CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

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Project Number
J1418

Project Title
Milk Temperature + Active Bacteria Culture = Viscous Yogurt?

Abstract

Objectives/Goals
The objective of my project is to determine how temperature of milk affects the viscosity of yogurt. I believe that the temperature of milk will affect the activities of Streptococcus thermophilus and Lactobacillus bulgaricus bacteria which are present in yogurt starter culture. This activity will affect the viscosity of yogurt.

Methods/Materials
Six cups of milk at varying temperature was used to set the yogurt. One teaspoon of yogurt starter culture was added to each cup. After 10 hours of fermentation the viscosity of yogurt was calculated for 6 cups. Viscosity was measured using Stokes equation.

Results
Viscosities of yogurt was found to be changing, though not in a linear fashion. Initially, as the temperature of milk increased the viscosity of yogurt also increased. This linear relationship was observed till the temperature of milk was around 130°F. From that point onward, though the temperature of milk increased, the viscosity was observed to be decreasing.

Conclusions/Discussion
A group of lactic acid bacteria: Streptococcus thermophilus and Lactobacillus bulgaricus (present in yogurt starter culture) ferments milk sugars to produce lactic acid. The viscosity of yogurt depends on lactic acid production. There exists a symbiotic or proto-cooperative relationship between Streptococcus thermophilus and Lactobacillus bulgaricus bacteria. The coagulation of milk proteins is induced by thermophilic bacteria (Streptococcus thermophilus, and Lactobacillus bulgaricus) which propagate at high temperatures. As the concentration of lactic acid increases the proteins present in milk form gel and the result is viscous yogurt. This is how the temperature of milk facilitates bacteria in starter culture to produce viscous yogurt.

Summary Statement
Viscous yogurt is the product of an ideal temperature of yogurt milk and the stimulation of bacteria in starter culture.

Help Received
My grandmother gave me the recipe to make yogurt.