milk is, from a human health standpoint, much better than the mechanically homogenized cow milk product. It appears that when fat globules are forcibly broken up by mechanical means, it allows an enzyme associated with milk fat, known as xanthine oxidase, to become free and penetrate the intestinal wall. Once xanthine oxidase gets through the intestinal wall and into the bloodstream, it is capable of creating scar damage to the heart and arteries, which in turn may stimulate the body to release cholesterol into the blood in an attempt to lay a protective fatty material on the scarred areas. This can lead to arteriosclerosis. It should be noted that this effect is not a problem with natural (unhomogenized) cow milk. In unhomogenized milk this enzyme is normally excreted from the body without much absorption. *--excerpted from "Goat Milk versus Cow Milk," by G. F. W. Haenlein and R. Caccese, University of Delaware, Newark, in the Extension Goat Handbook, fact sheet E-1, 1984.*

A new butter I've found particularly pleasing has the brand name, "Farm Families of New England." This butter has good flavor (for a sweet cream butter) and a silky texture, different from most butter on the market. On trying to contact them by calling Information using the address on the package, I learned that there is no company by that name in Braintree, Massachusetts. So I checked the on-line Yellow Pages for Braintree and – lo and behold! – Cabot Creamery had the same address. A fellow at Cabot told me that the Farm Families butter is made in exactly the same way as Cabot butter (which is good, but not ***as*** good). The only difference, he said, is that the milk used to make the Farm Families butter is fresh from New England farms and this line is guaranteed to be BGH-free, while Cabot brand butter is not. He said that they produce about 4 million pounds of the Farm Families butter a year, compared to 100 million pounds of the Cabot brand. So what does that tell us?

Start with the cow (or the doe, or the ewe, or the mare, or the yak ...)

Rule #1 – "You can't make good butter from bad milk." At least that's what they used to say in the old days. Most of the few available books on butter are from around the turn of the last century. (Remember the 1900s?) After that it appears, in the U.S. at least, that buttermaking became just another technical procedure and nobody cared much about how it was done, as long as the product was reasonably consistent and not actually bad.

One can only speculate as to why milk fresh from New England farms using no BGH would make better butter than that made from the regular milk pool. Freshness may play a part. These New England farms may have a higher percentage of non-Holstein animals. BGH may itself be a factor. It is interesting to read the old books about butter written in the early 1900s, at a time when there was a great transition taking place. The authors were able to remember when most butter was made on the farm, as well as the brief era during which butter was made at small, local cooperative creameries. The factory system was, by then, firmly in place, and the bugs were being worked out of the system. One of the problems mentioned is that the cream arrived at the factory too sour. At that time it was difficult to transport a lot of milk to be separated at the factory, so farmers separated their own cream. Apparently some farmers would hold the cream too long (to get enough to make it worth the trip) or would not clean the separator thoroughly, or would keep the separator in the barn, resulting in contamination of the fresh cream. Rather than insisting on fresher cream, the factories went about neutralizing the acid in the sour cream with limewater and other substances to make it more palatable!! A public outcry against this practice arose because it was felt that neutralization encouraged factories to use poorer quality cream, and laws were even passed against it. However, the factories eventually won, based on "scientific evidence" that the butter was okay for consumption even when neutralized. Eventually on-farm separation went by the wayside (as evidenced by the number of separator planters around). Factories separated the cream and returned the skimmed milk to a vat from which farmers drew to take home the milk for fattening hogs. Now they just bottle it for people who want to stay thin. Hmmm.

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Buttermaking *-- Continued from page 3*

Anyway, back to the animal. The forage the animal eats affects butter and all other milk products. As noted before, people once revered the butter made from the fast-growing fresh spring grass. The butter is particularly high in vitamin A at that time, and the butter (of cows) has a deep yellow color from carotene (a vitamin A precursor). This is not true of goat butter, as goats convert the carotene to vitamin A and carotene is not passed into the milk.[2] Of course certain breeds of cows have yellower butter than others, most notably Jerseys and Guernseys. Early spring and summer butter tends to be softer than fall and winter butter, also due to the differences in forages. Some homestead buttermakers felt for this reason that it was more profitable to have the cow freshen in late summer and be dried off during the hot summer months, when pastures are dry. As one writer put it, "It is almost impossible to make good butter in dog-days, living as we do, with no special appliances, and it is not worth while for us to get a patent creamer and a supply of ice. In the spring, we don't want a dry cow, but we are willing to have one in August."[3] Of course, air conditioning and refrigeration allow more leeway, but we in the South who live without air conditioning must also take into consideration that buttermaking and cheesemaking are much more pleasant tasks in the winter, and in winter we typically have fewer other chores to tend to.

We recently made an interesting discovery with our own cow. During the fall my husband Charley was making a lot of apple cider with the extraordinary abundance of apples we were blessed with in 1999. The cow and her calf were abundantly rewarded with apple pomace, which they ate with relish. There were several other factors that may have come into play (including the calf talking a lot of milk), but the cream in the cow's milk became very thin and greatly reduced in quantity. It was nearly impossible to churn butter out of this cream, and it wouldn't even whip up for cappuccinos. After I submitted a desperate query to the Cheesemakers-L discussion group,[4] moderator Julia Farmer said that dairy animals need long-fiber feeds for good production of cream, and that apple pomace wasn't one of them. Another contributor said that someone he got milk from told him that the cream would be thin because the cow had been eating apples. Unfortunately for science, but fortunately for us, we took the calf off the cow, ran out of apple pomace and started feeding some alfalfa cubes – all at the same time; since then the cream has been thick, and there has been plenty of it.

What forages are best? Nearly all sources say a good proportion of leguminous plants in the animals' diet – particularly clover and alfalfa – make the best milk and the best cream. Although goats are primarily browsers by nature, Ginny Tate of Goat Lady Dairy in North Carolina says that they find good quality alfalfa hay to be the most important factor in production of milk from their dairy goats. Alfalfa and clover are said to sweeten the milk, and perhaps they do. Both require a "sweet" (non-acid) soil for best growth, and this factor (calcium or a compound of it?) may be passed along in the milk. Incidentally, late winter is a good time to broadcast clover seed in your pasture, particularly if there is not a lot of plant residue. The freezing and thawing action of the ground helps get the seeds down into the soil for good contact. Some farmers broadcast the seed onto melting snow and allow the moisture to carry the seed down into the soil; you might need extra for birds, though, using this method. Because of its deep taproot, alfalfa is a particularly drought-resistant plant, and will thrive when everything else has wilted away. Frost seeding doesn't work as well with alfalfa, but it's worth a try if you don't have a way to drill it in. Check with your local extension agent for rates and varieties for your area.

Of course everyone knows to keep the animals out of the wild onions/garlic, and only feed turnips and parsnips just after milking. One writer in *Keeping One Cow* speaks of a heavy diet of carrots giving milk a "sharp, unpleasant, bitter taste." In *Principles and Practices of Butter-Making*, the author says that "it is a common occurrence to find that milk delivered by patrons who keep their cows on timber-land pastures has a peculiar weedy odor." It would be interesting to know where that came from! *[How forages affect milk quality is a subject of on-going interest to me and many others. I'd be pleased to hear from anyone who has particular experiences in this area.]*

The milk from animals is also affected by physical factors, including whether or not the dairy animal gets exercise, environmental conditions, the animal's general health, and even treatment by the owner or operator. We'll save for another article the deep details on this subject, but suffice it to say that if your animals get a moderate amount of exercise and are kept in a well-maintained environment, and if they receive humane treatment and good pasture, you will be rewarded many times over with better health and better milk.

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Letter *-- Continued from page 2*

get enough butter I plan on using it. The store also had a great selection of butter molds, two which were made really different, and said they were for hotels. Anyway, you can tell how excited I am about this.

(2) A cream separator – I've been searching for about a year for a used one. I've certainly found them, but with pieces missing and all rusty, not in working order, not even whole until I came upon a different antique store about an hour from me – and there it was, waiting for me. The lady had no idea what it was when I asked about it. It was a whole unit, absolutely nothing missing; no rust, just dirty. It's marked, "Junior" from "the DeLaval Separator Co. No. 4." It's a floor model with a hand crank that has a bell. It even has a place where you could mount an electric motor. For $100, what a find! The butter worker was $250.

(3) Butter mold – my husband bought me a round one-pound butter mold for my birthday. The ones I've found that are round seem to be running $80 and up, but he got this one for $39. Anyway, after I cleaned and sanitized it I tried it out – I made butter and filled it up and stuck it in the refrigerator till it was hard. Apparently that is not the way you do it because you can't get it out very easily, so the next time I tried it I put the mold in ice water, dabbed it on a towel to get the water off and filled it up with butter and then took it out right away, and that worked. I also was able to get a very small round butter mold. I've used it the most because it makes individual-sized butter patties with a design on it – how cute! ...

Marsha Windisch

Dairy Project News – The Small Dairy Project

The pasteurizer is often a limiting factor to small-scale producers, particularly wannabe goat cheese producers, who want to sell their unaged cheeses legally. Appropriately sized pasteurizers start at $7500 and go up from there. The Small Dairy Project has a unique offering for farms in this situation. They have a Pasteurizer Lending Program, in which the farm can borrow a 25-gallon pasteurizer (which costs around $12,000) for six months to see if it works for that operation. The borrower then has the option to buy or lease the pasteurizer. A $1500 security deposit and a shipping charge estimated at $500 are required initially. In addition, the borrower must become a member of the Small Dairy Project ($25) and agree to several other minor requirements. Recently the Project has developed a bottling attachment to go with the pasteurizer, which may be added on at an additional cost of $3200. There is a waiting list for the available loaner pasteurizers. For more information contact Courtney Haase at The Small Dairy Project, HC 65, Box 45, Bradford, NH 03221. Telephone (603) 927-4176. E-mail: nunsuch@conknet.com. Their Web site is at www.haasefam.com/sdp/small.htm.

An ancient churn. *(Illustration from* Principles & Practice of Butter-Making)

Flossie Howard, Buttermaker

A friend, Anne Bossi, recommended that I call Flossie Howard to interview her about her butter operation. Flossie lives in the state of Maine, one of the very few states that allows on-farm sales of unpasteurized milk products directly to the consumer. As mentioned in the main article, Flossie uses an antique hand cream separator for obtaining her cream, and she makes a sweet cream butter, about 20 pounds a week, from the milk of six Jersey cows. She uses a 20-quart Hobart mixer in her licensed kitchen to churn and work the butter two or three times a week. She then uses wooden molds to create "prints" and packs the butter in plastic wrap and quart freezer bags. Flossie gets only about 1½ quarts of buttermilk from ten pounds of butter, so buttermilk isn't a major product for her.

Dairy Sheep – Other Breeds

Last issue contained an article on East Friesian dairy sheep written by Larry Fallaice, as well as an excerpted article on dairy sheep from the American Livestock Breeds Conservancy. Since that time I've come across some interesting information on other sheep breeds that are suitable for dairy production.

First of all, there was an inquiry from WB in Louisiana, on Cheesemakers at ONElist, about sheep that are adapted to the hot and humid conditions of the south. I suggested that she contact the American Livestock Breeds Conservancy, P.O. Box 477, Pittsboro, NC 27312; (919) 542-5704; e-mail albc@albc-usa.org; web page www.albc-usa.org/. These sheep are critically rare, but they are adapted to the heat and humidity of the deep South. I have been told (and it may be a tale) that there were a couple of guys who made a nice artisan cheese made from the Gulf Coast Native's milk but that they ended up moving north to find a place more accepting of their lifestyle. In ALBC's breeders' directory there are only about a dozen breeders of GCN sheep listed, not including zoos and such. Anyone seriously interested should contact ALBC to inquire about breeders.

An unrelated discussion on the same list described the Awassi breed as "definitely a warm climate animal." The Awassi is being studied in Australia for its dairy potential, and apparently there is at least one large herd of them. There is information on this breed at www.uwa.edu.au/ (the easiest way to find the Awassi material is to search "Awassi" on the UWA web search engine). Another way to learn more about both breeds (and many others) is by searching "Breeds of Livestock" at www.ansi.okstate.edu/. This is an excellent web site for learning about all kinds of livestock breeds!

Mary Falk at LoveTree makes prize-winning sheep cheeses that have recently received a lot of media attention. In an e-mail to Cheesemakers, she cautions against milking sheep that are bred primarily for production quantities. According to Mary, "High butterfat gives the sheep milk its full rounded flavor and silky texture. ... You might be trading off the initial greater production of a high end producing animal, but your cheeses will have much greater depth of flavor and intensity of flavor along with a sweetness that only rich milk can produce." Mary suggests looking at Dorsets or local sheep that do well on forage in your region if you are interested in making an artisan sheep cheese.

The government is carefully watching the importation of sheep from other countries because of a disease known as "scrapie," which is similar to mad cow disease. If you want to know more, you can listen to a segment from an NPR program aired December 6 on www.NPR.org by navigating to "All Things Considered" and then the archives for December 6, 1999. The article is entitled "Mad Sheep." There is also information on scrapie on the Web at www.genecheck.com/Scrapie-Index.html and www.fb.org/lci/scrapie.html, as well as www.aphis.usda.gov/vs/scrapie. Archives #288 and 289 on Cheesemakers at ONElist (www.onelist.com) contain a lively discussion on this topic.

Curd Harp Maker Found

Many people have asked where to buy a curd harp. Well, good luck. To find one for use on the home scale or small scale is nearly impossible, and it is difficult to find someone who can make one custom for a reasonable price. However, I have located a fellow in Vermont who has done just that. He uses fishing line for the harp so that if it breaks it is easy to replace. He says his customers have been very satisfied. Dave also does other custom stainless steel projects. You may contact Dave Galisewski at dgal@vermontel.net or by phone at (802) 875-6060. His company is Heliart Design, P.O. Box 87, Chester, VT 05143.

Titratable Acidity (TA) and pH

(Much of this material was taken from an article prepared for the Hometown Creamery Revival by the Virginia Tech Food Science and Technology Department for a dairy processing course offered in 1998)

Once a cheesemaker or buttermaker acquires some experience, it becomes clear that to gain more control over the processes there is a need for objective measurements. Measuring acidity is probably the most important way to ensure that dairy products will have some level of consistency from batch to batch. As someone on Cheesemakers-L pointed out, those of us in the modern age do not have mentors to show us just what the milk or curd is supposed to look or taste or smell like at a certain stage, so it is important for us to measure until we gain that experience ourselves by making our own observations that correspond to the measurements.

The subject of titratable acidity and pH is confusing, to say the least. Both methods measure acidity, but in different ways.

Titratable Acidity

When milk is freshly drawn from the animal, it does not contain lactic acid. However, when titrated with an alkaline solution, it appears to be slightly acid. The acid nature of milk is caused by some of the normal milk constituents. The titratable acidity (TA) caused by these components is referred to as **normal** or **apparent acidity**. The TA is proportional to the solids-not-fat (SNF) content. The normal TA of fresh milk varies from 0.13% to 0.20%, expressed in terms of lactic acid because this is the predominant acid formed when milk ferments. The per cent acidity due to the SNF components consists of: casein 0.05-0.08; phosphates 0.05-0.07; albumin 0.01; citrates 0.01; and carbon dioxide 0.01-0.02. Mixed milk from several herds will contain between 8.6% and 8.7% SNF and have a TA of about 0.15%. Milk with more or less SNF will have a higher or lower TA, respectively. For example, milk containing 8.3% SNF would be expected to have a calculated TA of 0.144%. That is, 0.15:x :: 8.65:8.3.

To solve: $8.65x = 0.15 \times 8.3 = 1.245$

$x = 0.144\%$ TA, expressed as lactic acid

When milk is subjected to conditions of fermentation with the proper microorganisms, lactic acid is produced. The increased acidity caused by the development of lactic acid is referred to as **real** or **developed acidity**. The total acidity is composed of that caused by the normal constituents plus any developed lactic acid of other developed acid compounds. It may be measured by titrating milk with a standard alkali solution to the end point of a suitable indicator.

The test procedure for TA has been standardized so that 0.1 Normal (N) sodium hydroxide (NaOH) solution is used to neutralize the acidity to the end point of phenolphthalein. Phenolphthalein is an indicator which is clear under acid conditions and pink under alkaline conditions. The color change occurs at a pH between 8.3 and 8.4. During the titration procedure, any hydrogen ions that are capable of ionizing a pH 8.3-8.4 will be neutralized by the titer (NaOH). The ions may originate from either the normal milk constituents or those from developed acids.

It is possible to purchase a simple acid titration kit from a winemakers' or cheesemakers' supply place for less than ten dollars. A laboratory titration setup costs $200 and up. To perform a titration (using a wine test kit, which contains everything you need):

(1) With the 20 cc syringe measure out and add to the test bottle 15 cc of milk, cream or whey and pour into the test bottle.
(2) Add 3 drops of indicator solution (phenolphthalein) to the 15 cc test sample.
(3) Fill the 10 cc syringe to the 5 cc mark with titrate solution (NaOH). (More if you expect the acidity to be over 0.5.)
(4) Dispense the titrate solution into the test bottle a little at a time. In the beginning you will see pink on top of the sample, but when you swirl the solution in, the pink will disappear. When you reach the point at which the sample remains pink, stop and note how much solution you used by subtracting the remaining number of cc from 5. That is, if you have 2 cc left in the syringe, you used 3 cc. Multiply by 0.1 and you get 3 x 0.1 = 0.3% lactic acid (acidity). If you have 2.5 cc left, you used 2.5 cc. 2.5 x 0.1 = 0.25% lactic acid.

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Chef's Corner

with Kelly Shepherd

It's one of those scary words to some folks. You know the type – convinced that margarine is better for you. How could anything that tastes like that be good for you? I'll take my chances with butter – at least I can pronounce the ingredients. People have been eating butter since at least 2000 B.C.

Made mostly from cow's milk, butter can be made from sheep, goat or even mares' milk. Himalayan tribesmen make butter from yak milk and use it in their hot tea. Clarified butter, known as ghee, is widely used in India and Egypt. Ghee is made by melting butter and pouring the fat away from the milk solids, which are then discarded. This results in a product that doesn't spoil as readily and can be kept at room temperature.

Butter was made on the farm until 1850, but is now almost always factory-made. It should have uniform color (Colonial housewives colored their butter with carrot juice), it should be dense and taste clean. Butter should not be wet, the consistency should be smooth, and the butter should melt readily, without too much spattering (lots of spattering on initial melting means there is an excess of water or buttermilk in the butter). When I make butter, I never put salt in it – I think salt masks the fresh flavor. When buying butter from a grocery, purchase a good brand, at least AA grade, preferably unsalted. Butters vary in saltiness – too salty is awful! For long-term storage, butter freezes really well.

Enough talk. Let's get to the recipes. I've chosen some classics that are particularly buttery. Don't worry, eating them once in awhile won't kill you. *(Might even be healthier – see box on page 3 – Vicki)*

Chicken Kiev

(serves 6)

This recipe is a Russian classic. The chicken will squirt butter when pierced! (Anorexic fashion models beware!)

3 whole boneless, skinless chicken breasts
salt & pepper
2 Tbsp. chopped fresh chives
6 Tbsp. unsalted butter, cut into six finger-sized pieces and frozen hard
½ cup flour
2 eggs, lightly beaten
1½ c. fresh bread crumbs
vegetable oil for deep frying

Method: Divide the chicken into six equal pieces. Flatten each to about ¼" thickness. Do this between two sheets of waxed paper with a rolling pin to avoid tearing the meat. Discard the paper and lay breasts out, boned side up. Season with salt and pepper and sprinkle with chives. Place a finger of frozen butter on each breast half. Roll up meat to enclose butter completely, tucking in ends as you go. Dip rolls in flour, then beaten egg, then crumbs. **Chill at least three hours.** Heat the oil in a deep skillet, deep enough to submerge the chicken pieces. Heat oil to 365° F on a deep-fry thermometer. Fry until golden brown and serve immediately.

Grasmere Shortbread

A wonderful recipe from Scotland. (Makes about 24 pieces) The recipe is from a British book, which gives amounts in ounces rather than standard U.S. cooking measures.

12 oz. all-purpose flour (about 2¼ cups)
1 ½ tsp. ground ginger
¾ tsp. baking soda
6 oz. butter, chilled (1½ sticks)
6 oz. turbinado sugar (¾ cup)

Buttercream:
4 oz. butter, softened (1 stick)
8 oz. confectioners' sugar, sifted (½ box)
1 tsp. ground ginger
3 tsp. chopped candied ginger

Method: Preheat oven to 350°. Grease a 9" x 13" pan. Sift the flour, ginger, and baking soda into a bowl. Cut the butter into small pieces. Then, with a pastry blender (or fingers), cut the butter into the flour mixture until the mixture resembles coarse crumbs. Add sugar. Put ¾ of the mixture into the baking pan and press into an even layer. Scatter the rest over the surface to make a crumbly topping. Use a knife to mark into fingers or squares. Bake in preheated oven for 35-40 minutes or until pale golden. Cool slightly, then cut along marked lines. Leave in pan until cold.

To make buttercream, beat the butter until creamy. Gradually add confectioners' sugar and ground ginger, then add chopped ginger. Use to sandwich together pairs of shortbread fingers or squares. Once assembled eat within three days.

Butter Resources

Glengarry Cheesemaking & Dairy Supplies
RR#2
Alexandria, ON
Canada K0C 1A0
(613) 525-3133; http://glengarrycheesemaking.on.ca/

Dairy Connection (cultures and ingredients)
8616 Fairway Place
Middleton, WI 53562
(800) 810-0127; www.dairyconnection.com

Hoegger Supply Co.
P. O. Box 331
Fayetteville, GA 30214
(800) 221-4628

Lehman's
One Lehman Circle
P.O. Box 41
Kidron, OH 44636
(330) 857-5757; www.lehmans.com

New England Cheesemaking Supply
P.O. Box 85
Ashfield MA 01330
(413) 628-3808; www.cheesemaking.com

Winchell (custom commercial butter churns)
P.O. Box 57
Elroy, WI 53929
(608) 462-8456

Books

With few exceptions, modern books with butter as the main topic are very hard to come by. Some of the older books referred to in this publication may be found by searching on-line used book services. Some of the best services I've found are Bookfinder (www.bookfinder.com) and Barnes & Noble (www.bn.com -- click on "Out of Print").

TA and pH *-- Continued from page 7*

Remember that not only lactic acid is measured, but this is just the way the results of this particular test are expressed. There are other ways to express acidity; one you may see is degrees Dornic. The same solutions are used, but the strength of the phenolphthalein solution differs. The results of 0.25% acidity noted above would equal 25° Dornic. Most recipes, however, use percent lactic acid.

pH

pH is defined as the log of the reciprocal of the hydrogen ion (H^+) concentration expressed in grams per liter of solution. *(At this point my head starts whirling like it did in college chemistry.)* The (H^+) concentration may be expressed either by colorimetric (pH paper) or potentiometric (pH meter) methods. Accurate determination is best made by the latter. This method measures the difference in potential or voltage of two electrodes in a sample of the solution. One of the electrodes is a reference electrode with a potential independent of the solution tested. The other electrode is affected by the solution. The difference in potential of the two electrodes causes a voltage or current that can be measured by the potentiometer (pH meter). This instrument is designed so that pH is read directly from its scale or digital readout.

At times pH is a more useful and convenient measure than titratable acidity. pH monitoring is useful in determining the optimum pH for cutting cheese curd, or for moving on to some other step, such as cheddaring and milling in cheddar cheese or stretching of the pasta filata type cheeses (mozzarella, provolone, etc).

Accurate pH determination requires a properly maintained and calibrated meter fitted with the proper type of reference electrode. For most dairy products the calomel reference electrode is recommended. At the American Cheese Society conference I asked Dr. Paul Kindstedt ("Mr. Mozzarella") about what type of electrode is best. He suggested making sure to get one that compensates for temperature. He also suggested a spear-tip for measuring actual curd pH. However, it's difficult to get all these features in one electrode. The variety of electrodes is overwhelming, and consulting with a technical support person at the supply house might give you the best results. The condition, care and handling of electrodes directly affect the accuracy of pH measurement. Follow manufacturers' recommendations to condition and calibrate your meter and electrode, and never let the electrode dry out. Rinse electrodes with distilled water between samples and calibrations. When working with samples containing fatty substances it might be necessary to clean the electrode bulb with hexane or a mild soap solution, followed by a water rinse and blotting (not wiping) to dry.

Standardization or calibration should be done frequently. Turn on the meter half an hour prior to use in order to stabilize it; it is best to leave the meter on rather than turning it off between measurements. The meter should be standardized with uncontaminated buffer solutions (provided with the kit). Different meters require different procedures; follow the manufacturers' instructions. pH meters may be obtained from: Cole-Parmer (888-409-3663, www.foodtechsource.com) or Nelson-Jameson (800-826-8302, www.nelsonjameson.com), or one of many other laboratory supply companies. Both these companies will send you their large catalogs for free. Both also sell pH paper, useful on a home scale.

So, what is the relationship between TA and pH? Good question. Recipes for cheese may use one or the other or both! For that reason it is good to be able to measure either one, and it is relatively inexpensive to purchase pH paper and a TA kit. (When purchasing pH paper, try to get as narrow a range as possible so that it will be more accurate. You need a range of about pH 4 to 7 for cheesemaking.) There is no direct relationship between TA and pH. Steve Tate of Goat Lady Dairy told us that if he has a recipe that gives the TA, he calls up his dairy consultant and asks for a pH to go by, since Steve prefers to use his pH meter.

Here is a portion of an explanation given by contributors to Cheesemakers-L discussion group: "Titration is a clumsy way (but sometimes the only way) of getting to a given pH. Measuring pH tells you where you are, and can be used to tell you how to get to a different pH if you know what you're working with." "pH is the balance between acid and base in your solution. If there's the same amount of acid as base, the pH is 7.0. The scale measures from 0.0 to 14.0. A pH of 0 is like a seesaw with the acid side on the ground (more acid, or heavier on that side). A pH of 7 is balanced in the middle, and a pH of 14 has the base side resting on the ground. But pH doesn't tell you how much weight is on either side of the seesaw. A balanced seesaw could have no weight on either side, or it could have ten thousand tons, as long as

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Buttermaking --Continued from page 4

Separating the Cream

Once you have the milk, it's easiest to make butter from cream. People have been known to churn whole milk, but this practice places a heavy demand on your resources – time and churning power, in particular. Depending on the type of animal you have, it is more or less difficult to separate cream from whole milk. Goats and sheep produce a naturally homogenized milk that is most easily separated using a cream separator, but at least one source says that goat milk can be separated using the shallow pan method. The fat globules of cow milk are larger and separate from the milk and aggregate naturally upon standing.

There are three primary methods for separating cream from milk: **shallow pan, deep setting** and **mechanical**.

The shallow pan method consists of a large, shallow pan inside another, slightly larger shallow pan. Very fresh, clean milk is poured into the inner pan and cool water runs through the outer pan, with the object of removing animal heat and keeping the milk at about 60-62°. In about 30-36 hours (goat's milk may take 72 hours[5]) the cream rises to the top and is skimmed off. Cream separated in this way should be used as soon as possible, since it will already be several days old at relatively high temperatures. An interesting variation of this method is making Devonshire cream (see box, p. 12).

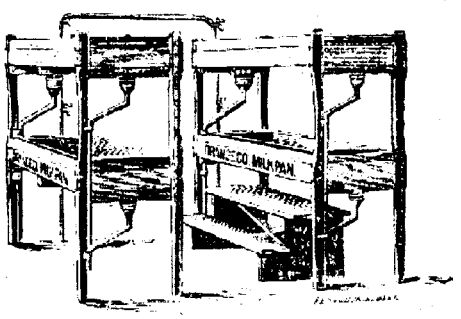
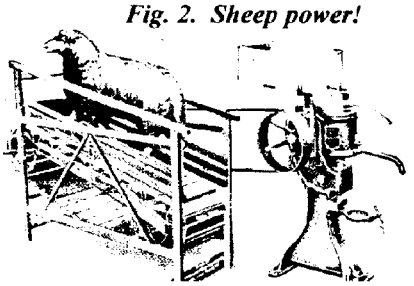


Fig. 1. A shallow pan separator.

The deep setting method was considered to be an improvement in separating cream via gravity, in that less milk was exposed to the air, keeping it cleaner, and removal of the cream was more thorough. A device known as a milk can cooler was popular for deep setting – this was basically a refrigerated tub in which cans of milk were set while the cream separated, with cooled water flowing around the cans. Springhouses were also popular for separating milk, since spring water is generally around 55°. In principle, the deep setting method is what you are using when you place jugs of milk in the fridge and the cream rises. It's just a different cooling method. Again, the cream is dipped off the top with a ladle; in some cases the can may have a spigot on the bottom for removing the milk. (You can purchase large glass jars for making sun tea that will serve this same purpose. I've found, though, that it's easier to dip the cream off the top with a gravy ladle than it is to get the cream out of the bottom of the jar.)

Centrifugal mechanical separators came on the scene in the mid-1800s, and this principle has been in use for separating the components of milk ever since. They were very popular toward the end of the century and were instrumental in the development of the small crossroads creameries, where farmers could take their cream to have it made into butter. Both hand-cranked and electrical separators were developed, and some inventors developed unique ways to power their machines (fig. 2). As mentioned before, many old cream separators are still around, but few can be found with all their parts and in good condition. Flossie Howard, a buttermaker in Maine (see box on page 5), said that a person must be very careful when buying an antique separator for farm use. She and her husband once found one that looked very nice and had all the parts, but they insisted on trying it out first. They were glad they did, because something inside the machine was "frozen" and, although the crank would turn, the separator did not work. She said the hand crank separator she eventually purchased has 16 disks that must be inserted in the right sequence or milk will "fly everywhere." One writer speaks of an early model separator that "blew up" and shattered, killing seven people. Occasionally cream separators are available on e-Bay auctions (www.ebay.com), and it's also possible to find instruction books (sold separately). Flossie said that they were able to get a replacement gasket that they needed, but availability of replacement parts is another consideration. Also, if the bowl is rusty, it may have to be re-tinned.

Fig. 2. Sheep power!



Continued on page 12

Devonshire Cream

Allow fresh milk to stand in a large shallow pan overnight or for at least six hours, until the cream starts to rise. Then place the pan on very low heat – as low as you can manage it – and heat the milk over a period of several hours. Do not allow the milk to boil. The cream on the surface will appear wrinkled and leathery, and the milk should be thoroughly hot. Carefully remove the pan from the heat (or just turn the heat off) and allow the pan of cream to cool for 24 hours. Skim the cream, which will be very thick, and serve. Devonshire cream is used much like butter is.

Buttermaking *--Continued from page 11*

What Next?

That depends on whether you want to make sweet cream butter or sour cream (cultured) butter. Sweet cream butter can be churned immediately, but sour cream butter requires an extra step – souring or culturing. If you have used the shallow pan method of separating, the cream is already three days old and likely has begun to sour. If separated in jars in the fridge, the cream may have begun to develop acidity (sour) by the time it has separated, but you may want to take it a step further.

Pasteurization

At this point you choose whether to pasteurize or not. If you are using cream that comes from someone else's animals and you do not know the conditions on that farm, pasteurize. If you want to make butter for sale in most states, you must pasteurize. Low-temperature, long-time pasteurization (145° for 30 minutes) results in the least damage to the flavor. If it is your own cream and you know it is fresh and clean and your animals free of disease, you may choose to use unpasteurized cream. Chances are, you are already consuming the milk without pasteurization anyway. If you do choose to pasteurize, you must cool the cream to at least 90° before adding starter (for cultured butter).

Sources of illustrations for "Better Butter" article:
Fig 1. X. A. Willard, Willard's Practical Butter Book (New York, 1875), p. 126.
Fig. 2, Fig. 4, & woman separating cream. G. L. McKay, C. Larsen, *Principles and Practices of Butter-Making* (New York, 1908).
Fig 3. Butter paddles from Lehman Non-Electric catalog.
Photo at Maple View Milk Company by Vicki Dunaway.

Cultured or Sour Cream Butter

It sounds complicated, but cultured butter is really very simple to make. Basically, once the cream is separated it must be allowed to set for a period of time to "ripen" or sour. This process produces what were once regarded as "typical" butter flavor and aroma, caused by the development of certain acids. The setting time depends on several factors: the freshness of the cream, whether or not a starter is used, the temperature of the room where it is ripening, and personal taste. If you are using natural separation (cream skimmed off the top), the milk is several days old and the cream is already developing some acidity; thus, it will not need to ripen as long as cream separated by machine shortly after milking, all other factors being equal. You may use a starter – a mesophilic starter culture, buttermilk from a previous batch, or a freeze-dried DVI (direct vat inoculation) starter – or you may just allow the cream to ripen on its own from the natural flora that come from the barnyard. The latter method is risky, particularly in summer. Adding a starter of some kind is mandatory for producing cultured butter from pasteurized cream because there are no good organisms remaining in the cream, and contaminants will make it spoil (not sour).

We use either #831 or #911 starter from Dairy Connection.[6] According to Dairy Connection's catalog, "The DPL 800 and 900 Series all contain various strains and combinations of *Lactococcus lactis* subsp. *lactis*, *Lactococcus lactis* subsp. *cremoris*, *Lactococcus lactis* biovar *diacetylactis* and *Leuconostoc mesenteroides* subsp. *cremoris*." #831 is supposed to give good diacetyl development; diacetyl is an important constituent in butter flavor. The 911 culture gives somewhat thicker buttermilk. These freeze-dried starter cultures are especially formulated for butter and buttermilk and are very easy to use – just stir a little, maybe 1/8 tsp., into a half gallon of cream, and then set the cream out at room temperature to ripen. We usually ripen our cream in the jar for the butter churn, but any Mason jar will do. You can also use these cultures in whole milk to make whole milk cultured buttermilk.

You may prefer to use ¼ cup of prepared mesophilic starter culture or buttermilk per quart of cream. Mesophilic cultures are available from most cheesemaking supply companies, and many have a culture particularly for buttermilk. If you have made a good batch of butter-

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Buttermaking *-- Continued from page 12*

milk previously, and it is still in good condition (without a moldy smell), that will work perfectly fine. Even some store-bought buttermilk will work (experiment!) if its good bacteria haven't been killed off. Avoid ultrapasteurized buttermilk. It has nothing in it that will help your process.

Once you have added your culture, find a spot that will stay in a temperature range between 55° and 75° F. (60° to 70° is preferable). A root cellar works well (be sure the cream is covered!) in the summertime. If you don't have access to a spot that temperature, you can still ripen cream, but in warmer temperatures it will not need to set as long; at low temperatures souring is slow. According to *Principles and Practices of Butter-Making*, "Well-ripened cream gets an apparently granular and glistening condition. It has a pleasant, mild acid taste, and a good clean sourish aroma."[7] It takes some experimentation to determine how ripe you like your cream; it's an entirely personal thing. As David Puckett of the Hometown Creamery Revival says, "Some folks like it so sour it curls your toes!" Most Americans are completely unaccustomed to cultured butter, which has not been generally available to the public for many years. We've tried allowing our cream to ripen as long as three days – in three days we got a pretty powerful butter! It was not rancid or bad, just very strong. Twenty-four to 36 hours seems to be a good length of time. You can also measure acidity to determine more scientifically the stage at which to churn. In *Butter*,[8] dated 1939, an acidity of not greater than about 0.30 is recommended for best keeping quality. Interestingly, the 1918 *Book of Butter* states, "Some markets call for butter made from cream with an acidity of approximately .4 per cent, and others call for .5 to .6 per cent acid."[9] Apparently tastes were changing (or being "guided") toward sweet cream butter, which has a churning point acidity of about 0.13 to 0.16.

Coloring

If you are making goat butter, or if it's mid-winter and your cream is very pale, you may wish to add coloring. This is best added just before churning, but may be worked in with the salt later if you forget. Generally annatto, the seed of a tropical tree (*Bixa orellana*), available from cheesemaking supply companies, is used for this purpose in small amounts. Annatto is used in very small quantities, just a few drops per pound.

Churning

At last you are ready to churn. Churning is simply the mechanical agitation of the cream that causes the aggregation of fat (butter), releasing the serum (buttermilk) from it. There are many ways to churn butter. You can simply fill a Mason jar half full of cream and shake it with a rhythmic motion until the butter "comes." (Charley says you are supposed to sing "Come, butter, come" as you do this or any other churning.) This is a great activity for young children. On a larger scale, a variety of types of churns are available, from one-gallon glass jar hand-crank churns to giant machines that make butter in a continuous flow. As noted in the article on Flossie Howard, it's also possible to make butter with a mixer.

It is best to have your cream at around 60-62° when you are ready to churn. (Mary Jane Toth says 55° for goat butter.[10]) Lower temperatures lengthen the time it takes to churn; higher ones may result in greater loss of fat to the buttermilk, as well as soft, difficult to work butter. Ripened cream generally takes less time to churn than sweet. Count on about 20-45 minutes to churn a batch of butter. As you churn, the cream will go through changes; it will become foamy, then like thick whipped cream. At this point the churn may become a little harder to turn or shake. Suddenly, the butter begins to "break" and small granules of butter become visible. Churn gently until the granules are about the size of corn kernels, but not more than an inch in diameter. At this point, stop and pour off the buttermilk through a strainer (preferably into a jar for future use). Some sources advise suddenly pouring cold water into the churn as soon as the small granules begin to form, which is supposed to give a better texture to the butter, but I've never had the heart to ruin the buttermilk this way.

I should mention here an unusual churning process that we witnessed at Maple View Milk Company in North Carolina. Maple View has established a very successful on-farm bottling and processing plant, and one of their products is butter. Because of the high cost of a churn, they found a different, cheaper way to agitate the cream that works quite well. They add starter in the evening and ripen the cream about eight hours in a 250-gallon bulk tank. (The aroma of that cream at 3 a.m., the time they start churning, is heavenly!) Then they pump the cream out of the bottom of the tank and rapidly back into the top, creating a mild agitation which, in about 45 minutes,

Continued on page 14

is enough to make butter (above). Because the area of the pump outlet is small, it is necessary to stir the cream fairly continuously, but it works amazingly well. The only problem I saw with this method was that the butter was very soft and difficult to work and this left a lot of moisture in the butter, but veteran buttermaker David Puckett felt it could be done at a lower temperature, or the butter chilled with colder water.

Washing

Once the buttermilk has been drained off the butter, the butter should be washed with cold water. There are varying opinions as to how cold the water should be – some say ice water and others say that water that is too cold ruins the texture of the butter. We use our cold well water from the tap, and we get very nicely textured butter. Water too cold will make for difficult working.

A note about water: water used to wash butter should be as clean and pure as possible. Chlorine, fluorine and other contaminants will affect the flavor of the butter, if only slightly. Using contaminated water may cause the butter to go bad quickly; this may be the case with spring water where animals are allowed near the spring. Use the best water available for the best butter.

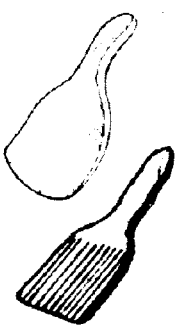

Fig. 3. Butter paddles

Most sources agree that a couple of washings are enough to get the large part of the curd (casein) and the buttermilk out of the fat. The suggestion is to use as much water as the amount of buttermilk poured off. Churn a bit more in the water and pour the first washing off; repeat. For small amounts, you can put the butter in a bowl after draining off the buttermilk – a pottery bowl with somewhat rough-textured sides works nicely – and then pour the water over it, working the water through the butter with a wooden paddle or large wooden spoon. The second wash water should be somewhat clearer, and the butter should not appear too moist.

Salting

After the butter is washed, salt is added if desired. Recommendations for the amount of salt vary. It was noted in a history of cheesemaking in New York that Southern butter patrons preferred highly salted butter, while those from the North liked theirs lightly salted, and Europeans did not want their butter salted at all! The average amount is about an ounce to a pound of butter. Sprinkle salt over the butter before working. Salt must be thoroughly worked in to prevent mottling and other problems. (Mottling -- the presence of light and dark areas in the butter -- is caused by other factors, too. Mottles may also be present if too much casein is present because buttermilk is retained in the butter.)

Working

Some larger churns contain "workers" so that the whole process is relatively automatic. (Follow manufacturers' directions, of course, when using a commercial churn.) Separate butter workers were also popular at one time; the butter worker consisted of wooden table with a lever or roller that was used to press the butter and squeeze out moisture. I've never seen a modern version of this. On a smaller scale, butter can be worked with butter paddles (see fig. 3), available from dairy supply companies, or large wooden spoons. Some prefer to use their hands (disposable gloves recommended for butter for sale). The butter is pressed with the paddles or hands until very little moisture can be expelled and

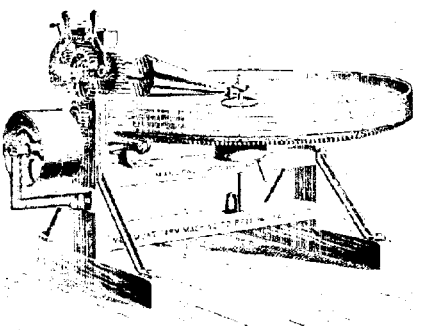

Fig. 4. A table butter worker

Continued on page 15

Buttermaking -- *Continued from page 14*

there are few holes. Take care not to overwork, but get as much moisture out as possible, because trapped moisture and casein are ideal places for organisms to thrive. It also makes the butter spatter too much when melting, and gives it undesirable properties for cooking. The legal limit for moisture in butter is 16%.

Printing and Molding

See Marsha Windisch's letter (p. 2-5) on printing butter. I've never tried it. In most places wooden butter prints and molds cannot be used for commercial butter because wood is considered unsanitary. *[I'm looking for an article by Jane Brody of the New York Times that discusses cutting boards -- nylon versus wooden -- and references some scientific experiments that found that wood was much safer. Can anyone guide me to this?]* Candy molds make nice little butter pats, and one could experiment with other kinds of molds for butter sculptures.

Other packaging and storage

We pack butter into plastic tubs and, if it's not for immediate use, we freeze it. Butter freezes very well. Some of the older books say to pack the butter (for your own use) into crocks and to never refrigerate it because refrigeration results in an irreversible crystallization. Commercially, the plastic tubs are convenient and easy to pack. Of course, butter can also be cut into blocks and packaged in wax paper as found in the grocery store. It will just taste better!

Footnotes

[1] ClaireTotman, G.L. McKay, and Christian Larsen, *Butter* (London, 1939), p. 108-110.
[2] G. F. W. Haenlein and R. Caccese, "Goat Milk versus Cow Milk," *Extension Goat Handbook*, fact sheet E-1, 1984.
[3] Henry E. Alvord, "The Village Cow in New England," in *Keeping One Cow* (New York, 1906), p. 45.
[4] http://members.xoom.com/cheesemaker/Cheesemakers-L.htm
[5] E. Annie Proulx & Lew Nichols, *The Complete Dairy Foods Cookbook* (Emmaus, PA, 1982), p. 173.
[6] 8616 Fairway Place, #101, Middleton, WI 53562. (800) 810-0127. Web site: www.dairyconnection.com.
[7] G. L. McKay, C. Larsen, *Principles and Practices of Butter-Making* (New York, 1908), p. 210.
[8] Totman, McKay, Larsen, p. 184.
[9] Edward Sewall Guthrie, *The Book of Butter (New York, 1918)*, p. 165.
[10] Mary Jane Toth, *Goats Produce Too!* (Coleman, MI, 1998), p. 17.

TA and pH -- *Continued from page 10*

both sides are equal, the seesaw will be balanced. (pH tells you the position of the seesaw.) The reason we need the titratable acidity concept is that if you have a neutral solution and you want to make it have an acid pH of 5 (as an example), you have to overcome the resistance of the solution to change. Milk is "buffered" – that means its pH is kept the same by the salts in the solution. Those salts combine in various ways to resist the pH change. If you have a small amount of resistance to change, you only need a little acid to make the pH more acid. If you have a lot of resistance to change, you have to add a lot of acid *[or allow more acidity to develop- ed.]* to make the change happen. So you start with an acid solution and add base in measured amounts. When the change to pink is just barely visible and doesn't go away with stirring, the amount of base you added corresponds to the amount of (excess) acidity that was in the sample before you messed with it. Since you know the volume of the original solution and the volume of the sample you took, you can use the amount of (excess) acidity in the sample to extrapolate how much acidity was in the whole pot or vat, and correct it accordingly (you don't have to correct it all the way to balanced - you go to whatever pH is desired.)"

There was more to this discussion, but that is the basic idea. Thanks to Elisabeth Faulkner, DVM and Robert Cantor for these explanations.

You don't have to understand the whole concept to use the measurements. Once you learn how to use a pH strip or meter, or to perform a titration, you will be able to follow the recipes with more confidence. ⌘

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Whey Butter

For the particularly thrifty, it is possible to make butter from the fat left in whey. This might be one option to get a little butter from goat and sheep milk for those who don't have a separator. Some fellow in 1895 apparently had nothing else to do and "calculated that if all the whey in New York were skimmed, there would be a saving of 4,776,598 pounds of butter in one year, which at twenty cents a pound amounted to a loss of fifty cents a cow."[1] Apparently whey cream butter was often considered inferior and received a lower price (and in some cases was used as a machine lubricant), even though on judging it received grades comparable to regular butter. After cheesemaking was finished, the whey was run through a separator and the fat saved. In factories it was standardized to a specific fat content and then churned. (I do not know if whey butter is still made.) Apparently it takes 50-70 gallons of whey to make a pound of whey butter.[2] Charley read about whey butter and decided to try it. He hand-skimmed a half pint of cream off the top of whey and made a couple tablespoons of butter in a jar. It wasn't bad, but this is not a task for the timid.

[1] Edward Sewall Guthrie, *The Book of Butter (New York, 1918)*, p. 211.
[2] Avice R. Wilson, *Forgotten Harvest* Wiltshire, England, 1995), p. 145.