

SNOW CREAM: A REVIEW OF BEST PRACTICES AND CALL FOR THE ESTABLISHMENT OF A  
PERMANENT RESEARCH PROGRAM

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**ABSTRACT:** Snow cream is a dessert similar to ice cream with the distinction that it is made with snow crystals. Snow cream is typically made by combining and mixing the traditional ingredients of ice cream (whipping cream, sugar, salt, and some sort of flavoring) with fresh snow crystals. The result, to be consumed immediately, has a flavor and texture that is dependent on the type, size, and temperature of the snow crystals as much as the mixing technique and flavorings. In this paper we report the results of an interdisciplinary collaboration among researchers and practitioners aimed at reviewing and systematically studying the best practices of snow cream production. Many variables in the making of snow cream were tested, from the type, size, and temperature of the snow crystals to the myriad potential flavors, both alcoholic and non-alcoholic. The results were rated on categories such as the consistency, flavor, and scooping quality. We conclude that much more research is necessary in order to support the recommendation of professional snow cream standards. Therefore, this collaboration seeks additional funding to establish a long term research program.

**KEYWORDS:** Dessert, thermodynamics, snow crystals

## 1. INTRODUCTION

According to *The Joy of Cooking*, “ice creams are based on carefully cooked well-chilled syrups and heavy custards, added to unwhipped cream” (Rombauer & Becker, 1975). It should come as no surprise that, somewhere along the way, this notion was adapted for backcountry applications by adding snow crystals to whipping cream instead of churning the ingredients in a bucket of ice and salt. Though the origins of the earliest snow cream (also known as snow ice cream) recipes are unknown, a variety of techniques and ingredients have been passed down for contemporary enjoyment.

This research project involves cooperation across institutions and disciplines. Members of the University of British Columbia Avalanche Research Group teamed up with members of the University of Calgary Applied Snow and Avalanche Research Crew, guided by the extensive experience of Alison and Tannis Dakin in the backcountry lodge industry. This unprecedented collaboration was an inspirational demonstration of the way that people can come together despite their differences to solve the important problems of our time.

This paper begins with a basic recipe for making snow cream, followed by discussion and observations of snow crystal forms, size, and temperature that are preferred in making snow cream. The next section covers the wide variety of flavours that can be added to snow cream, and this topic is divided into alcoholic and non-alcoholic flavours. We conclude with a discussion of the future direction of this research and a call for funding to continue this

research into the future.

## 2. RECIPE

To make a basic batch of snow cream have on hand:

- A large metal bowl, such as a salad bowl
- A whisk or spoon for beating (the cream, not the guests)
- 1 pint or 500 mL of heavy whipping cream (have a bit extra on hand as backup)
- 1 tsp salt
- 1 cup white sugar
- Flavouring of choice

Instructions:

- (1) Set the metal bowl and beater outside during dinner to properly cool.
- (2) Once cool, fill the bowl with cold powder snow. The following section outlines desirable snow conditions.
- (3) Go back inside and sit in a cool spot away from heat sources
- (4) Sprinkle sugar and salt over top of snow
- (5) Add about 2/3 of the cold whipping cream
- (6) Mix all ingredients thoroughly. Add more cream if the consistency is grainy or more snow if the mixture is runny
- (7) Add the desired flavouring
- (8) Mix until the snow cream has the texture of stiff yet scoopable ice cream
- (9) Serve immediately

## 3. DESIRABLE SNOW CONDITIONS

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The most important component of snow-cream is the snow quality. It is important to go outside and far enough away from the lodge or building to ensure that there is no possibility of ash from the stove or other contaminants in the snow. Use a headlamp if necessary to ensure that no yellow snow is present in the sampling area.

In addition to the cleanliness of the snow, the form, size, and temperature of the snow is also very important in determining the final consistency of the snow cream (Table 1). At this stage the size of our data set is much too small to perform a multivariate analysis to determine the relative importance of each individual variable, or the most important variables, in determining the overall quality of the finished product.

Form	Size	Temp	Notes
RG	2 mm	+1°C	Crunchy, grainy results. Poor consistency.
DF	2.5 mm	-2°C	Good scooping density
DF	1.5 mm	-3°C	Good scooping density
PP	1-2 mm	-1°C	Milkshake consistency, a bit grainy and crunchy

Table 1. *Observations of snow crystal form, size, and temperature (Canadian Avalanche Association, 2007) along with comments on the finished product.*

Based on experience, and relying heavily on the honed intuitive reasoning of seasoned backcountry chefs, ski guides, avalanche forecasters, and snow scientists, we can make the following preliminary recommendations for snow cream production:

- Recent snowfall (ideally HN24 snow) significantly increases the smoothness and quality of the snow cream. Stellars up to 4 mm, and partially settled recent snow of 1-2 mm produce a high quality product.
- Successful snow cream has been produced at air temperatures as warm as -2.0°C and as cold as -18.0°C.
- Take into account that the surface snow may contain a strong temperature gradient in the top 15 cm. Targeted sampling may be necessary in order to select snow at the desired temperature. More research is needed to recommend more specific temperatures, however.

The following conditions were found to produce undesirable results:

- Snow that has any discernible faceting is likely to produce a more crystalline and sorbet-like product.
- Surface hoar produces a terrible crunchy texture. The bigger it is the nastier the snow cream becomes and spoils the after-dinner

party. As surface hoar is to be feared and loathed from a skiing perspective, it is to be feared and loathed from a snow cream perspective.

- Any type or crust, wind slab, or other significant layer is to be avoided
- Depth hoar produces an inedible product and is best used for margaritas or slushies in the springtime.
- Once April has arrived, the opportunities for producing quality snow-cream dwindle rapidly. One has to wait for the occasional cold storm and have ingredients and skiers on hand to take advantage of the timing. It is often best to plan to make margaritas instead, and wait for next December for the cold storm.

## 4. FLAVOURINGS

### 4.1 Non-Alcoholic Flavourings

A variety of flavourings can be used for snow cream. The most common is about 1 teaspoon pure vanilla extract. Artificial vanilla is not recommended, as it will crystallize in contact with the snow and result in a disappointing crunchy texture.

Other non-alcoholic flavours that can be mixed directly into the snow cream include:

- cocoa powder or good hot chocolate powder (~4 tablespoons or to taste)
- finely ground coffee
- fruit jams or jellies (huckleberry, strawberry, raspberry, etc.)
- chocolate or caramel sauce
- fresh berries (these should not be mixed in with snow cream ahead of time because the water content of fresh berries tends to crystallize upon contact with the snow and produces a more granular product)

### 4.2 Alcoholic Flavourings

We have found that alcoholic liqueurs are quite popular among those that make and enjoy snow cream. We suspect a direct correlation between the percentage of mountain people that enjoy alcohol and the percentage of snow cream recipes that include some sort of alcoholic flavouring. However, our data set is too small to perform a statistical analysis to test this hypothesis.

Furthermore, the single ingredient in a snow cream recipe that is bound to incite the most discussion, and potential protest, is the amount and flavour of alcohol to add to a bowl of virgin snow cream. At this stage we refrain from making any specific recommendations on the amount of liqueur to add to a bowl of snow cream. Much, much more research is necessary to draw quantitative conclusions on this important point. In the meantime, we

recommend that you start with an initially small amount and mix thoroughly, keeping an eye on both the flavour and consistency of the snow cream before adding more. Adding extra dry snow may be necessary in stages to prevent a soupy texture.

The following is a list of tested and recommended liqueurs for snow cream:

- Irish cream
- creme de cassis (black currant)
- Kahlua® (coffee)
- creme de coconut
- peppermint schnapps
- Cointreau® (orange)
- Drambuie®
- Frangelico® (hazelnut)

We have observed that it is very important to sample and share the selected liqueur with all people present before adding to the snow cream. We believe that this sends important signals to the brain in advance of tasting the finished product.

## 5. DISCUSSION

A common thread of our collective snow cream experience can be tied to both the quality of skiing and the stability of the snowpack. Snow that is the most desirable to ski on—cold, dry powder—is also the best for making snow cream. Additionally, conditions that favour instability in the snowpack—surface hoar, depth hoar, wind slabs, or other crusts—are to be avoided for snow cream making as they are avoided for skiing.

A more in-depth analysis of the thermodynamics of the snow crystal/whipping cream mixture may help elucidate and support the recommendation of specific snow crystal types and temperatures for making snow cream. The partial first-order phase transition of snow crystals from solid

to liquid in the whipping cream is likely dependent on the surface area of the original snow crystal. Since new snow and decomposing fragments tend to have the highest specific surface area, they are the most likely to nearly complete the solid to liquid phase transition and minimize the presence of any grainy, remnant ice particles in the finished product. A full discussion and analysis of these points is beyond the scope of this paper, and is planned for a future publication.

Most of the analysis and recommendations in this paper are based on anecdotal experience and intuitive judgement. A small number of controlled experiments were carried out, though many more are needed in order to draw conclusions and specific recommendations. We believe that dessert, specifically snow cream, is a great means to bring people together from across disciplines and industries. We hope to continue this research indefinitely, and are currently seeking funding for the establishment of a permanent research program.

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