Discussion

Seen under the microscope, the confluency of all the plates was around 80% and the cells were found dead at the same, we can expect the milk and the colostrum to have some type of effect. The reason for the cells to die was first assumed to be contact inhibition but we found more confluent plates that were cultured prior to the project will a higher confluency. The problem could have been with the incubator that the cells were resting in as it was recently modified and cleaned. The 3T3 were the first cells to.

Furthermore, when the milk and colostrum were placed in agar plates to test for contamination, some unknown compounds were discovered. These compounds could either be lactose molecules, big proteins, uncaptured fat globules, and dead cells. The reason to believe that the milk was not contaminated, and the compounds found were not dead cells because the cells did not show any signs of contamination. Additionally, the smell of the milk that was processed was still sweet unlike the unprocessed milk which smelled bad and showed signs of bacteria.

Some limitations of this project are that due to the death of cells, most of the data is qualitative therefore the conclusions made in this paper may not hold true if the experiment was repeated.

Initially, the plan was to tyndallize the milk for 3 days and then use membrane filtration to make the milk sterile. The project also aimed to use mammalian breast cancer cells and primary chicken cells but due to some contamination, the focus had to change quickly to 3T3 cells.

Some other hurdles that were faced was that for the 1st half of the milk processing, all the sterile hoods in the lab were under maintenance and could not be used. To counter this, sterile environments were created outside the hood every day to conduct the experiments.

This study adds to the plethora of papers aiming to find an alternative for Fetal Bovine Serum. In past studies, most of the alternatives used were either synthetic, therefore expensive or only available in certain parts of the world. This study is unique as it focuses on a much more widely available resource. This research opens a new area of exploration for FBS replacements in the form of goat milk and goat colostrum. Although minimal data was available to collect during the research process, the data shows signs that the usage of goat colostrum might be almost as effective as FBS while being about 50 times cheaper.

Future Research

In the future, the project should be redone with more reliable equipment to ensure that the reason for cell death is because of the lack of quality of the equipment. Additionally, 0.45-micron filters can be used instead of irradiation to eliminate any molecules that will obstruct the view of the cells.

Furthermore, bovine milk and colostrum should also be tested as they are more accessible than goat milk and colostrum. The culturing of additional cell lines using the alternatives would also be valuable information to know. Since 3T3 cells are an immortal mammalian cell line, in the future, the alternatives can be tested on primary mammalian cell lines when eventually the cell lines of other animal groups.

Testing the effect of milk and colostrum on different types of cell lines is essential to determine if FBS can be fully replaced with the milk and colostrum alternatives.

Section V: Conclusion

The observed cell death on 3T3 cells in culture was initially accounted for as a case of contact inhibition and later linked to modifications that occurred in the incubator. Obstacles included the unexpected presence of various contaminants in goat milk and colostrum, leading to a change from breast cancer cells towards 3T3 cell culture.

Although this research has limitations regarding the applicability of qualitative data, it seems that colostrum goat is a rather cost-effective alternative to Fetal Bovine Serum (FBS). Further studies should be conducted using the same equipment that is not faulty, use 0.45-micron filters and develop bovine milk as well. Researching the substitution potential in different cell lines, more so primary mammalian cells is fundamental to know alternative means of support for cell culture. Thus, this study provides perspectives for the further investigation of goat milk and colostrum as possible alternatives to fetal bovine serum.