



# CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

<b>Name(s)</b> <b>Rafael D. Velazquez-Ramos</b>	<b>Project Number</b> <b>S1021</b>
<b>Project Title</b> <b>Manure Is Your Friend</b>	
<div><div><b>Objectives/Goals</b> To determine biogas production from different biodegradable material contained with equine manure in the digesters.</div><div><b>Methods/Materials</b> plastic 5 gallon water bucket Large Mylar helium balloon vinyl tubing size 1/4"; Stirring rod made from wood 20 gallon tank</div><div><b>Results</b> For my experiment I conducted four trials to test the biogas production of horse manure with different fruit waste which were banana skins, papaya peel, and orange rind. Then during trial two I came across cold winter months and the anaerobic bacteria do not become active in cold temperatures. In trial three I added an electrical heated blanket that was plugged into the wall during school hours. The blanket generated a temperature of 155°F, at the base of each digester. There was finally a fourth trial done where the digesters were under natural sunlight due to greater sunlight availability. During trial four the highest rate recorded was the orange rind digester with an average of 78.6 millimoles of biogas, followed by the papaya peel digester with 75.8 millimoles of biogas then by the horse manure (control) with 77 millimoles of biogas, and finally the lowest rate the banana skin digester with 68.5 millimoles of biogas. Overall the orange rind digester had a higher production of biogas, than papaya peels, banana skins, and the horse manure (control). This was due to the pH. In trial four the digesters were carefully observed for their pH under 31 days of incubation.</div><div><b>Conclusions/Discussion</b> My hypothesis was that the orange rind would produce more biogas than papaya peel, banana skin, and horse manure. My results do support my hypothesis. Each of the digesters proved to make biogas, which is a renewable energy that can be burned to generate power. In the experiment, orange rind had more production of biogas in three out of the four trials than the papaya peel who was always second in biogas production, and horse manure was third in production, leaving banana skin fourth with least producing amounts of biogas.</div></div>	
<b>Summary Statement</b> My project is about reusing horse manure and creating renewable energy to impact the horse industry.	
<b>Help Received</b>	