CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)

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Project Number

S0615

Project Title

The Perfect Cookie: The Effect of Baking Ingredients on Cookie Texture

Abstract

Objectives/Goals

The objective was to determine how adding, altering, or otherwise changing various baking ingredients would affect the mass, volume, density and perceived hardness, crispiness, heaviness, and crumbliness of chocolate chip cookies.

Methods/Materials

I baked seven batches of cookies: one control, the second with added baking powder, the third with melted butter (instead of leaving it at room temperature), the fourth substituting one egg with one egg white, the fifth melting the butter and using one egg white, the sixth adding baking powder, melting butter, and using one egg white, and the seventh substituting Crisco for butter. I then measured mass, volume (through water displacement), and density, and had nine "raters" rate the cookies on a Likert scale (1-5) on hardness, crispiness, heaviness, and crumbliness.

Results

Adding ½ tsp baking powder resulted in heavier cookies, an average of 34.0 grams as opposed to 24.0 grams, occurring by chance .332% of the time, as well as harder and crispier cookies. Melting butter resulted in heavier, harder, and crispier cookies. Using one egg white resulted in crumblier cookies, an average of a 2.6 adhesiveness rating as opposed to 4.1, occurring by chance .020% of the time. It also resulted in heavier, bigger, harder, and crispier cookies. Melting butter and using one egg white resulted in harder, crispier, and crumblier cookies. Adding baking powder, melting butter, and using one egg white resulted in crumblier, much harder (4.8 opposed to 2.3, occurring by chance .00079% of the time), and much crispier (5.0 opposed to 2.3, occurring by chance .000023% of the time) cookies. Using Crisco instead of butter resulted in heavier, harder, and crumblier cookies.

Conclusions/Discussion

Cookies make the world a better place. Chocolate chip cookies are a staple in homes all across America, but few understand the chemistry behind them. The results of this experiment show that baking ingredients significant affect cookie texture. When bakers understand the effect of baking ingredients, they are able to understand how to best change their recipes to create their favorite type of cookie - whether it be chewy or crispy, crumbly or adhesive.

Summary Statement

I tested how adding, altering, or otherwise changing various baking ingredients would affect the mass, volume, density and perceived hardness, crispiness, heaviness, and crumbliness of chocolate chip cookies.

Help Received

Two professional chefs supervised the baking process to ensure that the constants held steady for every batch.