



CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s) Max A. Freedman	Project Number 32114
Project Title Bean Bean the Magical Fruit: Testing for Glucose with Different Concentrations of Beano	
Abstract Objectives/Goals My project was to determine if different concentrations in Beano enzymes (Alpha-galactosidase and Sucrase) were effective in breaking down oligosaccharides in a bean solution. Methods/Materials I soaked 50 g raw green split peas in 100mL tap water at room temperature for 12 hours. Then I brought the temperature of the bean solution up to 37 C with a water bath. I took a glucose reading, then dropped in 0, 0.5, 1.0, or 2.0 crushed Beano tablets and started the timer. Every 2 minutes for 14 minutes, I tested glucose levels of the sample using a glucometer and recorded the results. I conducted three trials for each sample for a total of 12 trials. Results Glucose levels were slightly higher with increased concentrations of Beano. The highest was 2.0 Beano, then 1.0, then 0.5 Beano, and finally 0.0 Beano (control) was the lowest level of glucose recorded. In addition, the rate of the enzyme reaction was faster with increased concentrations of Beano. At 2 minutes 2.0 Beano was the highest (253.2 mg/dL) and 0.5 Beano was the lowest (135.5 mg/dL). Conclusions/Discussion Oligosaccharides are chains of complex sugars and some are difficult for humans to digest. Beano was developed to help people digest beans and other gassy foods. It contains two enzymes, Alpha-galactosidase, which comes from a fungus (<i>Aperigillus niger</i>) and Sucrase. When A-galactosidase is added to oligosaccharides and H ₂ O the result is galactose and sucrose. Then the second enzyme Sucrase changes the sucrose into glucose and fructose. Humans can now digest these simpler sugars. Without the enzymes in Beano, the oligosaccharides go through the human body undigested until they get to the large intestine. The bacteria in the gut partially digest the oligosaccharides and create gas. Taking Beano helps humans to break down the parts of the bean that would otherwise produce gas, keeping people from enjoying some vegetables. Understanding glucose and the role it plays in diet and nutrition helps people lead a healthier lifestyle.	
Summary Statement I tested how different concentrations of Beano enzymes affect a bean solution.	
Help Received My mom helped me with collecting data and research. My sister helped me with graphs. My dad helped me with standard deviation. Dr. David Bernick helped me understand glucose molecules and my experiment design.	