

**Exhibition of Undergraduate Research and Creative Achievement (EURēCA)
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Student Name(s): Ryan Hodges, Chanci King, Brandon Massengill, and Brittani Perez	Title of Presentation: Subclinical Mastitis Inline Detection System
Division of Entry: College of Engineering	Faculty Advisor: John Wilkerson

Abstract: *(Type in 12 point font to fit the box below.)*

Milk produced by America's 65,000 dairies makes up the country's second largest agricultural commodity. Mastitis in dairy cows is the inflammation of the udder as a result of bacterial infection, and because of the incidental reduction in milk quality and quantity as well as the associated veterinary and antibiotic costs, it is the most costly problem for the dairy business. Mastitis is classified as subclinical, clinical, or chronic, with subclinical being the least severe but most difficult to detect. There are existing techniques for detecting mastitis; however, they lack the timeliness and sensitivity for subclinical detection. When battling mastitis, a cow's immune system releases somatic cells, white blood cells and epithelial cells proportional to the amount of the infection. By adding a reagent to raw milk, the mixture's viscosity increases directly proportional to the concentration of somatic cells in the milk. We are developing a sensor that uses fluid dynamics and instrumentation to monitor somatic cell counts by measuring and comparing viscosity. This sensor is a real-time, inline somatic cell level detector that is affordable, reliable, easily maintained, and that is designed so that it can be installed into existing milking systems. A small sample of milk (about 15 mL) would theoretically be pulled from the milking claw in such a way that the four separate quarters could be tested. Once the sample, of a known volume, enters our system it is mixed with a controlled volume of reagent to achieve consistent and adequate mixing. The mixture is then pulled through a fluidic path that is designed to increase resistance to detect small changes in viscosity. Detection of subclinical mastitis will not only improve profitability for the producer, but it will also reduce the overall antibiotics need to treat mastitis having both an economic and environmental benefit.