



CALIFORNIA STATE SCIENCE FAIR 2014 PROJECT SUMMARY

Name(s) Andres S. Gonzalez	Project Number 34829
Project Title School Milk: Carton or Plastic?	
Objectives/Goals The purpose of this experiment is to determine if milk provided by schools to students should be served in plastic bags or paper cartons. Abstract Methods/Materials Many schools have chosen to change the containers of milk they serve their students. Schools now offer milk in both cartons and plastic bags. The plastic bags became available when the dairy production plants convinced schools that the plastic bags will reduce the amount trash. My experiment will show that within a few years the plastic milk bags will create more trash than the milk cartons at the county level, which contradicts the function of less trash for this consumer (student/district) product. I will show the ineffectiveness of the plastic milk bag compared to the paper milk carton by the decomposition rate. I will test to see which container loses the most mass after 190 days and then apply a decomposition rate formula to compare the two products. Results My hypothesis was correct. After decomposing 120 milk cartons and 120 milk plastic bags for 190 days I used a decomposition rate (using the formula: $\text{Decomposition Rate} = \text{Mass Lost} / \text{Time}$) to predict when both containers would completely decompose, assuming all of the variables stayed the same. The decomposition rate for the milk cartons showed that in 2 years the milk carton would decompose completely. In comparison, the plastic milk bags had the best decomposition at 364 years. Conclusions/Discussion In the district where I made my observations, there were approximately 347,400 milk cartons and 969,300 plastic milk bags placed in the trash for the 2012-2013 school year. Since the milk cartons averaged a mass of 10.6 grams it would total 3,682 kg of milk cartons added to a landfill. The plastic milk bags have an average mass of 2.1 grams and would total 2,036 kg added to a landfill. Assuming the actual decomposition rate was similar to the data from my experiment, in 2 years the 3,682 kg of milk cartons would be fully decomposed. Shockingly, it would take over 300 years for the 2,036 kg of plastic milk bags to decompose. Although the intended use of plastic milk bags does correctly replace a milk carton, the effectiveness of the plastic milk bag is not fulfilling its function of reducing the amount of daily trash as promised to school districts in a real world consumer oriented application.	
Summary Statement To determine which school milk container (carton or plastic bag) will create less trash.	
Help Received My mom bought me the supplies I needed. My dad helped me check my report and set-up my board.	