

Chapter 1

Introduction

1.1 Background

Consumer interest in plant-based foods has continued to grow due to concerns about health, sustainability, and ethical food choices. As plant-based eating patterns continue to grow, plant proteins are increasingly used as alternatives to animal proteins because they are suitable for vegetarian and vegan diets and are generally associated with lower environmental impact (Jafarzadeh et al., 2024). Plant-based proteins, including protein isolates, have also gained interest in food formulation because they can help improve nutritional value and support different dietary preferences (Xue et al., 2024).

Cereal bars are a suitable food product for protein fortification because they are convenient, portable, ready-to-eat, and widely consumed as snack products. Their formulation usually contains cereal ingredients and binders, which makes them flexible for the addition of ingredients such as protein isolates. Adding plant protein isolates into cereal bars may help increase protein content and support the development of high-protein snacks that meet consumer demand for nutritious and convenient foods (Busaidi et al., 2025). However, adding plant protein isolates into cereal bars can also create challenges. Plant proteins may affect taste, texture, color, and overall acceptability, depending on the type of protein used. Previous studies have reported that plant proteins can contribute undesirable characteristics, such as off-flavors, increased hardness, and color changes, which may reduce consumer acceptance of plant-based snack products (Etzbach et al., 2025; Ma et al., 2022).

These differences are influenced by the physicochemical and functional properties of each plant protein source. Properties such as solubility, particle size, water-holding capacity, and emulsifying ability can affect the structure and sensory quality of cereal bars. For example, a protein that does

not dissolve well may make the cereal bar harder or less uniform, while a protein that holds water well may help improve softness and binding (Jakobson et al., 2023). Different plant proteins may also interact differently with flavor compounds, which can affect sensory characteristics such as beany, bitter, or earthy flavor (Sharma et al., 2025). These differences may influence product quality and consumer liking (Baylan & Ozilgen, 2025).

Although plant proteins have been widely studied in food products such as meat alternatives, dairy alternatives, beverages, and other protein-enriched foods, fewer studies have compared soy, pea, and oat protein isolates together in cereal bar formulations. Therefore, this study evaluated the effects of soy protein isolate, pea protein isolate, and oat protein isolate on the physicochemical and sensory properties of cereal bars, with a control formulation included for comparison. The results of this study may help give a better understanding of how different plant protein isolates affect cereal bar quality.

1.2 Objective

To evaluate the effects of different plant protein isolates on the measured physicochemical and sensory properties of cereal bars.

1.3 Research Questions

1. How do different plant protein isolates affect the measured physicochemical properties of cereal bars?
2. How do different plant protein isolates affect the sensory properties and preference of cereal bars?

1.4 Hypothesis

For RQ1: Physicochemical Properties

- H_{01} : Different plant protein isolates have no significant effect on the measured physicochemical properties of cereal bars.
- H_{11} : Different plant protein isolates have a significant effect on the measured physicochemical properties of cereal bars.

For RQ2: Sensory Properties and Preference

- H_{02} : Different plant protein isolates have no significant effect on the sensory properties and preference of cereal bars.
- H_{12} : Different plant protein isolates have a significant effect on the measured sensory properties or preference outcomes of cereal bars.