

**Assignment #2 (Team 20) - Food Regulations**

1. Selected food product: **Ice Cream** (Western Family Vanilla Ice Cream vs. Western Family Vanilla Light Ice Cream with No Sugar Added).

**2. Western Family Vanilla Ice Cream**



Figure 1. Western Family Vanilla Ice Cream from Save on Foods (own photo).

**Western Family Vanilla Light Ice Cream with No Sugar Added**



Figure 2. Western Family No Sugar Added Vanilla Light Ice Cream from Save on Foods (own photo).

### 3. Ingredient lists (4 points):

#### a. Ingredient lists.

- **Western Family Vanilla Ice Cream:** Modified milk ingredients, cream, sugars (sugar, glucose), artificial flavour, carrageenan, guar gum, mono- and diglycerides, polysorbate 80, xanthan gum, annatto.
- **Western Family Vanilla Light Ice Cream with No Sugar Added:** Modified milk ingredients, cream, natural flavour, carrageenan, cellulose gum, guar gum, locust bean gum, mono- and diglycerides, maltitol, sorbitol.
  - Both contain milk, and both may contain peanuts, tree nuts, eggs, soy, and wheat.

#### b. Identify fat substitutes, sugar substitutes, and/or additives used, if there are any.

- The sugar substitutes used in the Western Family Vanilla Light Ice Cream with No Sugar Added are: **maltitol** and **sorbitol**.
- The fat substitute used in the Western Family Vanilla Light Ice Cream with No Sugar Added as well as Western Family Vanilla Ice cream is: **Simplesse** (listed in ingredient list as modified milk ingredients).
- The additives in Western Family Vanilla Ice Cream are: **carrageenan, guar gum, mono- and diglycerides, polysorbate 80, xanthan gum, and annatto**.
- The additives in Western Family Vanilla Light Ice Cream with No Sugar Added are: **carrageenan, cellulose gum, locust bean gum, guar gum, and mono- and diglycerides**.

#### c. Explain the role of **fat substitutes**, **sugar substitutes**, and **additives** used in terms of the functional properties they contribute to the product.

##### **Western Family Vanilla Ice Cream:**

- **Modified milk ingredients:** AKA Simplesse® (Wikipedia, 2023), is a protein-based fat substitute that can be based on soy, milk, or egg white protein made through microparticulation which involves the heating of proteins to coagulate and yield a micro dispersion. The extremely small particle size of the micro dispersion is perceived as a fluid that has the creaminess and richness that are characteristic of fat (Chan, 2023).
- **Carrageenan:** Polysaccharides extracted from seaweed (kelp) (Chan, 2023). Carrageenan is used as a suspending agent, where microscopic particles are kept in suspension in the ice cream mixture (Chan, 2023). In addition, carrageenan is used as a stabilizer in ice cream, which stabilizes the colloidal dispersions with the gas in the solid (Chan, 2023).
- **Guar gum:** A plant polysaccharide which is extracted from guar beans from guar plants (Sangle et al., 2014). Guar plants are mainly farmed in India and Pakistan, where they are low cost and widely available. Guar gum's uses in ice cream are multifaceted: it increases the ice cream's stiffness, prevents ice crystal formation, increases the whip ability during aeration, and prevents shrinkage during storage (Sangle et al., 2014).

- **Mono- and diglycerides:** A synthetically made emulsifier resulting from reactions between animal or plant fats with glycerol that result in a mix of mono-, di-, and triglycerides alongside fatty acids. Altogether, they grant ice cream its smoothness and prevent shrinkage in storage as well as fast melting during consumption (Porter, 2013).
- **Polysorbate 80:** A synthetic emulsifier also made from either plant or animal fat that react together, but with sorbitol rather than glycerol. It is more effective at fat destabilization than mono- and diglycerides because it is able to displace more protein from the surface of fat globules, but only when it is used simultaneously with mono- and diglycerides (Porter, 2013).
- **Xanthan gum:** A polysaccharide, where trisaccharides are attached to every second glucose unit (structure:  $\beta$ -D-glucose) (Chan, 2023). Xanthan gum is cultured in large fermentation tanks, then purified (Chan, 2023). In ice cream, xanthan gum is used to prevent ice crystal formation in the ice cream (Chan, 2023).
- **Annatto:** A natural food colourant sourced from achiote shrub seeds that can produce shades from a light yellow to strong orange (Wikipedia, 2023). In this case, a small amount is added for the subtle yellow colour we associate with vanilla ice cream.

#### **Western Family Vanilla Light Ice Cream with No Sugar Added:**

- **Modified milk ingredients:** AKA Simplese<sup>®</sup> (Wikipedia, 2023), is a protein-based fat substitute that can be based on soy, milk, or egg white protein made through microparticulation which involves the heating of proteins to coagulate and yield a micro dispersion. The extremely small particle size of the micro dispersion is perceived as a fluid that has the creaminess and richness that are characteristic of fat (Chan, 2023).
- **Maltitol:** One of the sugar-alcohols, maltitol is a low-calorie and non-cariogenic sweetener that is less sweet than sugar and has a cool-refreshing sensation. It is found naturally in many fruits and berries, but can also be produced through hydrogenation of sugars. Additionally, it does not increase blood glucose or insulin levels, making it a safe sugar alternative for diabetics (Chan, 2023). Unlike sorbitol, maltitol has a sweetening power closer to sucrose at 0.9 that makes it more preferred over sorbitol (Roze et al., 2021).
- **Sorbitol:** One of the sugar-alcohols, sorbitol is a low-calorie and non-cariogenic sweetener that is less sweet than sugar and has a cool-refreshing sensation. It is found naturally in many fruits and berries, but can also be produced through hydrogenation of sugars. Additionally, it does not increase blood glucose or insulin levels, making it a safe sugar alternative for diabetics (Chan, 2023). Due to its lower sweetening power of 0.5, it is not a preferred sweetener compared to maltitol (Roze et al., 2021).

- **Carrageenan:** A polysaccharide extracted from seaweed (kelp) (Chan, 2023). Carrageenan is used as a suspending agent, where microscopic particles are kept in suspension in the ice cream mixture (Chan, 2023). In addition, carrageenan is used as a stabilizer in ice cream, which stabilizes the colloidal dispersions with the gas in the solid (Chan, 2023).
- **Cellulose gum:** Cellulose gum, also known as carboxymethyl cellulose (CMC), is a polysaccharide that is made up of the structural parts of plants. Cellulose gum is made when trees or cotton are mixed with acetic acid and salt, then filtered and dried, creating a fine powder (International Food Additives Council, n.d.). Cellulose gum's use in ice cream is to slow the melting rate, increase viscosity and increase smoothness (Manurung et al., 2021).
- **Guar gum:** A plant polysaccharide which is extracted from guar beans from guar plants (Sangle et al., 2014). Guar plants are mainly farmed in India and Pakistan, where they are low cost and widely available. Guar gum's uses in ice cream are multifaceted: it increases the ice cream's stiffness, prevents ice crystal formation, increases the whip ability during aeration, and prevents shrinkage during storage (Sangle et al., 2014).
- **Locust bean gum:** A polysaccharide composed of galactose and mannose. It is extracted from the seeds of a carob tree, where the endosperm (gum) is separated from the husk and germ to then be milled to create locust bean gum (Ice Cream Science, 2017). Locust bean gum's use is to increase the viscosity of ice cream, especially during mixing, making it have a smoother feel. It also prevents ice crystal formation (Ice Cream Science, 2017).
- **Mono- and diglycerides:** A synthetically made emulsifier resulting from reactions between animal or plant fats that result in a mix of mono-, di-, and triglycerides alongside fatty acids and glycerol. Altogether, they grant ice cream its smoothness and prevent shrinkage in storage as well as fast melting during consumption (Porter, 2013).

d. Compare and contrast the lists of the two products and explain differences

- **Similarities:** Modified milk ingredients, cream, carrageenan, guar gum, mono- and diglycerides.
- **Differences:** The major difference between the Western Family Vanilla Ice Cream and the Western Family Vanilla Light Ice Cream with No Sugar Added is that the latter has sugar alcohols maltitol and sorbitol as sweeteners substituting sugar. The latter also uses natural flavour over artificial flavour and lacks the food colourant annatto, which is reflected in its whiter colour compared to the former. Aside from sugar substitutes, differences in flavouring, and colourants, Western Family Vanilla Ice Cream includes polysorbate 80, xanthan gum, while Western Family Vanilla Light Ice Cream with No Sugar Added includes cellulose gum and locust bean gum.

→ Because polysorbate 80 (a stabilizer/emulsifier) was removed to make “Western Family Vanilla Light Ice Cream with No Sugar Added”, cellulose gum and locust bean gum were added instead to keep the stability of the ice cream’s colloidal dispersions. In addition, the removal of sugars (sugar, glucose) in the “Western Family Vanilla Light Ice Cream with No Sugar Added” necessitates the addition of maltitol and sorbitol, both carbohydrate replica substitutes for sugar.

<b>Western Family Vanilla Ice Cream</b>	<b>Western Family Vanilla Light Ice Cream with No Sugar Added</b>
Sugars (sugar, glucose), artificial flavour, polysorbate 80, xanthan gum, annatto	Natural flavour, cellulose gum, locust bean gum, maltitol, sorbitol

4. Labels (1 points)

a. Provide detailed description of the information found on the labels.

<b>Bilingual Labelling</b>	Mandatory info presented in both English and French.
<b>Common Name of Food</b>	Ice Cream with the flavour of Vanilla.
<b>Country of Origin</b>	Made in Canada, from domestic and imported ingredients.
<b>Date Marking and Storage Instructions</b>	“Keep Frozen” storage instruction, but no best before date indicating the durable life is greater than 90 days.
<b>Identity and Principal Place of Business</b>	Prepared for Save-On-Foods LP, with local Vancouver, BC address and phone number, and prepared in Victoria, BC.
<b>Irradiated Foods</b>	N/A
<b>Legibility and Location</b>	Font type, height, width and colour requirements of the information are presented in an acceptable, legible manner around the packaging of the product.
<b>List of Ingredients</b>	Declared in descending order of proportion by weight, along with possible food allergens and cross-contaminants including milk, peanuts, tree nuts, eggs, soy and wheat.
<b>Nutrition Facts</b>	Table provides info on calories, fat (saturated and trans), carbohydrates, fibre, sugars, protein, cholesterol, sodium, potassium, calcium and iron per serving size of ¾ cup or 188 mL.  Also contains sugar alcohol content in the No Sugar Added version.
<b>Net Quantity of Food</b>	1.65 L per tub.
<b>Sweeteners</b>	No Sugar Added version is sweetened with maltitol and sorbitol.
<b>Other Info</b>	“No artificial colours” and “artificial flavour”.  Dairy Farmers of Canada label is a quality assurance program that guarantees dairy products are made with 100% Canadian milk. This label signifies that the dairy product was produced using milk sourced entirely from Canadian dairy farms.  Recycling Where Facilities Exist label is an indication that the packaging is recyclable in certain areas or regions where appropriate recycling facilities are available.

b. Indicate whether the information complies with the regulatory requirements as outlined in **Lesson 04.**

- Yes, the information complies with the regulatory requirements as outlined in Lesson 4.

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