

Hongji Zhang

## Objective

To meet the market's growing demand of good tasting Yogurt snack and fulfill consumer's requirement of having healthier dairy product that easy to eat and package.

## Background

Yogurt has a long history and is a common component in daily diet. Yogurt plays an irreplaceable role as a common snack ingredient because of its unique taste and high nutrition value. According to marketing study, in the past 30 years the annual per capita yogurt consumption in United States has grown from 1.13 kg in 1980 to 5.67 kg in 2010; additionally, market is predicted to be continuously growing in the future.

## Impact

Positive impact:

- Providing innovative yogurt product with unique taste and texture.
- Stimulation of local dairy industry and providing more job opportunity.

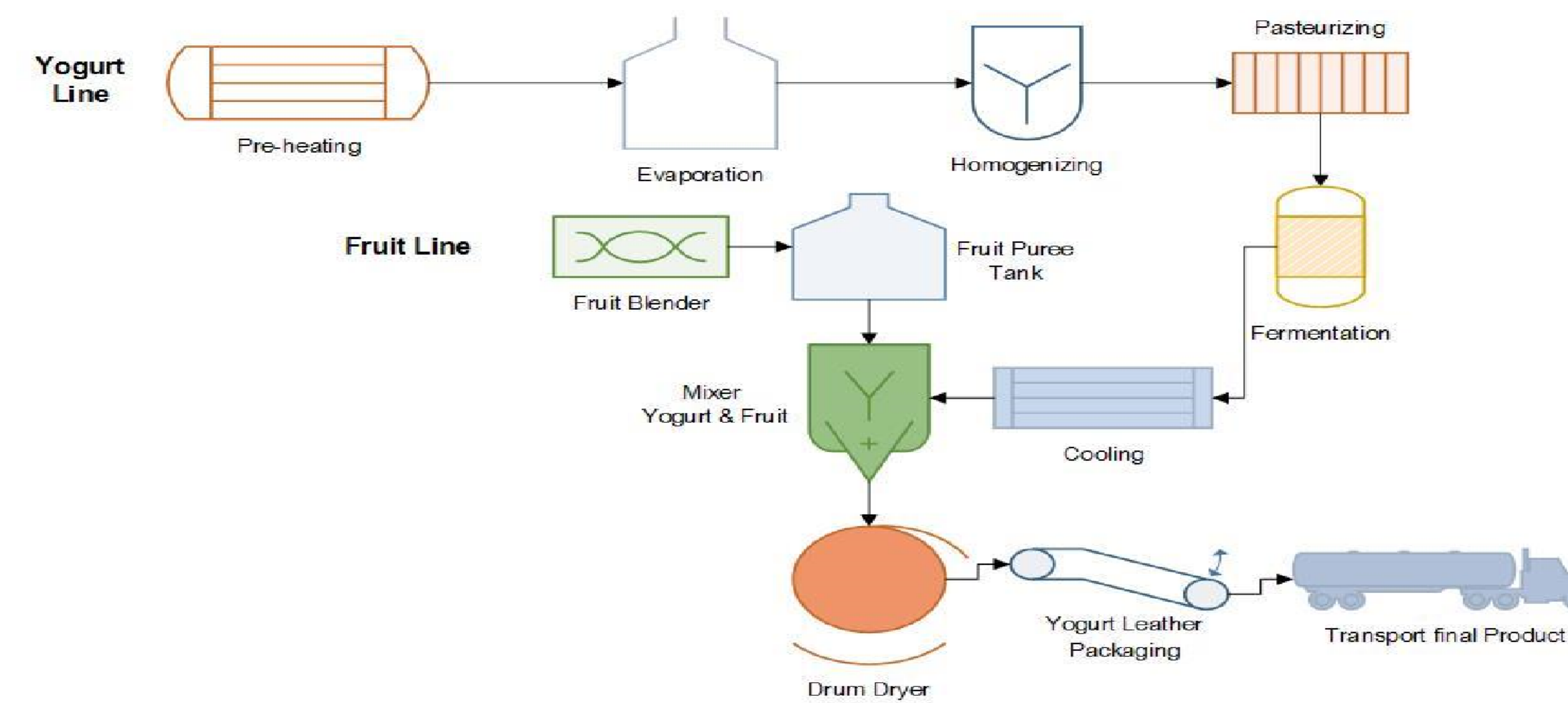
Potential negative impact:

- Industrial pollution (air pollution, water pollution, etc.)

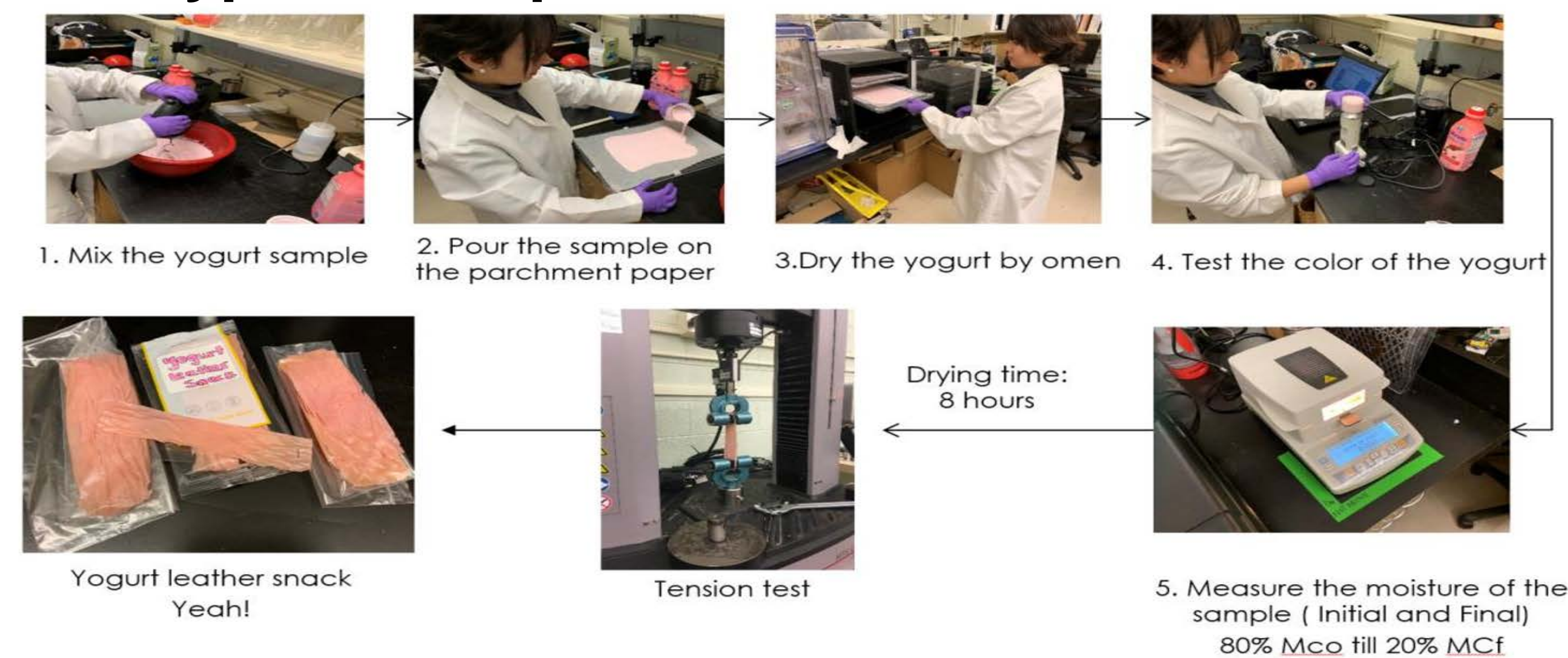
## Budget Information

Cost	Price
Total Capital Investment	\$ 59531.81
Annual Manufacturing Cost	\$ 318523.02
Annual Genral Expenses	\$ 93233.59
Annual Production Cost	\$ 411991.11

## Process Flow Diagram



## Prototype Development



## Alternative Evaluation

Drying Method	Characteristics	Comparison with Drum Dryer
Air- Dried Snacks	Low cost and easy operation.	Reduces nutritional value drastically for the use of high temperatures, also had a bad impact on color and flavor.
Snacks made by Extrusion and Decompression Drying	Fruit and dairy powder is mixed with starch to create an extrude product. It allows to enrich with extra vitamins and proteins added during the process.	It is not applicable for these purposes. But it establishes a point that works also for drum drying, of adding extra additives to the snacks.
Freeze Drying	Keeps most of the organoleptic properties on the product.	High cost, slow drying
Drum Dryer	Allows the drying of flakes for gelatin products like the leather fruit-yogurt snacks, temperatures and velocities can be managing to maintain certain moisture content. It works for creating thin layers of product film that will be scratch and process into packaging later.	Needs control of temperature to keep precision on the process. High cost.

## Recommendation & Constraints

Constraints:

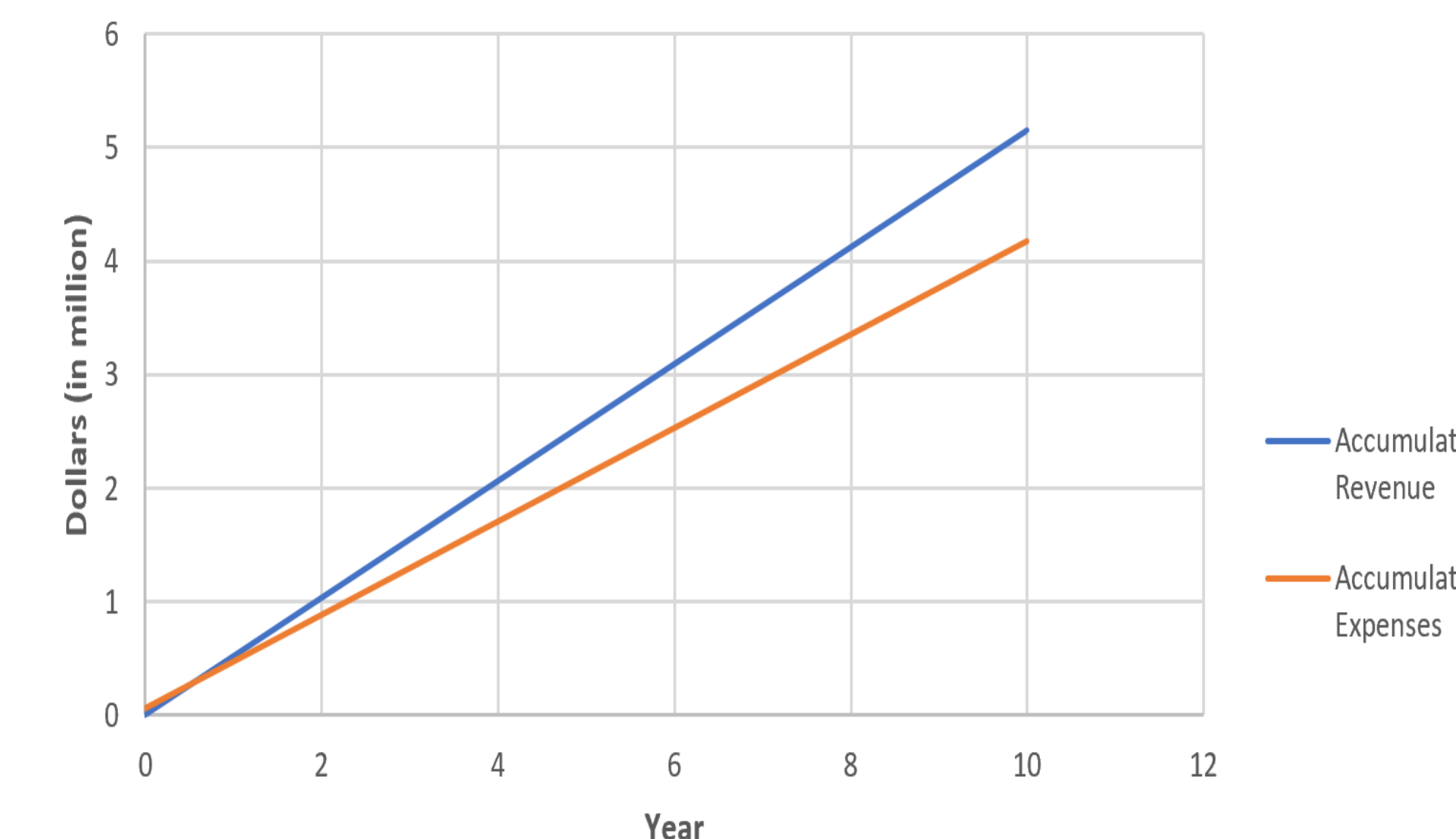
To produce high quality yogurt leather snack, large continuous raw material is required (milk). Therefore, to minimize the transportation cost for raw material, it is better to build the plant close to dairy farms.

Recommendations:

- Add different amount of sugar or adjust the drying time to improve taste and texture.
- Use more environmental friendly materials and avoid using plastic for packaging yogurt leather snack.

## Economics Analysis

Year	Outflow	Inflow	Net Cash Flow	Profit
0	59,531.81	--	-59531.81	-59531.81
1	411,991.11	926,984	514,993.02	455,461.21
2	411,991.11	926,984	514,993.02	970,454.23
3	411,991.11	926,984	514,993.02	1,485,447.25
4	411,991.11	926,984	514,993.02	2,000,440.27
5	411,991.11	926,984	514,993.02	2,515,433.29
6	411,991.11	926,984	514,993.02	3,030,426.31
7	411,991.11	926,984	514,993.02	3,545,419.33
8	411,991.11	926,984	514,993.02	4,060,412.35
9	411,991.11	926,984	514,993.02	4,575,405.37
10	411,991.11	926,984	514,993.02	5,090,398.39



## Timeline

Design Phase	Date
Design Selection, Problem Statement, Determination, Literature Review	08/22/18 – 10/13/18
Mass Balance and Energy Balance	10/13/18 – 10/31/18
Lab Scale Experiment	10/31/18 – 01/16/19
Project Analysis, Economics Analysis	01/16/19 – 04/15/19
Poster & Presentation Preparation	04/10/19 – 04/17/19
Final Report Preparation	08/22/18 – 05/03/19