

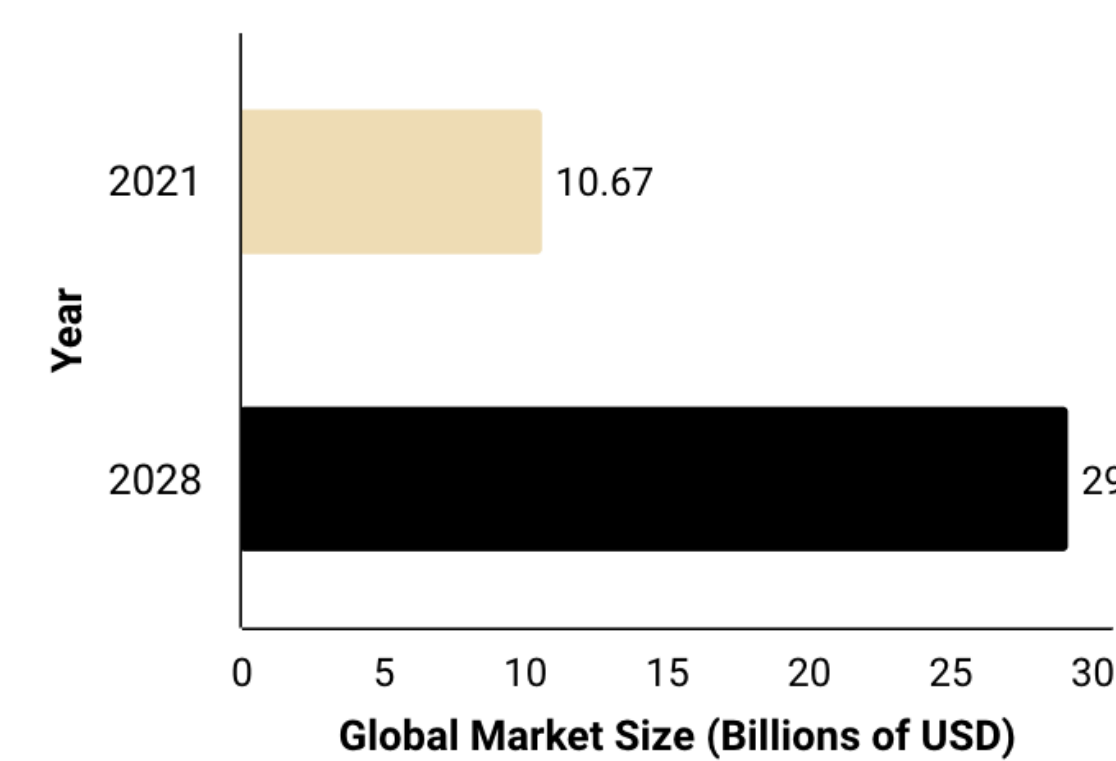
Background

A **nootropic** is a substance that enhances cognitive functions.



Problem: Consumers seek **trustworthy alternatives** to consuming caffeine & nootropics.

The nootropics market size is projected to **double** by 2028.



→ While tablets/capsules currently constitute 45% of the nootropic market by revenue, the **beverage segment is anticipated to register the fastest CAGR of 16% from 2021 to 2028.**

→ **Primary Competitors** include AmaTea (\$3.99/can), Neuro Drinks (\$2.26/can), TruBrain (\$3.57/can) & BrainJuice (\$4.49/can).

Nootropic of interest: Ashwagandha

A shrub used for reducing stress, calming the brain, lowering blood pressure, reducing insomnia, aging, anxiety, and boosting the immune system.



Objective: MockTropic aims to bridge this gap of public interest yet mistrust by creating an affordable nootropic mocktail that reduces anxiety, improves focus, and is derived from sustainable/natural resources. In this way, MockTropic strives to give consumers an energy boost without the "jitters" associated with artificial sources of caffeine or the side effects of alcohol consumption.

Important Considerations

- Ethical: Transparency about ingredients & ethical sourcing
- Global: Product availability to various economic classes
- Societal: Providing accessible information about nootropics

Product Description

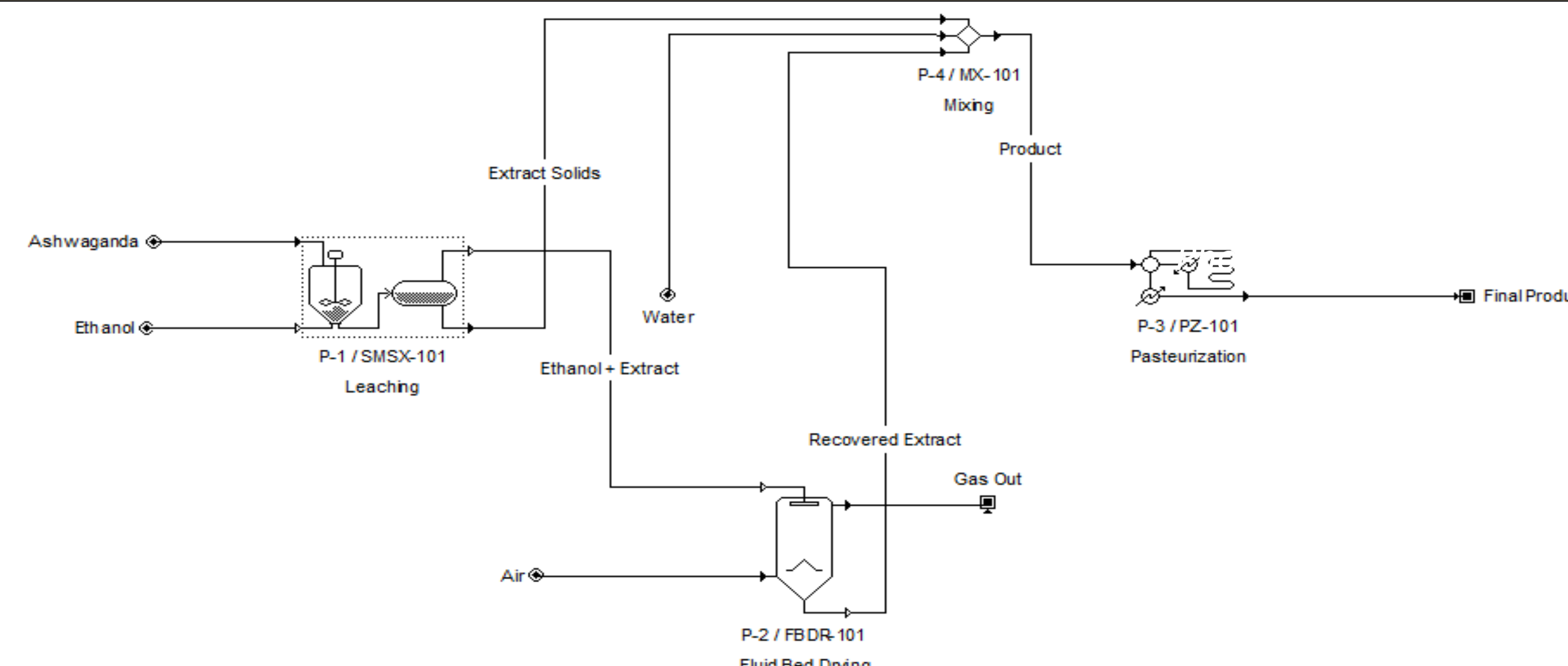
Our product delivers a vibrant citrus flavor infused with Ashwagandha extract. The drink aims to be a refreshing delivery of quality flavor and cognitive benefits including promotions of mental clarity and enhanced focus. Whether you're seeking a rejuvenating pick-me-up to power through your busy day or a refreshing moment of mental clarity to fuel your creativity, this beverage is perfect for any occasion.

Nutrition Facts

1 servings per container	
Serving size 1 can (355ml)	
Amount Per Serving	% Daily Value*
Calories	110
Total Fat 1g	1%
Saturated Fat 0.6g	3%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 0mg	0%
Total Carbohydrate 24g	9%
Dietary Fiber 0g	0%
Total Sugars 21g	
Includes 0g Added Sugars	0%
Protein 2g	4%
Vitamin D 0mcg	0%
Calcium 267mg	20%
Iron 9.967mg	60%
Potassium 0mg	0%
Vitamin C	100%
Ashwagandha Root Extract 300mg	100%

*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Process Design & Optimization



Extraction

Microwave assisted extraction provides efficient nutrient leaching of oils from ashwagandha powder using ethanol as a recyclable solvent.

Alternative: Supercritical Fluid Extraction

Drying

Fluidized bed drying provides an efficient way to dry the extracted material to separate and recover ethanol to be recycled for extraction.

Alternatives: Spray drying, freeze drying

Mixing

The ashwagandha oil will be incorporated with orange juice concentrate, water and vitamins in a continuous inline static mixer.

Alternatives: Batch mixing

Sterilization

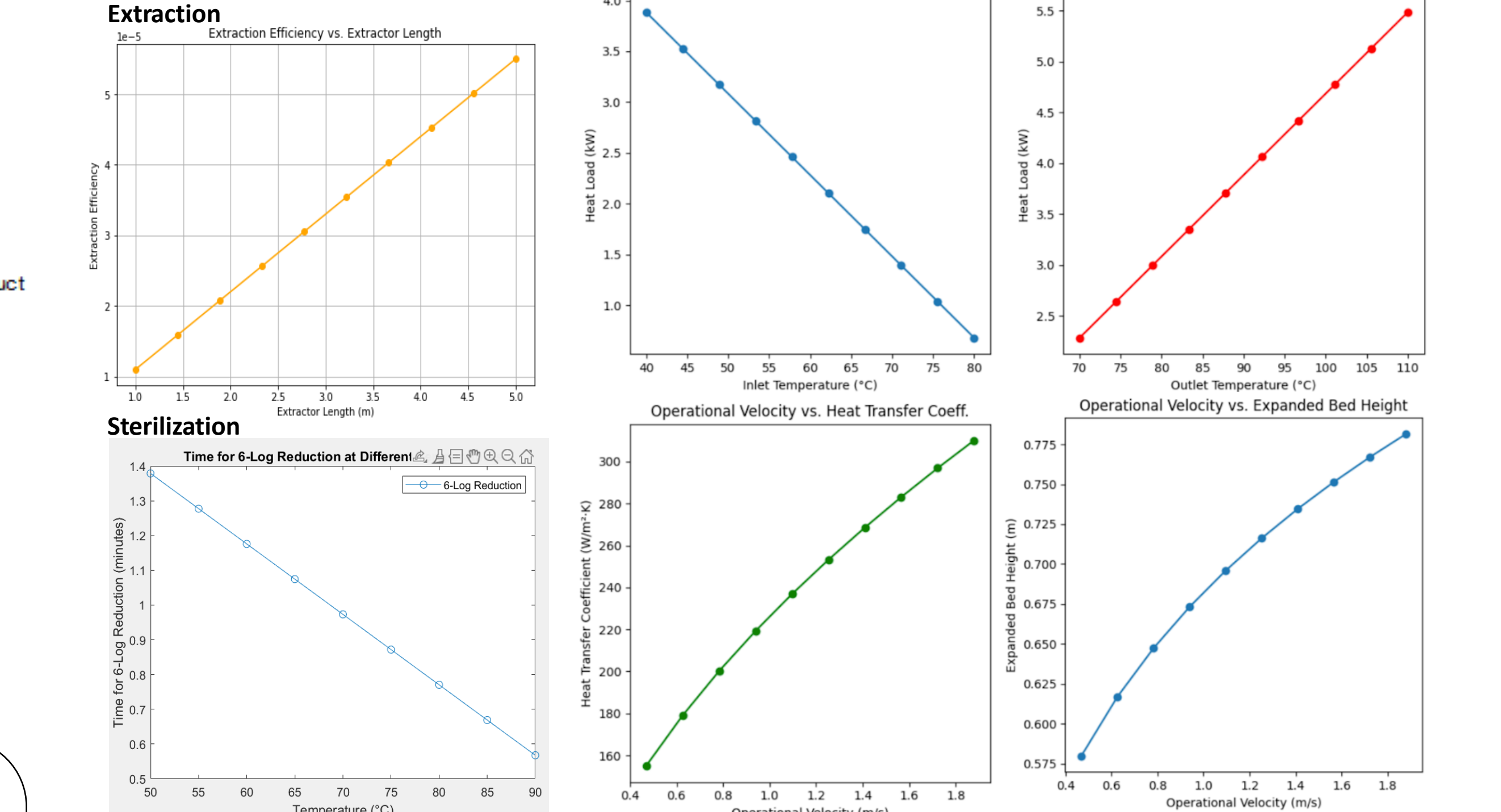
The batch's will be sterilized using semi-continuous pasteurization at 74°C resulting in a 6 log kill time of 62 seconds and total residence time of 4 minutes.

Alternatives: HTST sterilization

Plant Operating Conditions

- Annual Production
 - Extract yield : 58.4 kg/year
 - Cans : 365000 units/year
 - 10000 units/day
- Annual Consumption
 - Total Power : 47,894 kW-h/year
 - Total Gaseous Emissions : 2 metric tons/year
 - Total Annual raw materials : \$27,099

Optimizing Operating Conditions

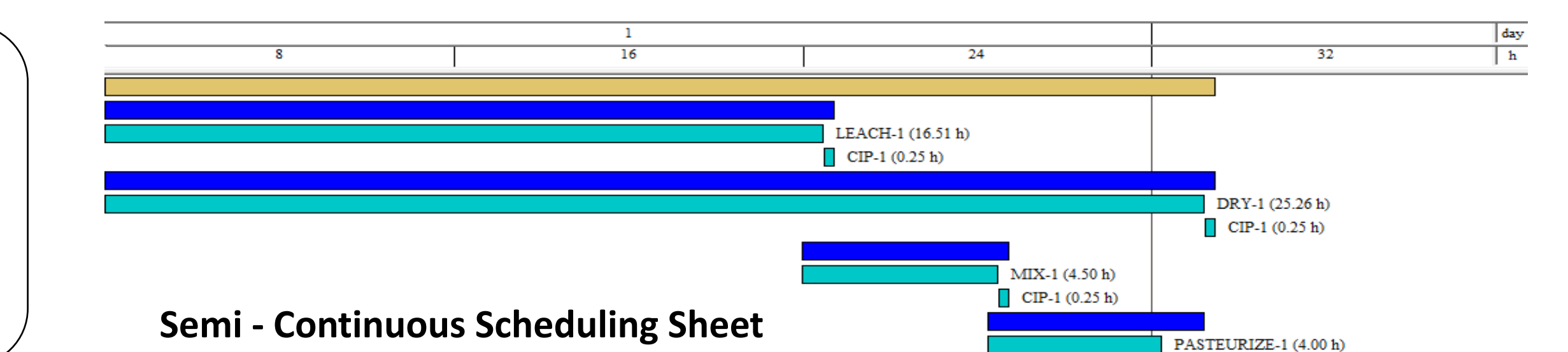


Extraction : Longer extraction vessels result in increased extraction efficiency but results in more expensive equipment and operational costs

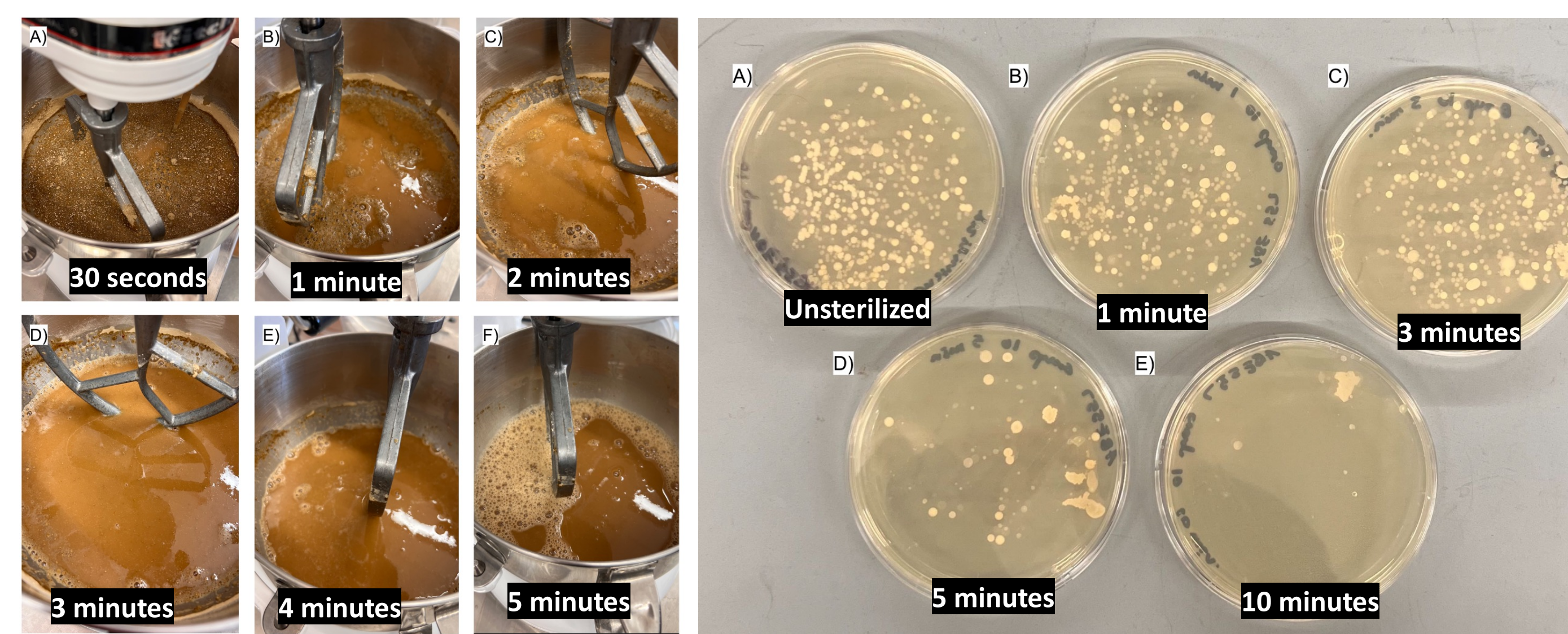
Drying: Higher inlet & lower outlet temperatures cause a lower heat load required. A lower operation velocity causes a smaller expanded bed height & heat transfer coefficient.

Mixing: An increased mixing time results in a more homogenized product.

Sterilization: Higher temperatures kill pathogens faster, but nutrients may also be degraded.



Experimental Results



Mixing: Find the mixing time necessary for a well-mixed, homogenous product.

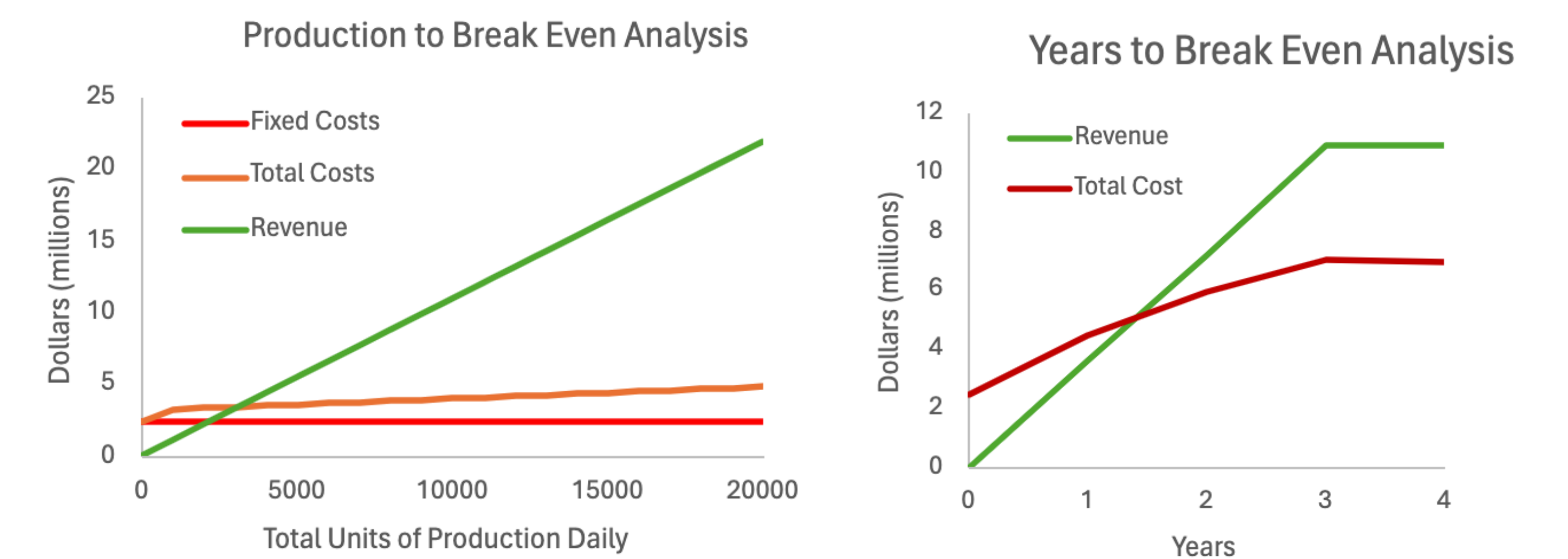
Result: 4-5 minutes

Sterilization: Find the best boiling time to effectively kill off pathogens at 210°C.

Results: 10 minutes at 210°C

Business Plan & Economics

- COST PER UNIT : \$3.00
- BREAKEVEN PRODUCTION RATE : 3173 CANS/DAY
- BREAKEVEN PRODUCTION TIME : 1.4 YEARS



Future Work: Experimentally test fluidized bed dryer & microwave assisted extraction, expand nootropic choices outside ashwagandha, and expand flavors.

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