



**CALIFORNIA STATE SCIENCE FAIR  
2009 PROJECT SUMMARY**

<b>Name(s)</b> <b>Anna K. Kimball</b>	<b>Project Number</b> <b>S0413</b>
<b>Project Title</b> <b>Antibody Based Analysis of Digestive Enzyme Action on Gluten in Wheat Flour using Enzyme Linked Immunosorbent Assay</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The presence of gluten was tested using three different enzyme formulas: Gluten Digest, Gluten Ease, and Ultra-Zyme, to determine which enzyme breaks down gluten the best after 90 minutes in various environments.</p> <p><b>Methods/Materials</b> The first analysis used stomach-like conditions (prepared to allow enzymes to break down in approximately their natural pH of 2.5 and 98 degrees F temperature environments) for a period of 90 minutes. Enzyme Linked Immunosorbent Assay test strips (E-Z Gluten) were then used to measure the presence of gluten. A second analysis was performed to test our suspicion that either the sodium bisulfate or the enzyme mixtures were affecting the antibodies in the test strips.</p> <p><b>Results</b> Results show that the pH and/or enzymes were affecting the results. Additional tests were performed without the presence of sodium bisulfate and with the destruction the enzymes by boiling samples for 15 minutes prior to analysis.</p> <p><b>Conclusions/Discussion</b> Ultra-Zyme breaks down gluten the best. Gluten Ease worked second best. Gluten Digest gave faulty readings, and we were unable to determine actual results. Further experiments should be conducted to account for irregularities in test results.</p>	
<b>Summary Statement</b> Antibody Based Analysis of Digestive Enzyme Action on Gluten in Wheat Flour using Enzyme Linked Immunosorbent Assay (ELISA).	
<b>Help Received</b> Father helped experimental design; Sister and Mother helped with board; test strips/advice from Laura Allred, Lab Director ELISA tech, Florida; Dr. Margaret Rice Ph.D. Assistant Professor of Biochemistry Cal Poly San Luis Obispo explained antibodies	