

# Reliability and Validity in Empirical Research

## Summary

Scientific experiments applied to the study of food production.

## Main Core Tie

Food Science

[Strand 9](#)

## Background for Teachers

What Is Food Science? - A study of food science is systematic because such a study crosses specific branches of science: biology, botany, zoology, physiology, chemistry, bacteriology, physics, and others. Each can contribute to an understanding of food and food preparation. Of the many branches of science, organic chemistry and physics are two that are most useful to the study of food. If you have ever asked why a recipe or food you cooked turned out the way it did (appearance, flavor, texture), you were most likely asking a question concerning chemistry or physics. Foods are complex chemical substances. Food science is the study of the chemical composition and structure of food and changes that take place with varying procedures.

It would be hard to imagine daily life without the vast number of convenience foods that were developed using food science. Pringles potato chips are an interesting example. The process used to get each Pringles potato chip the same shape is a great technological and engineering feat. Frozen microwave pizza was also developed using food science, and NASA scientists invented Tang. Food scientists continually discover innovative ways to preserve food so that it is nutritious and safe to eat. Many foods we frequently enjoy were produced through food science. For example, an apple or orange from a vending machine has been in a controlled atmosphere made possible through food science. Many foods that used to be packaged in cans now stay fresh in aseptic packaging; i.e., pudding, juice, and milk. Some other food processes that food scientists have developed include such things as freeze-drying, flash-freezing, irradiation, dehydration, and the benefits of food additives. Food science discoveries provide many benefits. A great challenge is to provide safe food that everyone can afford. An ever-present challenge of food science is to feed and keep healthy an expanding world population. To effectively evaluate and confront these challenges and the many other scientific discoveries in our world, people within our society need a greater understanding of science than ever before.

## Intended Learning Outcomes

As students utilize the scientific method, they will be able to discover principles of food preparation and preservation, and evaluate food and food products in terms of the scientific composition of food, and use their creativity to solve problems in valid and reliable ways.

## Instructional Procedures

See attachments below:

The students will participate in an awareness PREASSESSMENT that has the five senses being used in a food test.

The students will sample Pringles potato chips and discuss the technology that went into the development of a variety of foods. (See BACKGROUND INFORMATION.)

The students will experiment with FOOD COLORING: NATURAL vs. ARTIFICIAL to show the reaction of natural and artificial food coloring. They will follow a scientific procedure and observation method, record it as an experiment on RECORD OF EXPERIMENT, and put it in their notebooks.

After reading and discussing MODERN RESEARCH DEVELOPMENT, the students will participate in the following experimental lab activities using analogues:

Have the students prepare and compare meat and meat analogues and complete the record table and questions. See COMPARISON OF MEAT ANALOGUE TO MEAT.

Have the students prepare and compare real and fabricated seafood products, and complete the record table and questions. See COMPARISON OF SEAFOOD ANALOGUE TO REAL SEAFOOD.

Have the students prepare and compare texturized vegetable protein as a meat extender in chili, and complete the record table and questions. See TEXTURIZED VEGETABLE PROTEIN AS A MEAT EXTENDER IN CHILI.

As a summative evaluation, the students will participate in a SCIENCE FAIR AND INDEPENDENT RESEARCH. This is an optional activity. Resource materials are included at the end of this unit.

### Authors

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