

SALTING TECHNIQUES FOR CHEESEMAKING

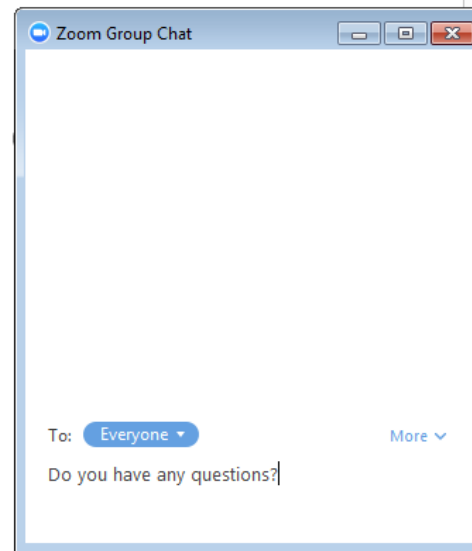


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Thursday July 27th , 2017

Asking questions

- Hover mouse over bottom of screen and bar will pop up.
- Click Chat for chat box to appear.
- Type questions in here and press Enter.



This webinar is being recorded

- Link will be emailed to you following the webinar

Acknowledgements

- **Dairy Australia**
- **National Centre for Dairy Education**



Peter Hicks Dixon

- Dairy foods consultant, teacher and cheesemaker from Westminster West, Vermont.
- Bachelors and Masters degrees in Animal and Food Sciences from the University of Vermont.
- Over 35 years of experience establishing small-scale cheesemaking facilities, developing cheesemaking recipes and techniques plus designing and implementing food safety programs.
- Started Dairy Foods Consulting in 1997, working in agricultural development projects in Macedonia, Albania, and Armenia and traveling in the US, Canada, and China to teach workshops and consult for artisan cheesemakers.
- Operates Westminster Artisan Cheesemaking, teaching classes in cheesemaking, food safety, affinage, creamery design, organization and management.
- Cheesemaker at Parish Hill Creamery

SALTING TECHNIQUES FOR CHEESEMAKING



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Functions of Salt as an Ingredient

- Preservative
- Flavor Development
- Slowing Bacterial Growth
- Discouraging Growth of Contaminants
- Removal of Moisture



Functions of Salt as an Ingredient

Preservative

- Inhibits gas producing bacteria
- Prevents bitterness
- Maintains proper flavor and texture

Flavor Development

- Sufficient salt is needed or cheese lacks flavor
- Too much salt slows flavor development
- People have different thresholds for saltiness

Slowing Bacterial Growth

- Circuit breaker of lactic acid fermentation
- Controls some pathogens

Discouraging Contaminants

- Helps to maintain pure cultures of blue mold inside the cheese
- Discourages other molds from growing on cheese rinds

Moisture Removal

- Dehydration and Rind formation

ORDER of SALT TOLERANCE

Type	% (Optimum to Maximum)
1. Mucor mold	<1
2. Geotrichum	1-3
3. Yeasts	1-4
4. Penicillium white	2-5
5. Penicillium blue	3-6
6. Micrococci	2-10
7. Coryneforms	3-10



Microbial Salt Tolerance

What grows best is important for interior texture and flavor development

- Carbon dioxide producing bacteria need low levels
- Blue molds need higher levels
- Stimulating amino peptidase activity to reduce bitter peptides

What grows best is important for rind development

- Very low levels encourage Mucor mold to grow
- Surface molds need lower levels
- Coryneform bacteria and yeast on washed rinds need higher levels

The Concept of Salt-in-Moisture

Water in cheese is a brine solution called Salt-in-Moisture

- Water exists in two states: bound to protein and free
- Salt is dissolved in the free water to create the brine
- Microbial activity is governed by the salt concentration of the brine

Salt-in-Moisture has a large effect on cheese quality

- Calculated as the salt percentage in the cheese divided by the moisture content plus the salt percentage
- Cheddar has 1.5-1.75% salt and 4-5% Salt-in-Moisture
- Salt-in-Moisture can range from 2% (Swiss) to 8% (some Blue cheeses)

Methods of Salting

- Direct Salting of Whey and Curds, e.g. Havarti and some Blue cheeses
- Direct Salting of Curds: milled curd cheeses
- Direct Salting of Curds: lactic curd cheeses
- Surface Salting
- Brining: before aging and during aging
- Rind Washing with brines and salt solutions during affinage

Direct Salting of Whey and Curds

Northern European Cheeses

- Salt is added during stirring after whey is removed and water is added
- Usually 200 grams of salt per 100 liters of milk (.2%) is added to the whey and curds at least 15-20 minutes before end of stirring
- This amount does not impede acidification
- Salting promote moisture retention in the curds
- Curds lose less moisture during cooking in the vat
- Calcium content is lowered to make a more flexible (less firm) consistency
- Cheeses are brined for less time, e.g. 50 to 75% less

Direct Salting of Whey and Curds

Blue Cheeses

- Curds are more buoyant and helps prevent matting of the curds
- Salting creates firm curds with minimum distortion to create open texture for blue mold to grow
- Salt is added to the vat after whey equal to 40 % of the milk weight is drained
- Salt equal to 0.6% of the original milk weight is added and curds are stirred for 15 minutes
- This creates .6 to .8% salt in a one day old cheese

Direct Salting of Curds for Milled Curd Cheeses

Cheddar types, Stilton, and Fresh Curds

- Curds are added after the lactic fermentation is almost finished at pH 4.8 to pH 5.35
- Whey is drawn off the curds during salting
- Salt is quickly incorporated into the cheese and reaches a stable, homogeneous content within one day
- Hooping happens after salting



Direct Salting of Lactic Curd at pH 4.60 or less

- Salt is poured onto the top of the curd as the curd is being stirred in the vat
- One pound of salt is added to 10 gallons of curd and mixed to make a slurry that is drained in cheesecloth
- More common in industrial (large scale) manufacturing
- A very effective way to incorporate the salt into the cheese

Surface Salting

- Flake salt is used
- Usually fine flake salt but coarse is used for hard alpine cheeses
- Must be done for lactic cheeses
- Most commonly done for small format cheeses



Surface Salting

- The number of saltings depends on the thickness of the cheese, e.g. once for Brie, four times for Gorgonzola
- Rule of thumb is one salting per 3-4 pounds of cheese
- Saltings are done every other day
- Required for certain A.O.C. and D.O.P. cheeses
- required for certain hard alpine cheeses, e.g. Gruyere and Beaufort



Surface Salting as Part of the Affinage for Hard Alpine Cheeses

- a small amount of coarse salt is sprinkled on the surface
- the salt dissolves very slowly
- a brine develops on the surface overnight
- the brine is rubbed into the rind the next day
- on the following day the cheese is turned and more salt is applied
- this process is repeated for up to one month to develop a smear



Brining is used for many kinds of cheese

- Brining can replace surface salting of small format cheeses
- Saturated brines are commonly used to prevent contamination from yeast and other microbes
- 18% salt or greater is the typical salt content of the brine
- This is equivalent to 80% salt saturation as measured by a hydrometer



More About Brining

- Some whey is released into the brine
- More whey is released if the cheese is warmer than the brine
- Cooling the cheese first will reduce the amount of whey going into the brine
- Salt is concentrated on the surface to create a rind



Brining Time

- Depends on the thickness, weight and moisture content of the cheese
- Rule of thumb for Semi-hard and hard cheeses
 - inches thick x pounds = hours in the brine
 - example: a wheel of Gouda that is four inches thick and weighs 22 pounds needs: $4 \times 22 = 88$ hours in the brine
- The time is half to three quarters for semisoft and soft-ripened cheeses
- The time is longer for very hard cheeses like Grana
- Brining times can be subjective: a personal decision is made by the cheesemaker to create a specific salt content

Brining Procedure

- Separate brines must be used for pasteurized and raw milk cheeses
- Cheeses should float loosely in the brine
- Cheeses should not be packed tightly or the cheeses will not absorb salt where they are touching each other and gas will develop during aging
- Cheeses can be placed in layers as long there is a matting or grid between to separate them
- Coarse flake salt is sprinkled on top of the cheeses at all times
- Cheeses should be turned halfway through the brining and on a daily basis
- Alternatively, cheeses can be pressed under the brine with a grid to avoid having to turn them over

Brine Maintenance

- Skimming of curd particles
- Mixing and checking the salt concentration
- Wiping the sides of the brine tank to remove yeast and mold
- Cheese residue will build up in the brine over time
- Cheeses with smooth, pressed rinds do not lose as much residue
- Softer cheeses will reduce the life expectancy of the brine
- Titratable acidity of $> .40\%$ indicates that the brine should be changed or preserved
- Filtering and pasteurizing periodically to preserve the brine
- Microbiological testing

Thankyou for joining this
presentation

Questions?