

## **CHAPTER 1 INTRODUCTION**

### **1.1 Background**

Ice cream has a high popularity all over the world, and based on a recent market research, consumer demand towards ice cream variety keeps increasing, especially in tropical countries. At the same time, consumers are becoming more aware about choosing healthier food options. Furthermore, Canadean (2015) reported that Indonesia's ice cream production will have a growth of around 7.8% over the period of 2014 to 2019. Due to the growing market in Indonesia and worldwide, ice cream brands are constantly introducing new products to give consumers a better experience. Kerry Ingredients Company stated that the consumers' ice cream trends nowadays are more towards products that are convenient, premium, healthy, and tasty at the same time. Thus, food industries have started to develop ice cream with healthier nutritional profiles. For example, one of the most popular ice cream brands, Ben & Jerry's, introduced oat in their ice cream products (Grandviewresearch, 2018). Other major ice cream companies are also competing to develop healthy ice cream (Hosch, 2018).

Following the growth in Indonesia's ice cream market and the healthy ice cream trend, it has become necessary to develop ice cream with reduced fat and sugar in Indonesia. Furthermore, the limited innovation in ice cream product that follows the healthy trend could also cause a reduction in ice cream demand. The advantage of eating ice cream is due to its high calorie content and thus, its ability to provide energy. Ice cream is popularly known as a product that is high in sugar and fats such as cholesterol and saturated fat. This is due to the main ingredients in the ice cream, which are milk and cream, that are responsible for its flavor and taste (Marie, 2018). However, they contain a high amount of cholesterol and saturated fat which may be a source of health problems for consumers (Grandview research, 2018). Studies have shown that a high sucrose diet is able to cause lipogenesis which will increase hypertriglyceridemia and thus causing an increase in triglyceride concentration in

the liver and heart (Lin et.al, 2010). Therefore, ice cream products with lower fat and sugar content might be able to help customers with health conscious.

The term “reduced fat and sugar” in ice cream has become increasingly familiar due to the rise in popularity of a healthy ice cream brand, Halo Top. The main challenges in developing a healthy ice cream with reduced fat and sugar are poor texture and bitter after taste of artificial sweeteners that are used in the ice cream. Nevertheless, several popular brands of ice cream claimed that the combination of stevia, coconut oil, dietary fiber, and egg whites are able to reduce the fat content of the ice cream while maintaining a desirable texture. There are also several companies that have tried to compete with Ben & Jerry’s ice cream who was the first producer of “light” ice cream, which contains 650 Calories per pint serving (Naylor, 2018). The reduction of fat in ice cream could be categorized into several types of products: light, low, and non-fat ice cream. Reduced fat ice creams usually contain at least 25% lower fat as well as 30% lower calories than normal ice cream (Koenig, n.d).

## 1.2 Problem formulation

Based on the background, the problems can be formulated as:

- What are the best ingredients to be used to replace the cream, milk, and sucrose in ice cream product?
- How to prevent the bitter and textural defects in light and reduced sugar ice cream?
- How will different formulations affect the final light fat and reduced sugar ice cream quality?

## 1.3 Aim & Objective

The aim of this study is to develop an ice cream product with light fat (50% less fat than standard ice cream) and to reduce the usage of sucrose as a sweetener. To be able to develop light fat and reduced sugar ice cream, the objectives are:

- To use several concentrations of inulin and erythritol to replace the usage of 35% cream and sucrose.
- Observe and measure the ice cream quality with several analyses including physicochemical analysis (total solid, brix, viscosity), overrun, melting rate, and sensorial properties.
- Determine the best concentration of inulin and erythritol that could be used in the formulation by comparing the quality measurements with control and commercial vanilla ice cream.

#### 1.4 Research Scope

The field of this study is food processing focusing on new product development. This study will be focused on the optimization of light fat and reduced sucrose ice cream formulation. The physicochemical properties and sensory profile (Hedonic/liking) of the ice cream will be observed and compared with control and commercial vanilla ice cream. The analysis of this study will include viscosity, brix, total solid, overrun, and melting rate. All analysis will be further analyzed with XL-stats (ANOVA). The scope of the work will be limited by:

- Inulin will be used to reduce the concentration of cream by 40% while erythritol will be used to reduce the concentration of sucrose by 30%.
- Ice cream formulation trial will be made with the designed formulation and the most suitable ingredients will be adjusted.
- Ice cream will be made with one equipment ICE-100 for 1 hour and stored in freezer - 20°C.

- Viscosity, brix, and moisture will be measured in triplicate. Overrun will be measured before and after the ice cream is made. Melting rate temperature and time before measurement will be controlled and standardized.
- Sensory evaluation will be conducted with hedonic test and samples will be given monadically.
- Results will be further analyzed with ANOVA (XL-STATS) and plotted in graph.