30 min Mozzarella Cheese Making WSTA meeting November 2011

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**Gear per class:**

Temperature probe

pH probe (optional)

**Gear per group:**

1 stock pot

1 large microwave proof plastic bowl

1 sieve

1 sharp knife

1 metal spoon

1 slotted plastic spoon

1 squeezy pipette

Gladwrap (for wrapping samples to take home)

4L standard milk

2L low fat milk

2t citric acid

3mL Rennet

1C non-chlorinated water

Salt to taste

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| 1. | Mix 3 ¼ L of standard milk with 1.9L of lite/low fat milk in a large stock pot. This seems like a lot of milk but you will only get about a 10% cheese yield | Standardise the milk fat:protein ratio to approximately 8:10. Standard milk is 3.3 % fat and 3.2 % protein. Lite milk is 1.4% fat and 3.4% protein. Lowering standard fat composition and increasing standard protein composition increases stretchiness of mozzarella and crumbliness of cheddar |
| 2. | Heat to 13ºC | If using a live culture to lower the pH then this temperature would be higher - 36ºC. Mozzarella cultures have to be thermo stable to survive the high temperatures of the stretching steps later. |
| 3. | Add 2t/10g citric acid. Fold in gently for about 3-5 mins to avoid localised pH changes. The pH should drop from around 6.7 to 5.2ish. Avoid making bubbles. | A live culture would lower the pH slowly by excreting lactic acid due to anaerobic respiration slowly over a period of hours. *Streptococcus lactis var cremorus* is the standard cheddar culture.  Dropping the pH down to around 4.2 will extract casein.  Bubbles in the milk will be incorporated into the curd, reducing the homogeneity of it and making it break apart more easily. |
| 4. | Heat to 31ºC. | Curds and whey will start to separate. |
| 5. | Dilute 3mL rennet in about 1C of NON CHLORINATED WATER | Chlorinated water denatures the rennin enzymes in the rennet |
| 6. | Fold diluted rennet gently in to milk for a couple of minutes then use the spoon to gently stop the milk moving. | Rennin is an enzyme that hydrolyses kappa casein molecules. Casein has a hydrophilic and a hydrophobic end. The hydrophobic ends are embedded in fat globules while the hydrophilic ends interact with water to keep the fat globules of milk in suspension and separate from each other. When the rennet cleaves the kappa-casein end off the casein molecules the fat globules coalesce. |
| 7. | Leave it to sit still for a couple of minutes | From this point onwards you want to disturb the milk as little as possible as it should be starting to set. |
| 8. | Heat to 38ºC - 42ºC over a low, gentle heat | The size of the jump in temperature from 31ºC determines how much water will be driven out of the product |
| 9. | Leave to set for a couple of minutes. | Curds and whey will separate which can be seen as a yellowish fluid starting to pool. |
| 10. | Gently cut the curd into a grid starting from the centre with the gridlines a couple of cm apart. Harp the cheese by using a metal spoon to cut the curd horizontally as well | The increased surface area allows the whey to escape more efficiently |
| 11. | Leave for 5 minutes for the curd to heal | The rough edges created by the cutting action smooth themselves out due to the osmotic interactions between the curds and the whey |
| 12. | Collect the curd in a large plastic bowl. This can be done by any or all of decanting, spooning it out or sieving. Big chunks are good as it minimises damage to the forming cheese | The whey can be discarded or collected to make ricotta. |
| 13. | Microwave for 1 minute. Drain the whey off |  |
| 14. | Repeat till a temperature of 60ºC-63ºC is reached. Start kneading as the consistency allows. | This is remarkable hot. A cool water bath is nice to have sitting beside you.  As you pull and knead it, the protein fibres start to align and the cheese goes stringy and shiny. |
| 15. | Salt: Youre aiming for about 1% salt content in your final cheese. You can add this directly and knead it in, or you can make a 10% brine solution and let the cheese ball soak in it overnight. | The salt has slight preservative qualities but makes a massive difference to the taste of the cheese. |