

From Last Time:

Exam 1 Results & Feedback:

Average = 72%

Will be posted to D2L soon...



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Spring 2014 - Bodwin

Cheese

Curdled milk with most of the water removed

Add acid and salt

Discourages "spoilage microbes"

Enzymes hydrolyse fats and proteins

Smaller molecules = flavor, aroma



Image: <http://blog.fooducate.com/2011/06/26/why-milk-is-white-why-is-cheese-yellow/>



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Storage & transport

Waterproof "bags"

Animal parts...

Stomach → Rennet (enzymes)

Makes cheese more cohesive, pliable

This is (was) SCIENCE!



Image: <http://blog.fooducate.com/2011/04/05/10-things-to-know-about-rennet-its-in-your-cheese/>



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Rennet

The original Biotechnology!

Chymosin enzyme (digests milk) from the

4th stomach of a milk-fed calf

Calf <30 days old

Once off milk, chymosin stops



Image: <http://www.ontario.ca/blog/warning-babies-die-for-cheese/>



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Rennet

Modern rennets – "vegetable rennet"

Chymosin from yeast, mold, bacteria

From "genetic engineering"

Is that good or bad?



Image: <http://www.cheesesupply.com/>



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Rennet

What does it do?

Very specific activity

Attacks kappa-casein

Casein micelles merge/string together

Analogous to fat globules in whipping cream

Why not just use acid?

Destroys casein micelles too much

Lose some protein & calcium - nutrition

Tangy cheese?



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Cheese Ingredients

Milk
Milk bacteria
Rennet
Salt
Time



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Cheese Microbes

Bacteria are what make cheese

Lactococci (mesophilic, sour cream)
Lactobacilli & streptococci (thermophilic, yogurt)
Propionibacteria (holes, variant causes acne)
Brevibacterium linens (stronger flavors, salty environment, seashore & skin, "smear bacteria")



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Cheese Microbes

Molds
Penicillium – large family
Blue molds – *roqueforti*
Survive lower oxygen (inside cheese)
Breaks down fats – "peppery", aroma
White molds – *camemberti*
Surface ripening
Break down protein – creamy, flavor



Image: <http://www.gourmetsleuth.com/Dictionary/M/Maytag-blue-cheese-6166.aspx>



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Making Cheese

Acidify (bacterial)
Milk sugar to lactic acid
Curdle casein (rennet) and drain whey
Stabilizes curd
Ripening
bacteria + time = good



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Curdling

Acid
Fine, fragile gel
Formed over hours
Retains moisture
Rennet
Firm, rubbery curds
Formed under an hour
Cut to small grains,
loses more water

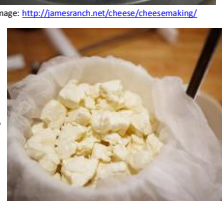


Image: <http://www.theKitchen.com/better-kitchen-make-squirly-cheese-at-home-167439>



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Image: <http://www.thechoppingblog.com/2012/02/02/cheese-curd/>



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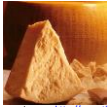
After the curd...

Draining – gravity, press, heat

Salting – mix or smear, inhibit spoilage

Shaping – Why wheels?

Ripening – Let the bacteria work!



Images: <http://www.theardentepicure.com/2010/04/food-of-day-parmigiano-reggiano.html>



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Enjoying cheese...

Don't cut too soon

Aromatics lost

Oxygen attacks!

Let it warm a bit

Humid & 55-60°F ideal

Softens fats – Don't go too far!

Store loosely wrapped

Puddles of moisture are bad



Image: <http://www.khiewchanta.com/archives/snacks/chili-cheese-experiment-1.html>



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Cooking with cheese

Melting

~90°F – milk fats melt

~130-180°F – protein matrix breaks

Non-melting cheeses

Acid curdled – Why?

Stringiness

Casein strings stick together - crosslinking

Aging, acid, moisture, salt



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Cooking with cheese

Avoiding “stringiness”

Grate finely

Heat carefully

Minimize stirring

Add starch – coats protein and fat



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