



**CALIFORNIA STATE SCIENCE FAIR  
2011 PROJECT SUMMARY**

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<b>Project Title</b> Protein Concentration in Different Stages of Cow Lactation	
<b>Objectives/Goals</b> The Imperial Valley is one of the top producers of many agricultural products and one of these products includes milk. Locally there are three dairies. The purpose of this experiment is to find out which stage of lactation in Jersey and Holstein cows produces a greater amount of total proteins in milk. The results of this investigation may be used to create a commercial combination of milk high in protein for human consumption. Total protein amount was chosen over the amount of the individual proteins because there is no commercial value attached to individual proteins. We chose bullfrog farms under the supervision of Richard Vanleeuwen because they have two different breeds of cattle which we can compare (Jerseys and Holstein). Our hypothesis was that the earlier the stage of lactation, the higher the protein concentration because of the nutritional needs of the calf. <b>Abstract</b> The Imperial Valley is one of the top producers of many agricultural products and one of these products includes milk. Locally there are three dairies. The purpose of this experiment is to find out which stage of lactation in Jersey and Holstein cows produces a greater amount of total proteins in milk. The results of this investigation may be used to create a commercial combination of milk high in protein for human consumption. Total protein amount was chosen over the amount of the individual proteins because there is no commercial value attached to individual proteins. We chose bullfrog farms under the supervision of Richard Vanleeuwen because they have two different breeds of cattle which we can compare (Jerseys and Holstein). Our hypothesis was that the earlier the stage of lactation, the higher the protein concentration because of the nutritional needs of the calf. <b>Methods/Materials</b> We extracted a total of 40 samples from different cows, 5 Holstein cows and 5 Jersey cows on each stage of lactation (colostrum, early, mid, and late) and performed protein analysis by spectrophotometry comparing the milk samples to a standard (bovine serum albumin). The independent variables for this experiment, manipulated independently from each other, are the lactation stage of the cow and the breed of the cow. The dependant variable for this experiment would be the consequential protein concentration of each sample from the different breeds and at different lactation stages. <b>Results</b> The results tend to show that there is a relationship between the stage of lactation of the cow and the protein content of the milk from the cow. In general, there is a decrease in concentration of protein in the later stages of lactation as opposed to the earlier stages. However, there seems to be an anomaly when it comes to the late lactation of Holstein cows. While there should be a decrease in concentration of protein and should even be the sample with the lowest concentration, the data shows that there is a sharp increase in the concentration in protein. Jersey cows produce milk with higher protein content in all four stages of lactation. <b>Conclusions/Discussion</b> The results gathered from these experiments tend to agree with our initial hypothesis, except for the final lactation state of Holstein cows. Reasons for this anomaly could be experimental error possibly when dealing with such minuscule amounts of sample in our procedure.	
<b>Summary Statement</b> The purpose of this experiment is to find out which stage of lactation in Jersey and Holstein cows produces a greater amount of total proteins in milk.	
<b>Help Received</b> Richard Vanleeuwen and Julio Alcantar from Bullfrog Farms.	