Whole Milk Ricotta

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Background

As a class expedition for this year, the eleventh grade at Doulos Discovery School had the opportunity to make cheese. To get information about how to make cheese we got to research, read documents about cheese and also we had to go on some field trips out of campus such as “Delicias Colombianas”, a place where the Colombians make yogurt and to “Queso Marte”, a cheese factory. In both of our field trips we got to know their sanitation procedures that they follow and the process of how they made their product. From going to a cheese factory and yogurt factory, we got to see very clearly the differences of how the cheese and yogurt are made, because it is important to know that both come from milk but they are not done in the same way, because cheese is done with the curds from the milk, it doesn't uses the whey or the water of the milk, and the yogurt uses everything from the milk it just had a process that makes it thicker, like another type of starter different from the cheese.

If you are working with a person, it is important to know that person well in order to trust him or her and know how they will react in certain situations. It is the same if you are working with milk. It is really important to know about the milk. The Webster's New World Dictionary of the American Language defines milk as a white liquid secreted by special glands of female mammals for sucking their young (382). The components of milk are water, (that is what the whey is mostly made of), carbohydrates (that is the lactose or the sugar on the milk), fat, proteins, and some minerals and vitamins (Cornell University, nutritional components in milk, http://www.milkfacts.info). Cheese basically doesn't uses the water from the milk, because it is the whey, it uses the lactose, and the protein from the milk that once you add the starter to the milk it becomes solid which we call curds.

Now that we know what milk is composed of, we can trust it to make our cheese, because we know that it is not poisonous and can give sugar, minerals and vitamins to our body. One of the first things that we have to do on starting to make our cheese is the pasteurization of the milk, that is the process when the milk is heated up to a prescribed temperature for a special time to kill the harmful bacteria in the milk leaving the beneficial bacteria alive and also preventing it from recontaminating again. It is good because it is safe for human consumption by destroying all bacteria that may be harmful to health (pathogens) (www.foodscience).

After the pasteurization, the next step is adding the starter to the milk to convert the lactose or the sugar on the milk to lactic acid to produce controlled ripening (Carrol, 43). Keep in mind that not all cheeses use the same type of starter. We can use citric acid as the starter as in our experiment to make the Whole Milk Ricotta Cheese. While the milk is ripening we have to keep in mind and make sure that the milk is at the right temperature, because it provides the proper levels of acidity required for successful home cheese making, also if the temperature is too low while the milk is ripening, it may not be warm enough to allow starter to grow(Carrol, 62). While we are heating the milk we can do it in two ways, directly on the stove or indirectly by placing the pot of milk into a bowl or sink full of hot water (this way is also to prevent it from burning or to make the milk heat up all at the same rate. Another step that is also taken and that is not required always for all the cheeses, is adding the rennet, to "cause the protein portion of the milk to precipitate out of the solution to become a-solid white custard like mass called curd" (Carrol, 45). After the whey and the curds are completely separated, for some of the cheeses it is required to cut the curds in order to let the rest of the whey that is still between the curds go out, then we have to put the curds to drain in butter muslin for the amount of time that the cheese requires. Keep in mind that some of the steps mention here might vary in the type of cheese you are making. The bacteria of the milk is what, in the ripening process makes the curds form, because the rennet by it-self, without the

bacteria, is not sufficient to make the curds. So the temperature and the pH of the milk does impact the growth of the bacteria on the milk because depending on the circumstances that the cheese is done, like with different temperatures the flavor of the cheese will vary and also depending on how acidic it is (Bacteria in Cheese, http://www.oldandsold.com/articles32n/bacteria-12.shtml)

An important thing that should be kept in mind is the measurement of the pH of our cheese. The pH measures the concentration of hydrogen in a solution, it tells us if a solution is an acid or base. The pH scale tells us the concentration of Hydrogen. In an acidic solution the concentration of hydrogen is greater than the concentration of OH, in a basic solution the concentration of hydrogen is less than the concentration of OH, and in a neutral solution both concentrations are the same. The pH scale is labeled from 1 to 14, where seven is neutral, the numbers less than seven are acids and the numbers greater than seven are basic. The pH of a solution can be measured with litmus paper, an indicator, or with a pH meter, which was what we used to measure the pH of our cheese. It is important to know the pH of our cheese because if our cheese is very acid the cheese can taste sour and can leak whey during the aging process, and if our cheese is very basic or has a pH greater than seven it can have little flavor and the curds might not separate very well (Carrol, 42).

Finally, another thing that we have to keep in mind during the whole process is our cleanliness, because the health precautions that we take can make a big difference in the result of our cheese. One of the things that we did to protect our selves and our cheese from contamination is that we wore gloves, and we sterilized everything, like all the tools or dishes that we were going to use with bleach or boiling water. All these steps can seem very difficult or hard to follow, but if we do everything step by step and with patience, at the end we can get the results that we want. It is interesting that we know how to make cheese, but, do we really know how was cheese invented. There is some data proving that the first cheese was made in the Middle East, Europe or Central Asia before the Roman times. There is one source that disestablish that cheese may have resulted from a method of storing milk, and mostly most of the containers to storage things in the late times

were made from stomachs of animals. Stomach contains rennet, and if milk is stored in a stomach container the rennet from the stomach might have curdled the milk and turned it to curds and whey, so that is what some people think that the first cheese was made or discovered (Bowlman, 1).

Hypothesis

What would the Whole Milk Ricotta Cheese look like?

This is the first time I have ever heard about this type of cheese so I imagine that this will be kind of creamy or very soft because of its name 'Whole Milk Ricotta'.

Ingredients/Materials

- 1 whole gallon of
- milk
- 2 teaspoon citric
- acid
- Teaspoons
- Big spoons
- One medium pot
- Stove
- Clock/Timer
- Colander
- Butter Muslin
- Gloves
- Thermometer
- pH meter
- An small bag to put the cheese once it is done

Hazards

- Make sure the clothes you are wearing are clean.
- Sterilize equipment.
- Be careful not to get burned with the hot milk by using hot pads.
- Milk could probably fall to the floor- clean it immediately so it won't be slippery.
- Only people cooking are allowed around the cooking area.
- Clothes might burned or get damaged by something spilled, try not to use any type of loose clothes.
- If hair is not worn back it can fall into the milk, wear your hair to the back or had it cover with a hat or something else.

Procedure

- Dilute the two teaspoons of the citric acid in ¼ cup of cool water and then add it to the milk that is in the pot.
- Heat the milk directly in a large pot to a temperature between 185°F to 195° F.
- When the curds and the whey have separated (make sure there is no milky whey), turn off the heat.
- Let set for 10 minutes.
- Line a colander with butter muslin.
- Put the curds in to the colander to drain.
- Tie the corners of the muslin into a knot and hang the bag to drain for 40 minutes.
- After it was drained we ate a little to taste it, and the rest of it we put if on the refrigerator to use it later.

Data Table

Type of cheese	Date Made	Type of Milk	Amount of Milk
Whole Milk Ricotta	03/03/11	Cow milk/ pasteurized	1 Gallon

Citric Acid

Type of Citric Acid	Non GMO Lot #6024336
Amount of citric	2 teaspoons
Time at adding the citric	8:40am
Milk temperature at the time of adding the citric acid	About 40°F to 45°F

Time of draining the curds	Started at 11:00am till 11:40am (40 minutes in total).
Date of first bite	03/03/11

Comments and observations

- We added 1 teaspoon diluted in ¼ cup of cool water of citric acid into the milk.
- We poured the milk into a large pot and on the stove.
- Now its heating, (not really high fire because it can burn, and not really low because it can take too long).
- Stir constantly.
- Milk has to heat up between 185°F to 195°F.
- At the temperature of 185°F the curds were not separating, (they were supposed to be separating at that point).
- At a temperature of 191°F the whey and the curds was a little separated.
- We had to mix another teaspoon of citric acid with ¼ of cool water, because the curds and the whey were not separating, and we began adding this a teaspoon at a time after 1 hour.
- The milk is at a temperature of 199°F and they still haven't separated.
- We started to add a teaspoon of the other mix we made of the citric acid and water.
- The temperature went back to 195°F.
- Its separating!
- It is starting to separate at a temperature of 194°F.
- We added one more teaspoon of the diluted citric acid, it seems to help (we think that the problem was that the pH from the milk was less than what it was suppose to be at the beginning).
- At a temperature of 191°F it had a pH of 5.1.
- The temperature came down to 184°F.
- When it was with a temperature of 185°F, we added another teaspoon.
- Finally we decided to add the whole ¼ cup of the diluted citric acid.
- At a temperature of 184°F we turn the stove off.

- We let it rest for 20 minutes, and then we poured the curds into the butter muslin and we let it drain for 40 minutes. The whey was suppose to be clear but it wasn't, because the citric acid did not react as it was suppose to so because of that we didn't had a very big yield because the curds and the whey did not separate completely.

In general, we observed that when the milk got to the temperature it was suppose to reach with the ¼ cup of water with the teaspoon of citric acid diluted in it, the curds were not separating from the whey, so we needed to double the portion to two teaspoon of citric acid to have the reaction. One reason that we thought that could be was that when the milk was been pasteurized, it heated up more than it was suppose to, or it didn't had the right pH.

Conclusion

From the result that we had, one question that came up to our mind was, What would happen if we use heavy cream? Because the heavy cream was in our ingredients but it was optional. We think that if we had use the heavy cream the curds would've be better, like more solid and with bigger yield. Another thing that we observed while making our cheese, was that from the moment we added the citric acid diluted in the ¼ of water and put it on the stove to get the temperature it was suppose to reach (between 185°H and195°F), for the curds to separate from the whey, it took more time than it was suppose to.

We think that one of our errors was that when the milk was been pasteurized it heated more than it was suppose to, so maybe it interrupted the process of the division of the curds from the whey. One of the things that we could have done maybe to have a bigger yield was to stir the milk often not always, because the constant stirring might had caused the curds to break, because for one time we stop stirring and some curds began to start forming but once we continued to stirr to prevent the milk from burning on the bottom, the curds began to break, so that is one of the things we can do for the next time, we can cook the milk indirectly, and stir less.

Work Cited Page

- Bacteria in Cheese. 1897. Old and Sold, 1897. March 21, 2011. http://www.oldandsold.com/articles32n/bacteria-12.shtml.
- Carrol, Ricki. Home Cheese Making. United States. Storey publishing, 1982.
- **N**utritional Componets in Milk. February 16, 2011. Cornell University, 2007. March 19, 2011. http://www.milkfacts.info/Nutrition%20Facts/Nutritional%20Components.htm.
- The History of Cheese Making. 2011. An IAC Company, Bowlman Cheril. March 21, 2011. http://www.life123.com/food/cooking-tips/cheese-making/history-of-cheese-making.shtml.