



**CALIFORNIA STATE SCIENCE FAIR  
2014 PROJECT SUMMARY**

<b>Name(s)</b> <b>David M. Duncan</b>	<b>Project Number</b> <b>J0505</b>
<b>Project Title</b> <b>What's In the Meat We Eat? Detecting Antibiotics in Beef, Pork, and Chicken Using Bacillus stearothermophilus Microorga</b>	
<b>Abstract</b> <b>Objectives/Goals</b> My objective is to determine if trace amounts of antibiotics can be detected in meats sold in major California grocery store chains. I will test muscle tissue fluids from meat samples using the Bacillus stearothermophilus var. calidolactis microorganism as an indicator for the presence/absence of antibiotics. I will also analyze the concentration of antibiotics in the meat samples. I predict that antibiotics will be detected in some of the meats I test. <b>Methods/Materials</b> To test a sample of raw meat (beef, pork, and chicken) for antibiotics: I used the Bacillus stearothermophilus var. calidolactis microorganism that was injected into an agar-nutrient medium, combined it with a sample of meat fluid, and then incubated in it a block heater. If the heat-thriving bacteria did not multiply, this indicated the presence of antibiotics; if the bacteria did multiply, it indicated the absence of antibiotics. I also designed and built a photo color gradient scanner to analyze the concentration of antibiotics in each meat sample. I performed three trials per sample and used a negative control for each test. <b>Results</b> Twelve (12) out of the twenty-four (24) meat samples I tested tested positive for antibiotics; ten were negative; and two were inconclusive. For my concentration analysis: Five (5) meat samples tested positive for the maximum testable amount of antibiotics (100%); eight (8) samples showed no antibiotic concentration (0%); and two (2) samples tested at 50%. So using the microorganism as an indicator, antibiotics were, in fact, detected in the meats sold in certain grocery stores. Also, my scanner showed a range of concentrations of antibiotics. <b>Conclusions/Discussion</b> I accept my hypothesis that antibiotics would be detected in some of the meat samples from the major California grocery store chains. In fact, half of the meat samples tested positive for antibiotics. This shows that antibiotics are in the meat we eat. The decreasing effectiveness of antibiotics due to overuse has become a major public health issue. Today 80% of all the antibiotics sold in the United States is added to feed for livestock -- for meat and poultry that will be sold in grocery stores throughout the country. Many of these antibiotics are the same ones prescribed for humans. This can lead to the development of antibiotic-resistant illnesses and infections -- and, ultimately, untreatable "superbugs."	
<b>Summary Statement</b> My project tests meats (beef, pork, and chicken) for antibiotics using the Bacillus stearothermophilus var. calidolactis microorganism -- to determine the presence/absence of antibiotics and to analyze the antibiotic concentration.	
<b>Help Received</b> My science teacher (Mr. Norm Brennan) supervised all the student projects for our school science fair; my father provided transportation to the grocery stores and assisted in ordering supplies.	