



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

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Project Title Can Algae Reduce Methane Production from Cow Manure?	
Abstract Objectives/Goals Globally, 28% of the world's methane emission came from livestock and methane is a contributing factor of global warming crisis. The purpose of this experiment is to determine whether algae has a role in decreasing methane production when it is grown on cow manure. The hypothesis is that algae would be able to reduce methane production by 20% when it is co-digested with cow manure. Methods/Materials In the first trial, the cow manure and the cow manure/algae digesters were closed and left outdoor for 1 week. After 1 week, the digesters were placed under a heat lamp for a period of 7 days. Gas sample was analyzed using a mass spectrometer. In trial 2, the digesters were not capped, allowing algae to have air exchange and exposure to sunlight during the first 7 days. The digesters were then exposed to heat lamp as in trial 1. Gas sample were collected and analyzed. Results The cow manure/algae digester had 69% methane on day 1 and increased to 72.4% on day 2. The cow manure started with 17.6% and dropped to 16.4% on day 2. The cow manure/algae digester produced more methane than the cow manure group. In the second trial on day 4, the cow manure group showed 18% methane concentration. The cow manure/algae group displayed 12.4% methane concentration which is 22% less methane production than the cow manure group. Conclusions/Discussion The combined results of the two trials support the hypothesis. The set up for trial 1 was not designed properly to test the hypothesis. The algae was not alive and served as additional organic substrate for the digestion process. A redesign of the experiment that allowed an open, healthy ecosystem for algae growth was done for trial 2. The result of trial 2 supports the hypothesis that algae when grown on cow manure can reduce methane emission from cow manure. Additional trials should be conducted to obtain more data to validate the hypothesis.	
Summary Statement The objective of this study is to evaluate whether algae can reduce methane production from cow manure.	
Help Received Drs Lueker and Paplawsky offered the use of mass spectrometer for gas analysis.	