



**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

<b>Name(s)</b> <b>Ishani N. Desai</b>	<b>Project Number</b> <b>S0604</b>
<b>Project Title</b> <b>The Science Behind the Stretch</b>	
<b>Abstract</b>	
<b>Objectives/Goals</b> To find which cheese, made from different fat percentages of milk (3.5% milk, 1.75% milk, < 0.1%) results in the longest stretch of cheese.	
<b>Methods/Materials</b> <ul style="list-style-type: none"><li>-1.5 gallon of whole milk</li><li>-1.5 gallon of skim milk</li><li>-1 1/4 teaspoon of citric acid</li><li>-1/8 mL of rennet enzyme</li><li>-Huge pot (big enough to hold 1 gallon of milk)</li><li>-Colander</li><li>-Thermometer</li><li>-Weighing scale</li></ul>	
<b>Results</b> <p>In the first trial, whole milk stretched eight feet, and weighed 600 grams. The combination milk (half whole milk, and half skim milk) stretched 3.5 feet, and weighed 475 grams. The skim milk stretched 11 feet, and weighed 300 grams.</p> <p>In the second trial, whole milk stretched 9.25 feet and weighed 600 grams. The combination milk stretched 3 feet and weighed 575 grams. The skim milk stretched 7 feet and weighed 310 grams.</p> <p>The the third trail, the full fat milk stretched 7 feet and weighed 585 grams. The combination milk stretched 3 feet and weighed 575 grams. The skim milk stretched 7 feet and weighed 310 grams.</p>	
<b>Conclusions/Discussion</b> <p>The cheese made from skim milk was enable to stretch the most. On average, this is because when the cheese was stretched, the temperature was at the highest. This enabled the cheese the stretch the most because of the protein in the cheese likes the hot temperature to stretch. First, the milk must be at a certain pH in order for the proteins to precipitate. In order for the protein to precipitate, the milk must be brought to a certain temperature and must have a certain acidity. The citric acid added, and the heat was able to bring the pH to the desired level, about a 6. When that was done, the rennet was added. This rennet was necessary to break apart the casein (milk protein). This enables some of the whey and some of the moisture leave the milk. Removing partially, this whey leaves the basic components of cheese: protein, lactose, minerals, and vitamins. Adding a certain amount of heat, along with the protein and moisture in the cheese, makes the cheese stretchable.</p>	
<b>Summary Statement</b> <p>How does cheese, made from different milk fat percentages, affect how far the cheese itself is able to stretch.</p>	
<b>Help Received</b> <p>My father helped me with stretching the cheese because it was very hot and difficult to handle.</p>	