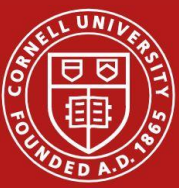




# Maple Cream Troubleshooting

Catherine Belisle, Ph.D., 2022



## Overview

This article provides guidelines for addressing issues commonly encountered when making maple cream. Maple cream is a thick, smooth, spreadable confection derived from maple syrup. Its peanut butter-like texture develops when small sugar crystals are formed and held in a supersaturated or concentrated syrup solution. The consistency and quality are controlled by water content and inverted sugar levels. The desired water content is 15 to 18% (Hartel, 2018). Boiling syrup to 25 °F above the boiling point of water (ABPW) yields a cream with approximately 15% water content, while boiling to 22 °F ABPW yields approximately 18% water content (Norish, 1967; Hartel, 2018).

The main factor determining which temperature is appropriate for making maple cream is the level of inverted sugars present in the maple syrup. Sucrose, the primary sugar in maple syrup, forms a stable crystal in maple cream. The invert sugars, glucose and fructose, help maintain moisture and reduce crystallization. The recommended range of invert levels for cream are 0.5 to 3% with 1.5% as ideal. For a detailed recipe, please refer to “Making Maple Cream” by Stephen Childs. More information on invert sugars and measurements can be found in the New York State Maple Confections Notebook.

## Crystallization or Graininess

Large crystals can form at three points during the production process: prior to stirring the heated syrup (sugar solution), during stirring, or during storage. Crystal size must be controlled during production of maple cream, as formed crystals will continue to grow during storage. To reduce the formation of large crystals, follow the guidelines below.

**Inhibit crystals prior to stirring.** As the sugar solution is cooling, do not agitate the mixture. Any type of agitation can cause sugar crystals to form and grow. This will lead to large sugar crystals in the final maple cream. During heating, brush the sugar crystals from the side of the pot into the sugar solution using a water-wetted silicone brush. After the sugar solution has reached the desired heating temperature, a fine mist of water can be sprayed on the surface of the solution to prevent crystal formation – in this instance, heating the solution an additional 1 to 2 °F higher can help account for the added moisture.

**Cool the sugar solution.** Large crystals will form if the solution is stirred when warm, this is because the sugar crystals move more easily in a warm solution, thus increasing the likelihood of sugar crystals binding to each other. Stirring a cooled solution will produce a large number of small crystals and result in a smooth fondant. The ideal temperature range for stirring maple cream is below 70 °F and above 45 °F.

**Control the crystal size with “seeding”.** Seeding is the process of adding sugar crystals of an ideal size to an un-crystallized solution. Stirring the sugar crystal “seeds” into the solution initiates the crystallization reaction. To accomplish this, add maple cream with desired crystallization to the cooled, unmixed sugar solution at 1 to 2 tablespoons per gallon of syrup used or 5% of the heated solution.

**Stir sugar solution quickly.** Stirring too slow or too fast will produce a fondant with larger crystals. If all other guidelines have been followed and graininess is still developing, alter your stirring speed.

## **Thick or Hard Cream**

Cream viscosity (thickness) is dependent on two characteristics: water content, and sugar crystal concentration and distribution. The factors determining viscosity can be controlled during production or during storage.

**Use higher levels of invert syrup.** The invert sugars have two functions, glucose reduces the crystallization of sucrose and fructose acts as a humectant that softens maple cream. The recommended invert levels are 0.5 to 3% with 1.5% as ideal. A recipe with low-invert can harden. In this situation, it is recommended to increase the invert levels of unheated syrup. To slightly increase invert levels, add ¼ to 1 teaspoon of liquid or powdered invertase per gallon of maple syrup. Allow solution to sit at ambient temperature for 1 to 6 hours and monitor frequently. Once the desired invert level is measured, heat the solution to inactivate invertase activity.

**Reduce finishing temperature.** The finishing temperature (22 to 25 °F ABPW) is correlated with water content (approximately 15 to 18%) (Norrish, 1967). The higher the finishing temperature, the lower the water content. A thick or hard cream can be fixed by reducing the finishing temperature by 2 to 5 °F.

**Add inverted syrup to heated sugar solution.** An alternative method for producing maple cream is to add inverted syrup to the heated sugar solution. Since water content is a key characteristic to control, a low-invert syrup (0.5 to 1.0%) would be heated to approximately 35 to 38 °F ABPW. The fully inverted syrup would be heated slightly (to about 150 °F) and then added to the sugar solution once it has reached the finishing temperature. It is recommended to add 5 parts heated sugar solution with 1 part fully inverted syrup to yield a water content between 15 to 18%. The combined sugar solutions would then cool and procedures would continue as recommended in the “Making Maple Cream” article (Childs, 2007). In thick creams, the invert sugars, particularly glucose, will reduce crystallization during storage and thus reduce drying of the cream.

**Add water to finished cream.** Maple cream will harden during storage. This occurs due to the crystallization of sugars or drying of the product (Ozcan et al. 2019). The water content of fondants is typically 15-18%, but can be slightly lower or higher (Hartel, 2018). Packaging creams in water barrier packaging with a tight seal will reduce water loss during storage. However, if drying does occur, add approximately 2% water by volume of the cream (34 mL of water per 177 mL of cream). For reference, a half-pound jar of maple cream is about 177 mL.

**Add invertase to finished cream.** Invertase can soften hard creams during storage by reducing crystallization (Ozcan et al. 2019). However, invertase will not reduce graininess caused by large sugar crystals. Add invertase at 0.1 to 0.3% of the cream solution or 5 to 15 g per 5000 g of syrup and store cream at room temperature for 24 to 48 hours. For reference, a gallon of syrup is approximately 11 lbs or 4989 g.

## Thin or Soft Cream

Similar to thick or hard cream, the viscosity of thin creams is dependent on water content and sugar crystals. Viscosity can be controlled during production or during storage.

**Use lower levels of invert syrup.** In maple syrup, the 66 °Brix consist of sucrose and invert sugars. Further, the invert sugar level is inversely correlated with sucrose levels. In a 66 °Brix solution with an invert level of 2%, the sucrose level will be 64%. If invert levels are too high and the sucrose content is too low, there will not be enough crystalline sugar to provide firmness. By using lower invert syrup, the sucrose sugars can crystallize and result in a firmer fondant. The recommended invert levels are 0.5 to 3% with 1.5% as ideal.

**Increase finishing temperature.** A lower finishing temperature results in a higher water content. The higher water content results in a softer, runnier fondant. To combat this, increase the finishing temperature by 2 to 5 °F.

## Separation of Cream

Separation of maple cream occurs when the water content is too high or the invert level is too low. Cream separation does not occur until storage; however, its occurrence can be reduced during production or during storage.

**Increase finishing temperature.** Sugar crystals form a matrix in maple cream. When water content is high, some of the water is removed from the matrix and settles on top of the cream. By reheating the cream solution to a finishing temperature 2 °F higher than the initial finishing temperature or heating the initial sugar solution 2 °F higher, the solution will be thicker and less likely to separate. When reheating a finished cream,

add 500 to 750 mL of filtered water per gallon of syrup used. This will allow the sugar crystals to dissolve in the solution and is imperative to reduce development of a grainy texture.

**Add inverted syrup to heated sugar solution.** The methods for this recommendation can be found in the “Thick or Hard Cream” section. Invert sugars will draw in moisture and hold it in solution (Hartel, 2018), reducing separation. However, too high invert will result in a soft, thin cream that may be undesirable.

**Add invertase to finished cream.** Invertase breaks sucrose into fructose and glucose. In this process, a water molecule is used. This reduces the available water in the solution and consequently reduces separation. Add 5 drops of liquid invertase or a few granules of powdered invertase per 6 oz container of cream, stir, and store at room temperature for 24 to 48 hours. This will result in a softer cream.

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## Citations

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College of Agriculture and Life Sciences  
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