



**ISLAND ABBEY
FOODS®**

Improved Manufacturing of Honey-Based Products

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Project Summary

Island Abbey Foods

- Prince Edward Island based company specializing in honey-based products.
- Products include multivitamin gummies and menthol lozenges. The facility operates as a contract manufacturer, along with their in-house brand, Honibe®



Project Objectives

- Primary objective of the project was to design an improved cooking process for multivitamin gummies, capable of producing 4000 kg/day. Additional design objectives included:
 - ⚠ Improving operator safety and reducing the risk of product cross-contamination
 - 📈 Reducing batch variability by improving process parameter control
 - 🧼 Optimizing fluid transportation with an in-place cleaning system

Technology and Process Selection

- Two designs were carried through all stages of the project, being continuous cooking and batch-to-continuous cooking.
- Due to lower operating costs and greater scalability, the continuous process was recommended as the primary design.
- ⚖ Decision Matrix was used to objectively select the most appropriate process

Economics Summary

- Class V cost estimate, -50% to +100% accuracy was completed.
- Continuous process was calculated to be more economically viable than the Batch to Continuous Process.
 - 💰 Continuous Process results in savings of \$850k/year
 - 📅 Fully Continuous Process
 - Payback period: 4.8 years
 - Return on Investment (ROI): 14%

Process Description

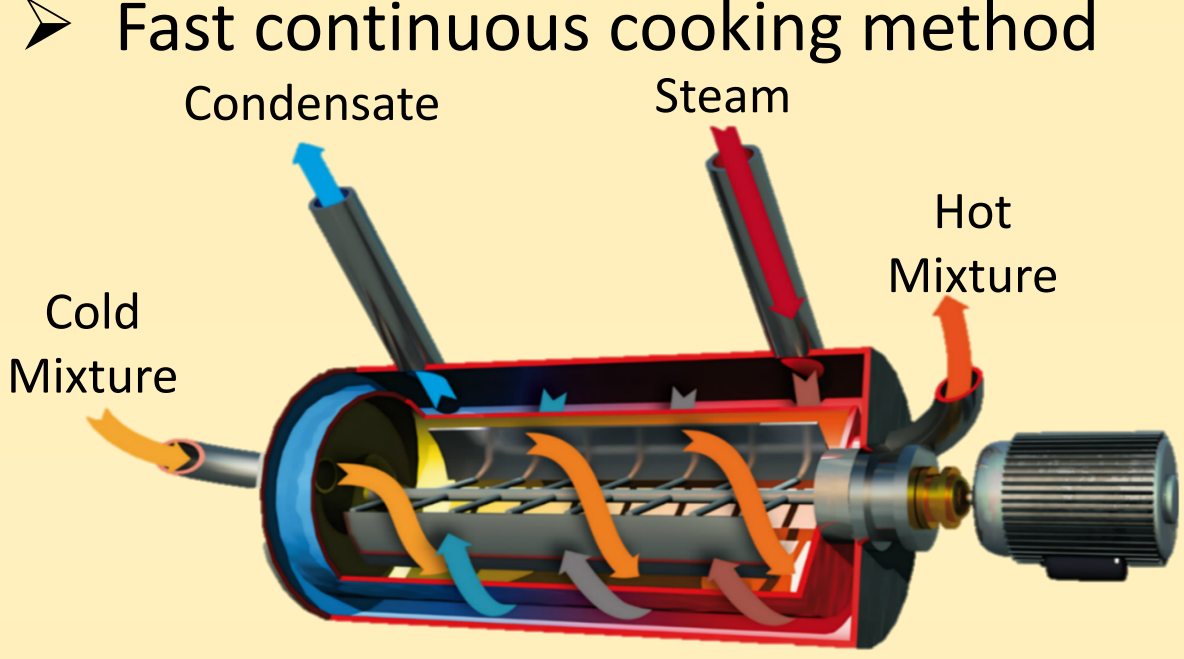
Continuous Cooking

Process Advantages

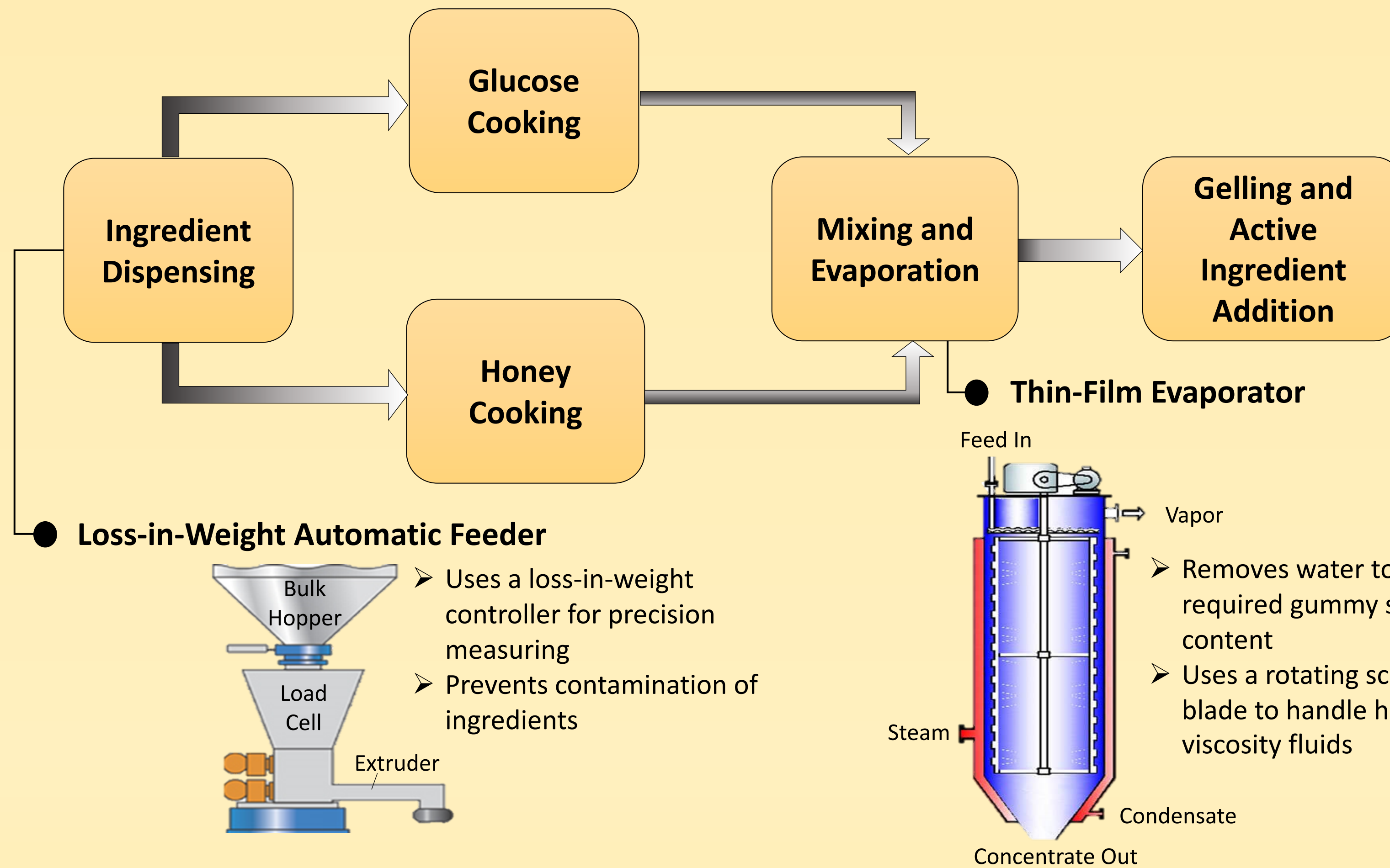
- Improved process automation
- Improved Safety and Ergonomics
- Scalable Design
- Eliminates Process Bottleneck

Scraped Surface Heat Exchanger

- Rotating shaft to reduce fouling and increase heat transfer
- Fast continuous cooking method



Gummy Production Overview



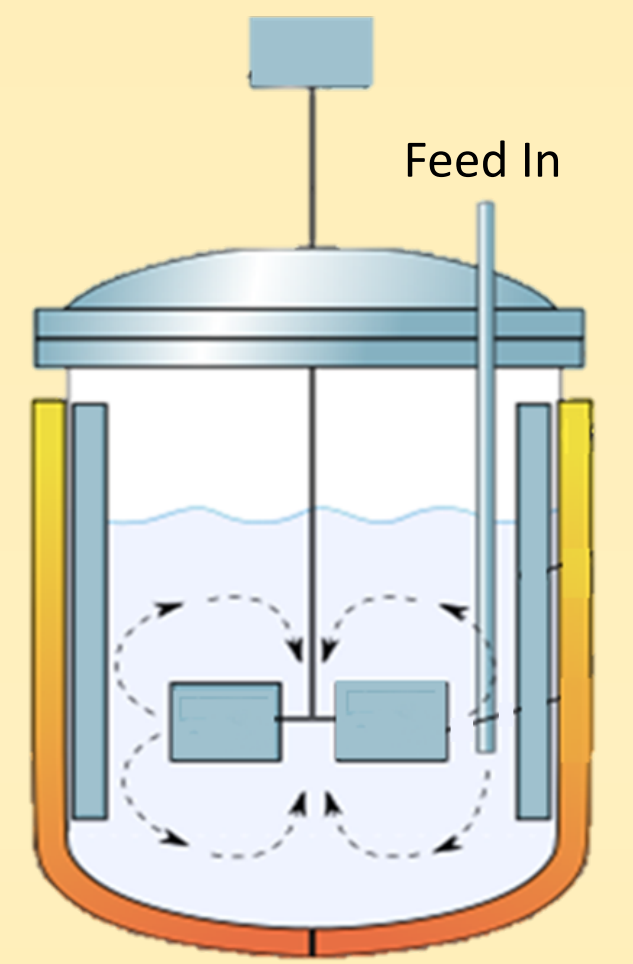
Batch-to-Continuous

Process Advantages

- Lower Process Complexity
- Established Cooking Technology

Steam Kettle Cooking

- Steam heated jacket for uniform heat transfer
- Batch operation



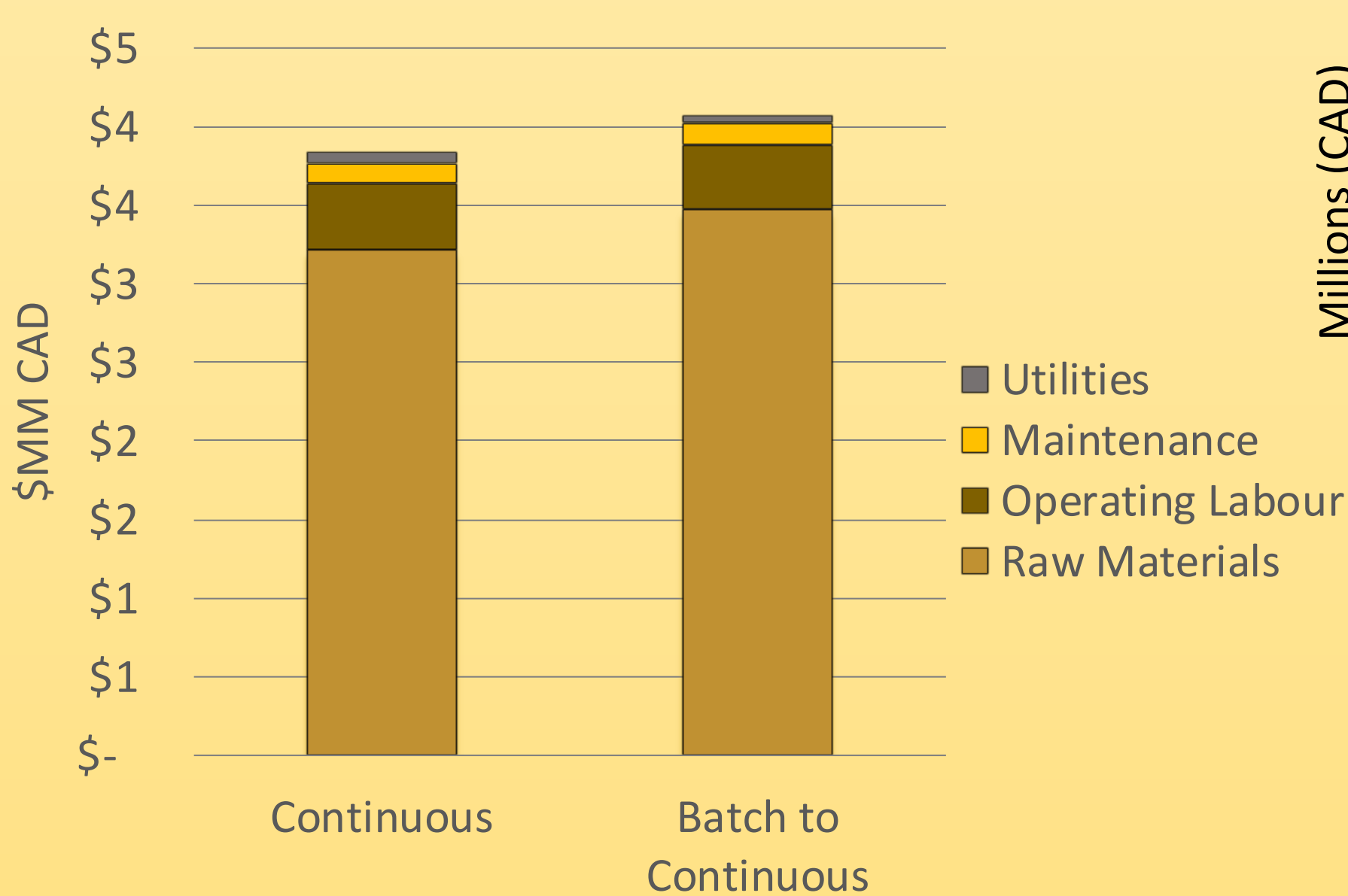
Design Features

🐝 Continuous Process was selected as the proposed process given its increased scalability, lowered batch variability and inherent safety

- 🐝 4000 kg production in a 12-hour daily operation
- 🐝 Optimized fluid transfer and increased operator safety
- 🐝 4 cycle clean-in place (CIP) system
- 🐝 Automated ingredient feeders to reduce batch variability
- 🐝 FDA Approved Food-Grade Materials

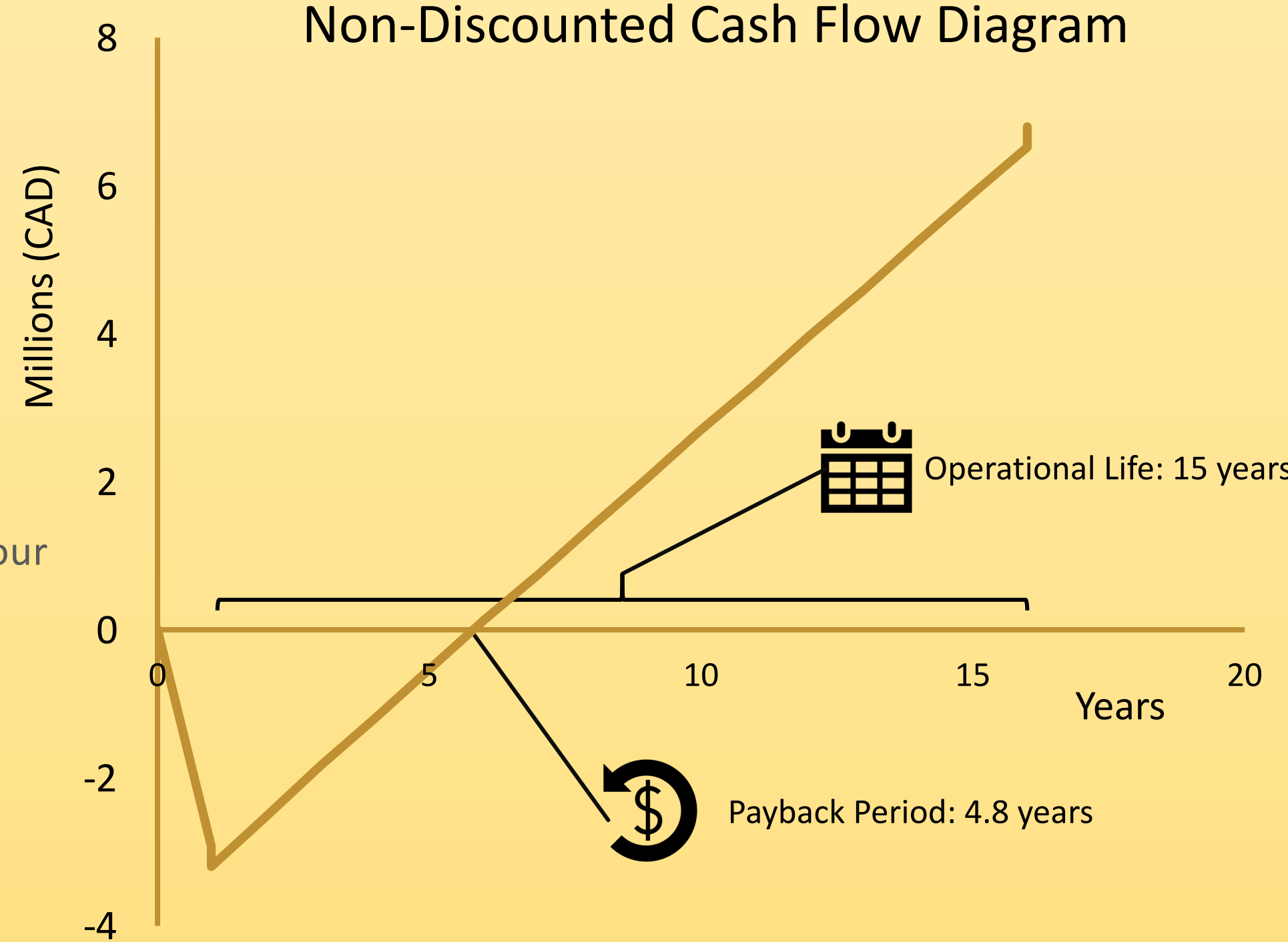
Economics

Operational Expenses

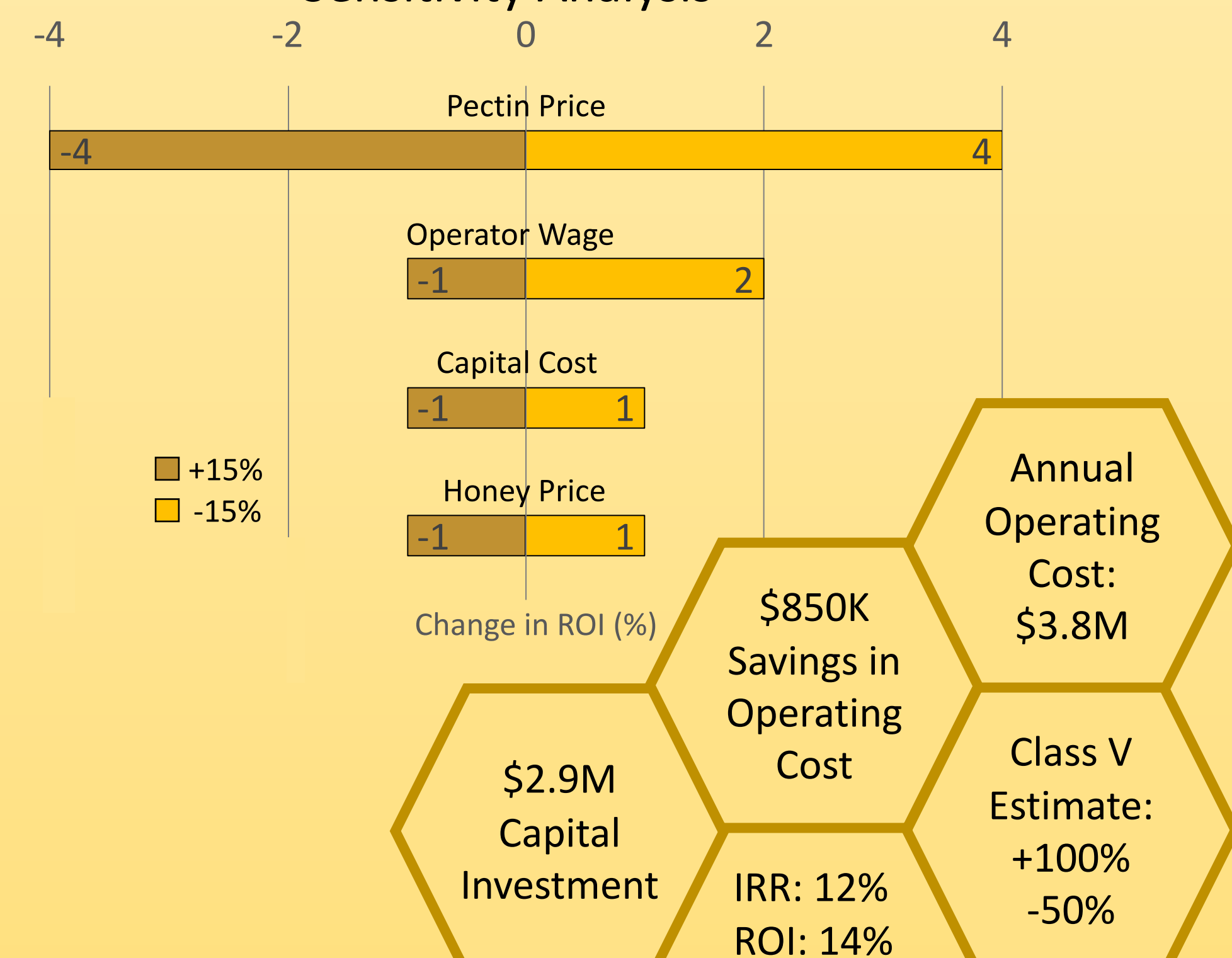


🐝 Batch process required an additional \$300K in cleaning chemicals

Non-Discounted Cash Flow Diagram



Sensitivity Analysis



Conclusions and Recommendations

Continuous Operation

- Doubled production capability to 4000 kg per 12 hours
- Removed operator burden of manual fluid transport

Improved Product Quality

- Automatic control improves product consistency
- Temperature and pH control reduces process variability

Economic Viability

- \$850k in Operational Savings
- Payback Period: 4.8 years
- ROI: 14%

Scalable Design

- 24-hour operation doubles production to meet further demand increases
- Increasing depositor capacity will reduce operating costs

Acknowledgements