



**CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY**

Name(s) Annalisa J. More	Project Number J2011
Project Title Comparison of the Nutritional Value of Infant Formulas Using a Handheld Refractometer	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Background: Infant formulas are designed to provide complete nutrition for babies. There are numerous types of infant formulas that vary based on type of protein (milk, soy, hydrolyzed, amino acid), liquid versus powder, and brand name versus generic. Objective: I sought to determine which kind of infant formula has the greatest nutritional content by measuring the amount of dissolved solids using a handheld refractometer.</p> <p>Methods/Materials Methods: Infant formulas were prepared according to manufacturer's instructions. Using a handheld refractometer, light refraction through various infant formulas was measured, which correlates with the amount of dissolved solids present in the infant formulas. Whole fat cow's milk (liquid) was chosen as a positive control. Distilled water was used as a negative control, as a diluent for powdered infant formulas, as well as to calibrate the refractometer. Readings were performed in duplicate and an average value obtained.</p> <p>Results Results: The value ranged from 5.35 to 13.15. Kirkland Signature (powdered generic milk protein) had the lowest percent Brix reading (5.35), while Nutramigen (liquid hydrolyzed milk protein) had the highest percent Brix (13.15). In general, liquid formulations had higher percent Brix readings than powdered formulations. Some generic infant formulas had significantly lower percent Brix than brand name infant formulas, while other generic infant formulas were nearly identical to brand name formulas.</p> <p>Conclusions/Discussion Conclusions: . The Nutramigen (hydrolyzed milk protein) infant formula had the greatest nutritional content, possibly because the partially broken down proteins present in this formula are still large enough to refract light, and are more numerous than that of the whole milk or soy protein. Neocate (amino acid) had the lowest nutritional content. Powdered formulas that required reconstitution had, in general, lower nutritional content than liquid formulas. Finally, generic infant formulas had similar nutritional content compared to generic formulas, except for Kirkland Signature (generic powdered milk protein), which had an extremely poor nutritional content as a result of being poorly soluble in water. Parents should be aware that infant formulas are not created equal and vary widely in nutritional content.</p>	
Summary Statement My project is about which infant formula has the greatest nutritional value.	
Help Received My father who is a professor explained and helped me design and perform my experiments. H donated materials needed. He also acted as my scientific adviser	