



Manufacture of Whipped Topping

Maria Ruhlman

Kelly Smith

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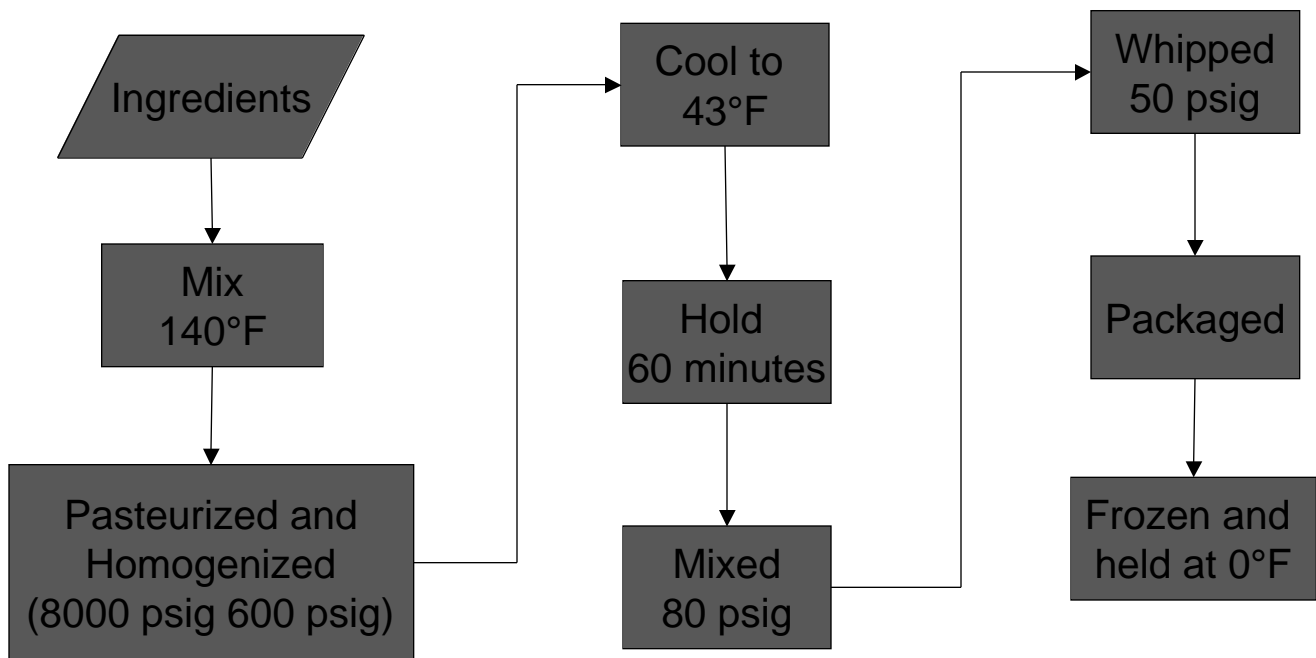
What is Whipped Topping?

- “Non-Dairy” form of Whipped Cream
 - Doesn’t meet the Standard of Identity for Whipped Cream
- Emulsion
- Foam
- High Freeze - Thaw Stability

Ingredients

- Water
- Coconut &/or Palm Kernel Oil
- Sugar / Corn Syrup / Modified Starch
- Sodium Caseinates and NFDM
- Stabilizer (xanthan and locust bean gum)
- Emulsifier (polysorbate 60)
- Phosphate salts
- Flavor, color, etc

Basic Flow Diagram



Ingredient Addition

- Phosphate salts must be dissolved in water prior to other ingredients being added.
- The fat source, emulsifying agents, and stabilizers added next.
- Followed by all other ingredients
- Mixed together at 140°F

Emulsion Formation

- Pasteurized 161°F for 15 sec
- Homogenized
 - 8000 psig 1st phase, 600 psig 2nd phase
- Cooled to 45°F and held for 60 minutes
 - Stabilizes the emulsion
 - fat crystallization
 - rearrangement of the proteins
 - rearrangement of the emulsifying agents
 - Allows for complete hydration of ingredients

Air Incorporation

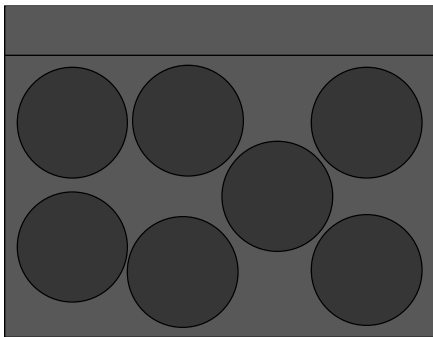
■ Mixing

- Stirred (80 psig) to begin air incorporation (300% overrun)
- Large air bubbles form

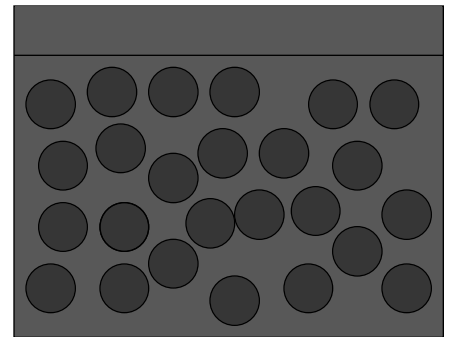
■ Whipping

- Stirred in closed vessel to maintain achieved overrun
- Transforms large air bubble into smaller air bubbles

Air Incorporation



After Mixing



After Whipping

Key to Stability

- Both aeration steps are done at temperatures below 55°F
- Allows fat to remain crystallized in its stable form
- Leaves the protein in solution

What Protein??

- Caseins are the main protein class present in whipped topping
 - From both the NFDM and the Caseinates
- Very hydrophobic
 - Typically forms micelles with itself to hide hydrophobic parts
- High shear can easily break up the micelles, which allows the protein to interact at the air interface

Freeze Thaw Stability

- Main Characteristic of Whipped Topping
- Protein layer protects the air pocket from crystals
- High sugars in solution helps keep water crystals low in number (F.P. depression)
- Homogenization has stabilized the fat in very small globules which allows for only small fat crystals to be present

Conclusion

- Manufacture of whipped topping is a very controlled process
- Proteins, particularly casein, play an important part in the stability of whipped topping
- Proteins are very critical in maintaining the product structure during the freeze-thaw cycle
- Proteins in combination of small fat crystals and few water crystals leads to overall stability of the product

Thank You

