

Greater San Diego Science and Engineering Fair

2015 PROJECT SUMMARY

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Grade: 8

School: Marshall Middle School

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Project Title: Nutrition: Facts or Fiction?

Abstract

Objectives/Goals The objective of this experiment was to determine whether nutrition labeling is accurate or inaccurate in terms of Calorie content.

Hypothesis It is hypothesized that 20% of the 100 tested food products will have food labels that do not match the measured amount of Calories. These food items are predicted to have food labels whose Caloric values are 10% higher than that of the measured amount from the bomb calorimeter.

Methods/Materials A bomb calorimeter was constructed from a soda can, cylindrical ventilation duct, wooden dowel, metal coupling, drain netting, champagne corks, butterfly paperclips, and 50 ml of water. A gram scale, graduated cylinder, barbecue lighter, thermometer, facemask, safety goggles, food samples, and nutrition labels were also used. Calculations using the formulas for heat energy, $Q = mc\Delta T$, the first law of thermodynamics, and the formula for percent error were utilized as well.

Results 10 different food groups were observed and tested. Of 106 food specimens tested, 33 did not burn or failed to burn independently once lit. It was observed that foods that were dry and/or contained oils consistently burned better than those that did not. Foods that had excessive amounts of sugar, sticky coatings, hard shells, and even minimal amounts of moisture would not burn. Of the 73 foods that did burn, 0% of the measured kilocalorie amounts replicated their labeled amounts exactly.

Conclusions/Discussion There were several factors and variables that affected the accuracy of testing, however. Because of the ample amount of space for oxygen to reach the flame, and the openings at the top of the calorimeter, heat may have escaped. These factors, along with the fact that 33 foods did not burn, are enough to deem this experiment inconclusive. The data may not be completely accurate, but may perhaps be used as a rough estimate of Calories.

Summary Statement

A bomb calorimeter was constructed and used to determine the accuracy of labeled Calorie values.

Help Received Mrs. Gillum provided critique and resources, while Todd Talashek, mentor, provided knowledge and expertise.