Fermented Tomato Ketchup

Problem Statement and Objective
Ketchup global popularity has increased the demand on different types of ketchup to adjust for different tastes around the world. The search for non-traditional, organic ketchups has been growing significantly. On the other hand, customers are concerned about sodium and high fructose corn syrup levels in their condiments. Ketchup is typically produced using tomatoes and high fructose corn syrup, and the need for a more healthful ketchup product is present.

Fermentation products are rich in digestive enzymes and probiotics that help reduce diseases like lactose intolerance and asthma, and increase the absorption of nutrients derived from food. The purpose of our project is to design an efficient model for the fermentation of a healthful fruit ketchup that optimizes product quality while minimizing production costs.

Alternative Solutions
Waste: use of seeds & skin
Tomatoes: storing of tomato paste
Filtration: mesh screen
Bottle Sterilization: high heat sterilization, Ethylene Oxide processing
Packaging: cans, bottles, jars

Constraints
Price point: High in order to profit
Competitors: Heinz, Hunts, Kissan, DelMonte
Seasonal Growth: Tomatoes do not grow year round in the U.S.

Business Plan
Target Consumers: Individuals, families, and restaurants
Sales Platform: Online retailers, farmers markets, company website
Advertising: Social media, company website, free sampling

Equipment Cost
- Filtration System: $5,449.19
- Mixing System: $3,853.71
- Multiple Effect Evaporator: $1,512
- Fermentation System: $9,253.34
- Pumping: $2,250
- Piping: $1,562.30
- Total: $23,880.95

Summary of Economics
- Total Direct Costs: $56,120.23/yr
- Total Indirect Costs: $30,090.38/yr
- Total Income: $290,178.67/yr
- Total Product Cost: $192,356.57/yr
- Total Capital Investment: $120,121.18

Design Layout

Procedure
- Whole tomatoes enter system
- Tomatoes are washed and chopped
- Seeds and skin are filtered
- Excess water is evaporated to form tomato paste
- Excess water is condensed and recycled for use in the washing stage
- Spices are mixed in and cooked
- Fermentation of vinegar occurs
- Sterilized bottle packaging

Process Flow Diagram

Impacts
Market: The ketchup market was valued around $4.15 billion in 2015 and it is expected to grow to $5.9 billion in the next 5 years.

Global/Societal Impact: Considering the large market and our contributions to it, it is of critical importance that we acknowledge our global and societal impact. We have looked into finding places or unit operations in the food processing chain where waste can be minimized and productivity increased with the help of sustainable solutions. In the future, we might aim to make changes to our system to add back the skins and seeds and reduce waste.