



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Ariana N. Derman	Project Number J1709
Project Title Cooking Smart: The Use of Spices to Inhibit Microorganism Growth in Meat	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Spices have been used around the world for centuries and have been believed to prevent microorganism growth in meat. The purpose of my experiment is to prove if such is true. If so, which spice is the best to use to prevent microorganism growth? After completing my experiment, I will know which spice tested, if any, inhibits the most growth from raw hamburger meat.</p> <p>Methods/Materials I streak-plated nutrient agar Petri dishes with raw hamburger meat using a loop and I applied a different spice to each dish, carefully ensuring each streak-plated section had a sample of spice applied. I also had a control dish that had only meat streaked on it. The following spices were used in the experiment: black pepper, cinnamon, clove, coriander, garlic, lemon juice, oregano, pepper, rosemary, and salt. The dishes were put under a Stryfoam incubator and kept at 34 degrees Celsius for three days and had two replicates.</p> <p>Results All of the Petri dishes showed growth on the nutrient agar. Most of the spices were surrounded by a yellowish/white mass. The control plate showed white dots in all sections of the streakplate. Most spices inhibited growth of the same white dots seen on the control plate fairly well. Only small white dots were found on some dishes containing spices similar to the ones found on the control plate. The spices that prevented growth listed from most prevention to least prevention were: lemon juice, salt, rosemary, clove, habanero pepper, coriander, oregano, cinnamon, garlic, and black pepper.</p> <p>Conclusions/Discussion I concluded that most spices tested were able to inhibit growth of microorganisms from the meat. I hypothesized that the chili peppers and the lemon juice would probably inhibit the growth best. It was surprising to find white masses that surrounded most of the spices in the dishes. I was not able to determine what type of growth grew out without access to a microscope, but I observed what surrounded the spices looked different to that on the control plate and that some spices had significantly less growth than seen on the control. Now with access to a microscope, I have decided to re-run the experiment so I may be able to classify if the growth was bacterial or fungal or possibly both.</p>	
Summary Statement The purpose of this project is to determine if spices inhibit the growth of microorganisms in meat.	
Help Received My science teacher, Mrs. Vodraska, helped teach me how to prepare agar; my step father taught me about the importance of streakplating; my Girl Scout leader, Mrs. Winter, taught me how to use a microscope.	