



SYCAMORE

PROCESS ENGINEERING

wafiLin

masters in membranes

Content

- Introduction
- Hollow Fibre Membranes
- Use in F&B Industry
- Dairy Opportunities
 - MF
 - UF
- Q&A



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Introductions



Thomas Roersma
Manager Technology

- Graduated Food Technology
- 10 years at Wafilin Systems
 - Pilots
 - Engineering
 - Commissioning
- Responsible for membrane process technology



Leila Salter
Process Design Engineer

- Chemical Engineer with MEng
- Over 5 years of experience in delivering Capital projects across the Dairy, Food and Beverage Industries
- Responsible for the Process Design and Commissioning of projects

Sycamore Introduction

- **Experts in End-To-End** Process Solutions based in Sparkford, Somerset
- Over 70 direct employees, including:
 - Sales and Marketing
 - Process and Mechanical Design
 - Manufacturing
 - Project Delivery
 - Parts and Service
 - Management Systems
- More than **35 years of experience** in the Dairy, Food, Beverage and Plant-based industries.
- Passion for **sustainability** and **innovation**, ensuring our projects are utilising the latest technology whilst promoting the **lowest OPEX**.
- Overarching managements systems including **ISO 9001**, **ISO 14001** and **ISO 45001**

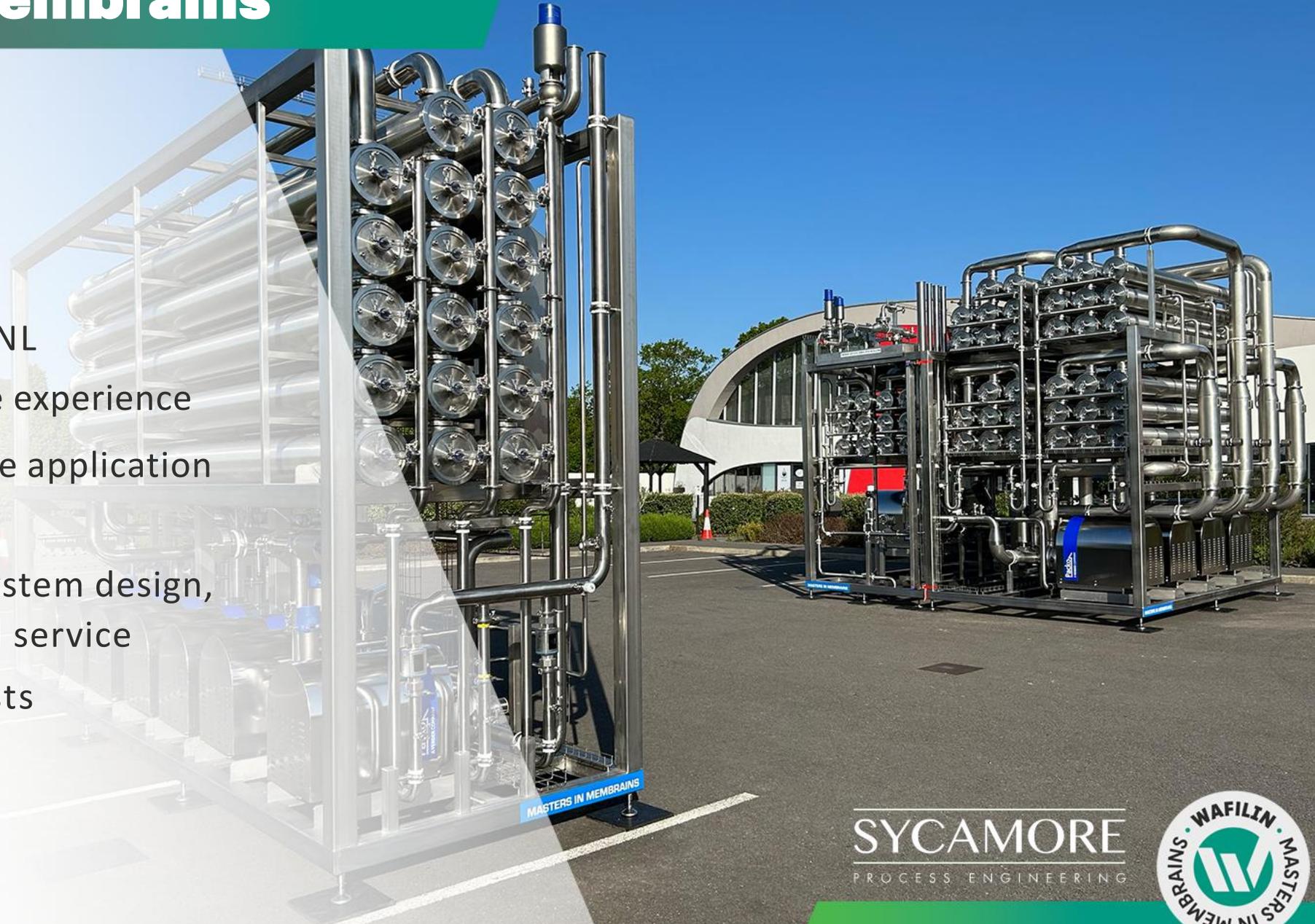


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Masters in Membrains

- Based in Leeuwarden, NL
- 50+ years of membrane experience
- Independent membrane application specialist
- Focus on membrane system design, delivery, integration and service
- 25 membrane specialists

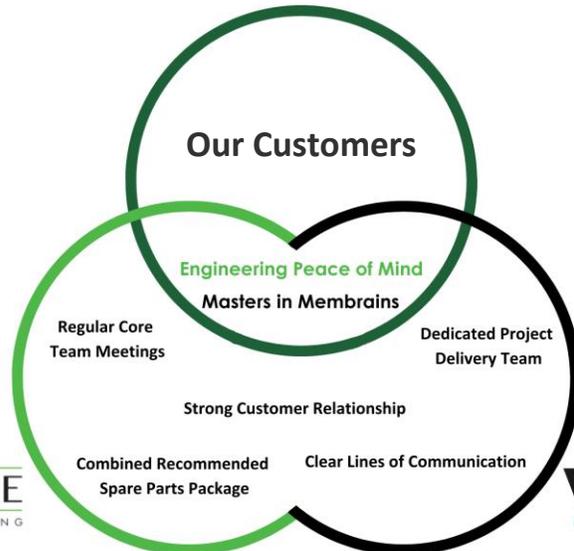
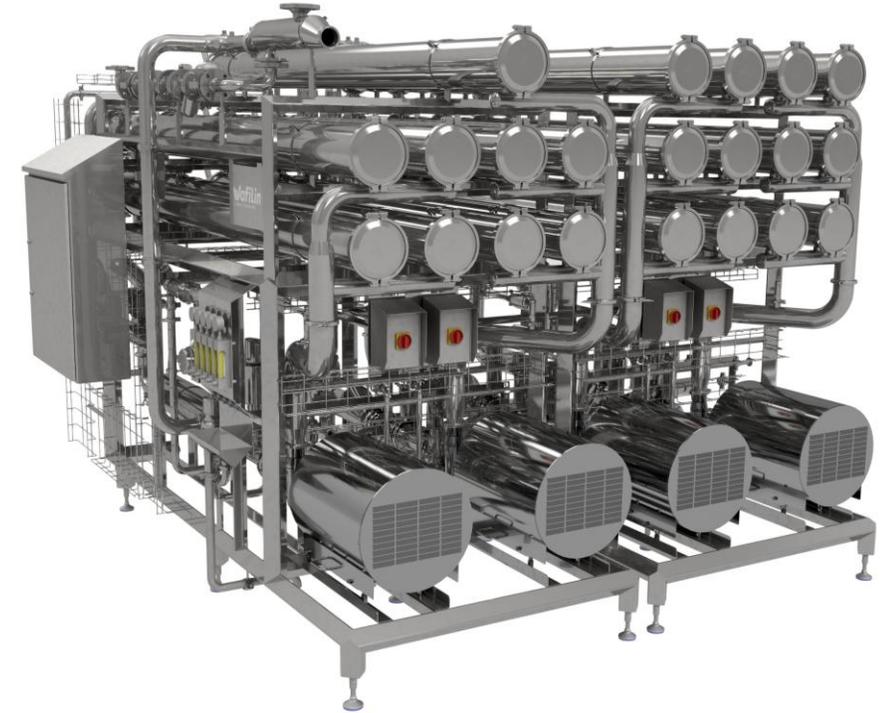


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Partnership Sycamore x Wafilin

- Collaborative partnership formed in 2020 to deliver end-to-end process solutions with expert knowledge in membrane filtration
- The crucial benefit this partnership brings to our customers is the seamless design and delivery of turnkey projects, including Membrane Filtration technology
- We provide MF, UF, NF, RO solutions and membrane replacements



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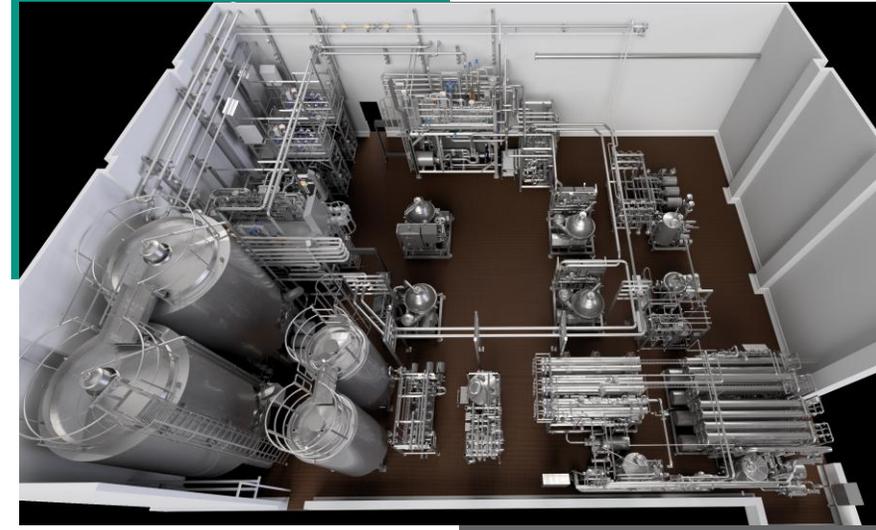
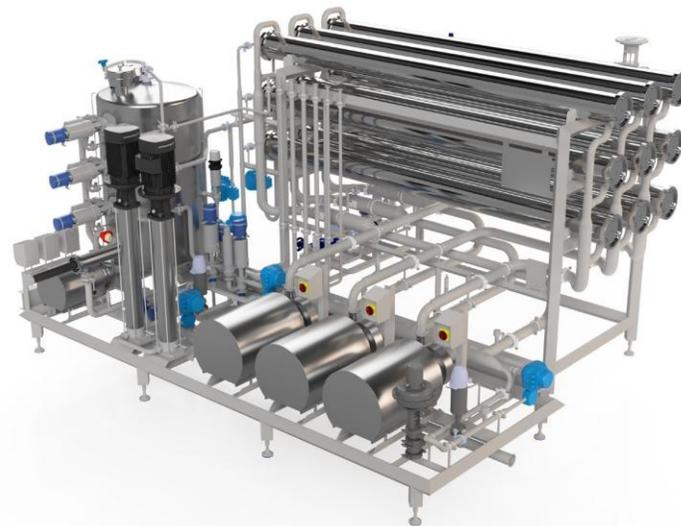


Selection of Joint Projects



Salty Whey Desalination plant with auto switch over duplex filters, separator and NF membrane filtration system

Design, manufacture, and installation of a 17,500 L/hr WPC60 pasteuriser and NF, UF & RO Membrane Filtration System



End-to-end whey processing facility to produce infant formula grade WPC 82

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Selection of our customers



Independent Membrane Supplier

Selection of membranes:

- Spiral Wound membranes
- Tubular membranes
- Ceramic membranes
- Hollow Fibre membranes





Hollow Fibre Membranes

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Hollow Fibre Membranes

- **Food & Beverage processes**

- Beer
- Juices
- Cider
- Wine

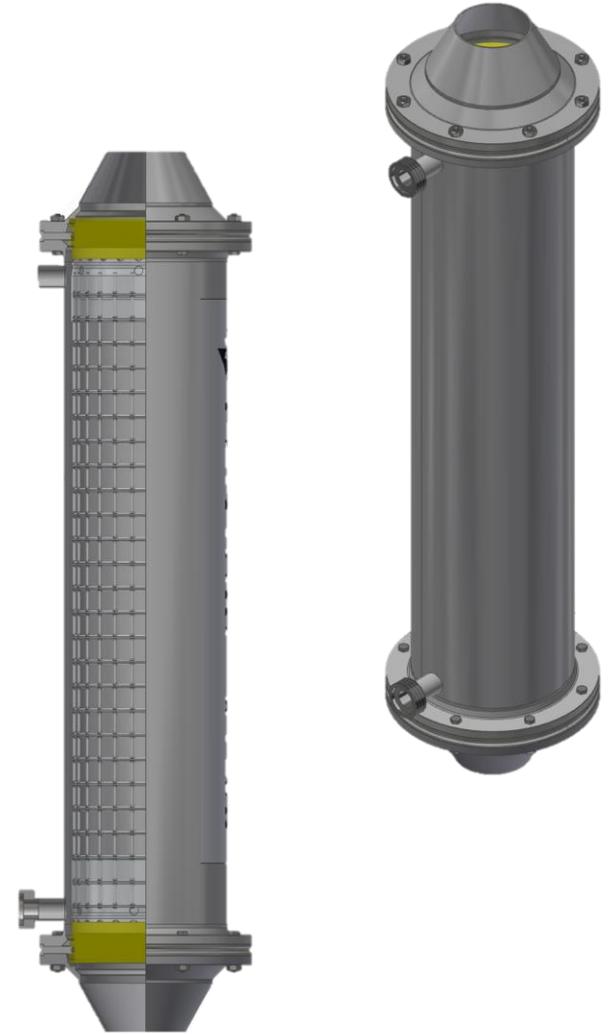
- **Benefits**

- Consistent quality
- Microbiological safety
- Higher fluxes
- Total protein retentions
- Energy consumption
- Membrane lifetime



Hollow Fibre Membranes

- **Low energy consumption**
 - Crossflow <2 m/s
 - DP Δ 0.5 bar
 - 0.8, 1.5 & 3.0 mm fibre options for high solids
- **Construction strength**
 - Temperature up to 80°C
 - Wide pH range 1 - 13
 - TMP control
 - Backflush possible



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Question

- How many cubic metres of beer is being processed by hollow fibre membranes per hour (Proven Technology for food/beverage)?

How many cubic metres of beer is being processed by hollow fibre membranes globally (Proven Technology for food/beverage) per hour?

2300

menti.com
3209 0325

Waiting for participants

Menti
SDT Spring Conference

Select which slide to add

Where are Sycamore and Wafilin each located?



Question

- Why is Beer being filtered?
 - Experience – Look and feel
 - Removal of yeast
 - Extended shelf life
 - Improve quality and stability
 - Taste consistency

Why is beer being filtered?

- Experience - Look and feel
- Remove Yeast
- Extend Shelf Life
- Improve Quality & Stability
- Taste Stability



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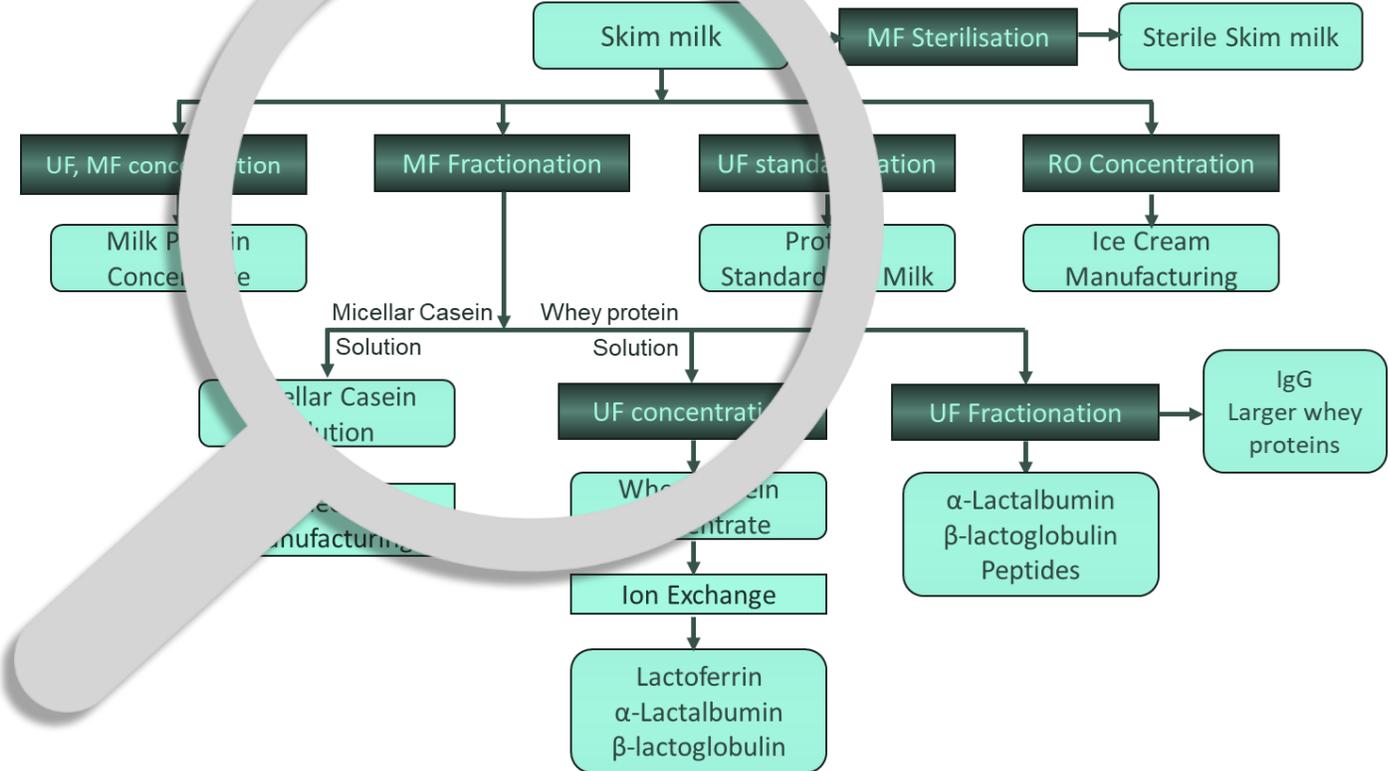
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MF & UF membranes Dairy

Dairy Applications

- Casein / Whey protein separation
- Colour Whey separation
- WPC / WPI high solids





Hollow Fibre in Dairy Applications

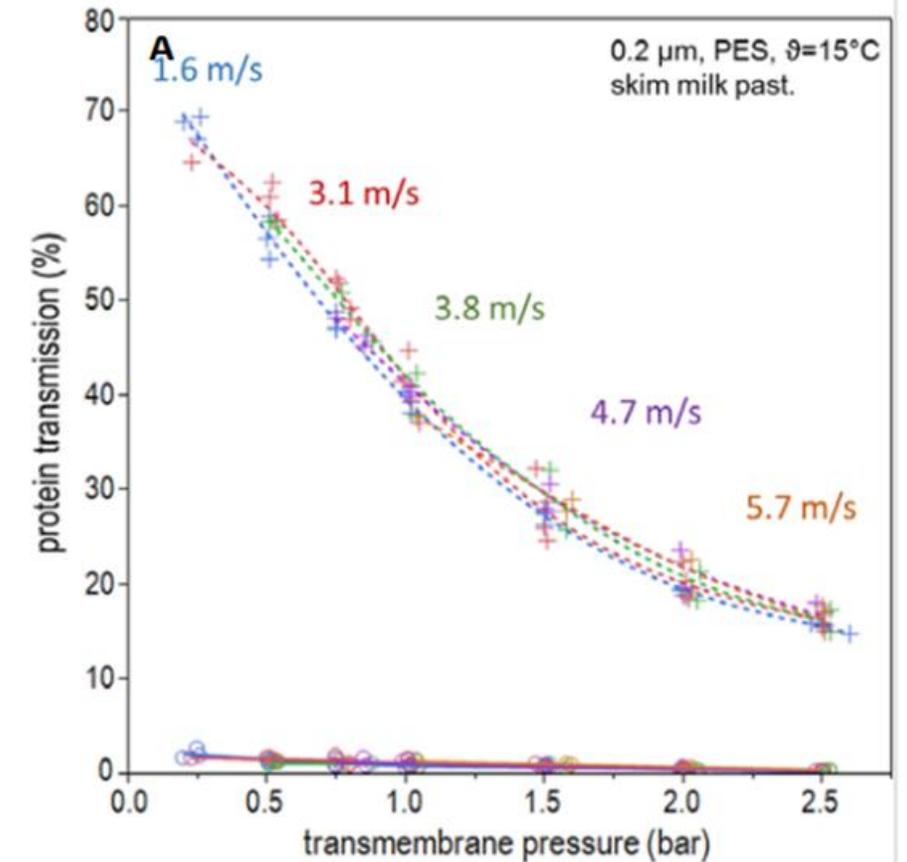
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Casein & Whey Separation

Native Whey

- Full TMP control
 - Backflush possible
- Maximum protein yield control
- Temperature range 10-50 °C
- Exchangeable for Spiral modules
- Better average flux compared with Spiral



Membrane Comparison

What would the OPEX of hollow fiber (HF) be:

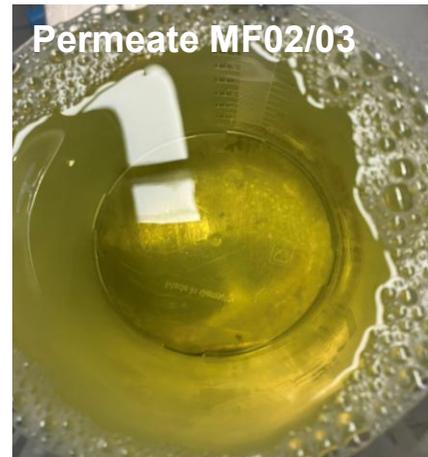
Quality/ Performance	Spiral wound	Hollow Fiber	Hollow Fiber	Ceramic
Temperature	10°C	10°C	50°C	50°C
Run time	20 h	20 h	<8 h	<8 h
Casein rejection	90-95%	97-98%	99%	99%
Whey purity	60-65%	65-75%	85-90%	90-95%
Flux	5 – 15 l/h	10-30 l/h	30 – 60 l/h	80-120 l/h
Energy consumption	Low	Low	Low	High
Cleaning Opex	High	Medium	Medium	Low



Special Whey

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Clarification & Defatting for WPI

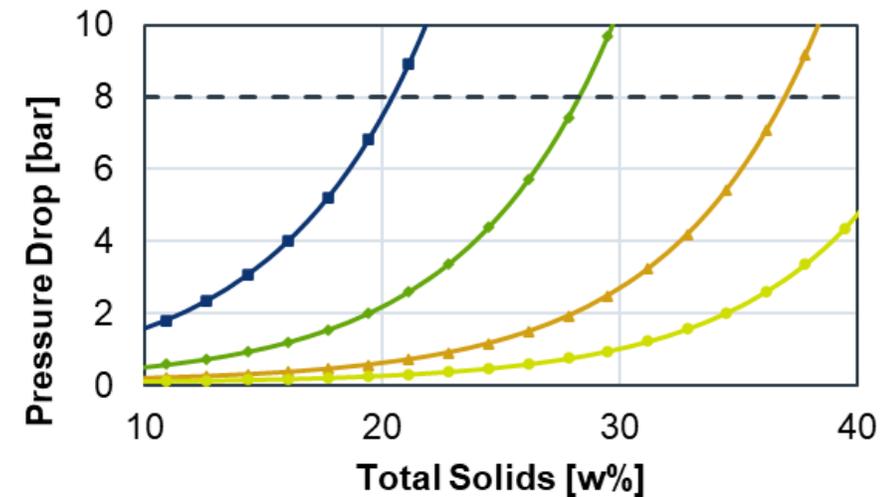
- Results on 0.2 & 0.8 μm
- Fluxes 20-50 l/mh
- Low pressure

- Removal of suspended particles before spiral wound elements
- Good Whey Protein Recovery

Whey Protein Concentrate

WPC 80

- **Stable processing**
 - High fluxes on high WPC
- **> 35% TS**
 - Can be achieved with only UF, no high-pressure NF needed
 - Low protein losses with narrow pore size distributions



—■— 0.8mm —◆— 1.5mm —▲— 3mm —●— 5mm

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Q&A

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Thank you
for your attention

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