

Chapter 1

Introduction

1.1 Background

Crickets (*Acheta domesticus*) and other edible insects have been increasingly recognized as an alternative, sustainable, and nutrient-dense protein source due to their high protein content and favorable essential amino acids (Chailangka et al., 2023). Compared to other livestock, crickets need less resources, lower greenhouse gas emissions, and are relatively easy to cultivate (Farkas et al., 2025). Because of these reasons, crickets are now considered as a promising alternative for protein sources for future food systems. Furthermore, insect powder/flour have been explored as a functional ingredient in a variety of food products, such as beverages, cheese, and frozen desserts (Zielińska et al., 2023, Chailangka et al., 2023). Despite the growing interest in insect-based ingredients, studies specifically investigating the sensory properties of cricket flour in ice cream remain limited. Previous research by Zielińska et al. (2023) and Chailangka et al. (2023) demonstrated that incorporating mealworm and silkworm flours into similar food matrices increased protein and essential mineral contents while also enhancing antioxidant activity. However, consumer sensory acceptance was often affected by changes in color, flavor, and texture resulting from the incorporation of insect-based ingredients.

Ice cream is a complex food system where sensory attributes such as appearance, aroma, flavor, and mouthfeel play a critical role in consumer acceptance. The incorporation of cricket flour has the potential to change these characteristics, especially at higher concentration. Previous research done by David-Birman et al. (2022) has shown that low concentrations of insect powder might enhance the nutritional quality without significantly affecting the sensory properties, while higher concentrations can cause undesirable changes, including darker color, off-flavors, and changes in textures that might

reduce the overall acceptability of the ice cream (Saetae, 2025). Furthermore, another study done by David-Birman et al. (2022) shows that relatively low levels of insect powder addition can be associated with perceptible aftertaste in ice cream products. Therefore, this study aims to analyze the effect of incorporating cricket (*Acheta domesticus*) flour at different concentrations on the sensory characteristics of chocolate ice cream, which will provide insights on the feasibility and sensory limitations of cricket flour application in frozen dairy products.

1.2 Objective

To evaluate the effect of different levels of cricket flour incorporation (9%, 12%, and 15%) on the sensory characteristics and consumer acceptance of chocolate ice cream using multiple sensory evaluation approaches (Just About Right, Focus Group Discussion, Check-All-That-Apply (CATA), Triangle, Hedonic, and Ranking).

1.3 Hypothesis

1st Hypothesis:

H_0 (Null Hypothesis): The Focus Group Discussion (FGD) method cannot successfully identify and generate a specific, consensus-based lexicon of sensory attributes for chocolate ice cream incorporated with cricket powder

H_1 (Alternative Hypothesis): The Focus Group Discussion (FGD) method can successfully identify and generate a specific, consensus-based lexicon of sensory attributes for chocolate ice cream incorporated with cricket powder.

2nd Hypothesis:

H_0 (Null Hypothesis): The different concentrations of cricket powder incorporation have no significant effect on the sensory attributes profiles of the chocolate ice cream.

H_1 (Alternative Hypothesis): The different concentrations of cricket powder incorporation have a significant effect on the sensory attributes of the chocolate ice cream.

3rd Hypothesis:

H_0 (Null Hypothesis): The different concentrations levels of cricket powder incorporation have no significant effect on the panelist hedonic liking scores for appearance, aroma, texture, taste, and aftertaste of the chocolate ice cream

H_1 (Alternative Hypothesis): The different concentration level of cricket powder incorporation have a significant effect on the panelist hedonic liking scores for at least one of the sensory parameters (appearance, aroma, texture, taste, and aftertaste) of the chocolate ice cream