Hans Christian Ebbe, Alfa Laval

Next-Generation Fermentation Concept **for Efficient Scale-Up**

Who’s speaking today?

Hans Christian Ebbe, Alfa Laval

- Married, father of 5, and grandfather of 3
- Passionate about football and winter sports
- Mechanical Engineer (B.Sc.), Denmark’s Technical University
- 25 years in Finland, deep experience with cross-border Nordic organizations and fluent in all four major Nordic languages
- International work experience in China, Russia, Middle East, US, and Europe - international mindset and cultural adaptability
- Broad industry background, mainly in process industries

Now focused on promoting Alfa Laval’s capabilities, business development, and supporting global sales in novel foods.

Alfa Laval at a glance

Founded in

1883

140 years of experience in engineering and innovation

Employees

22,000+

Operating in over 100 countries

Key technology processes

3

- Heat transfer
- Separation
- Fluid handling

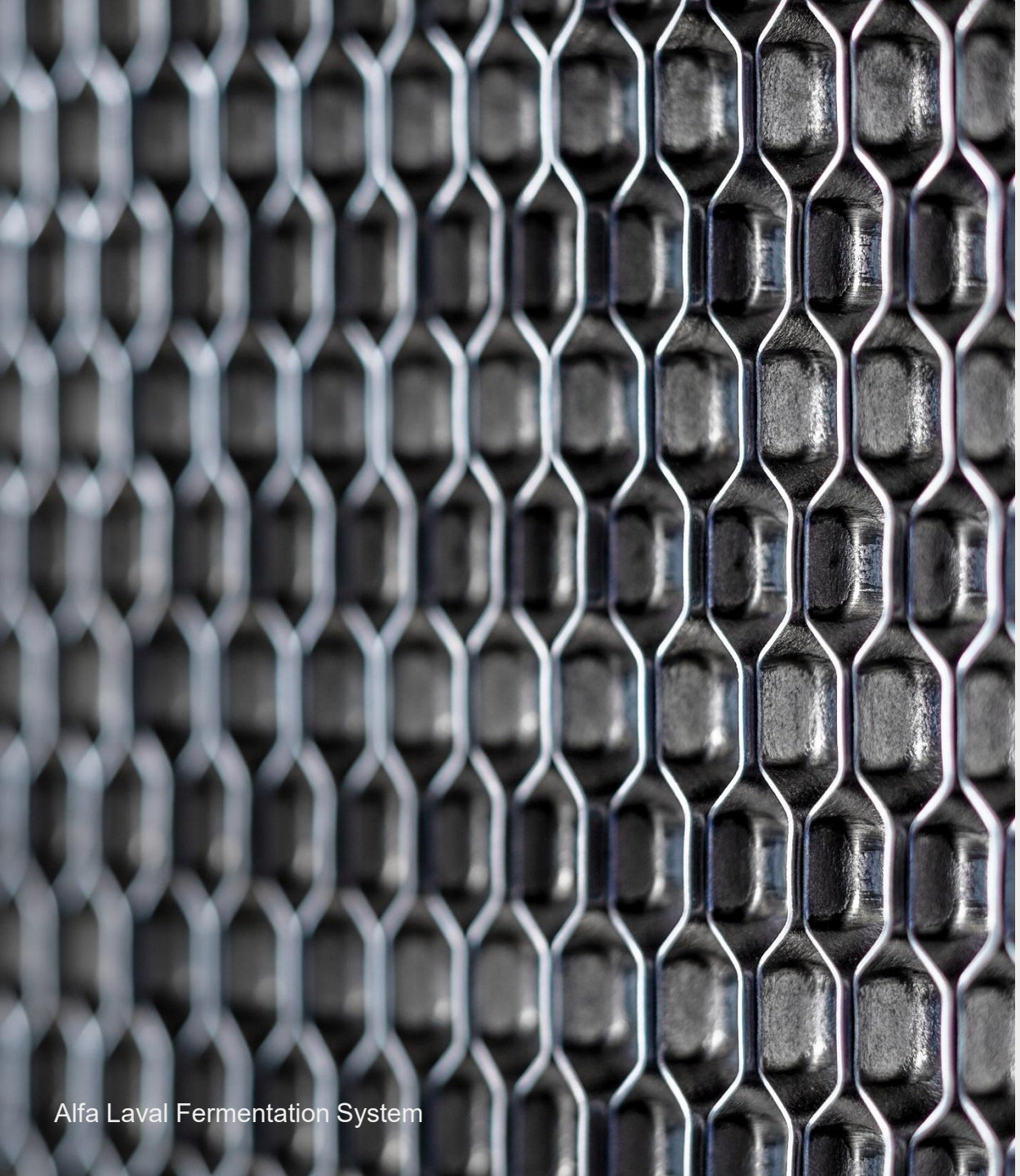
Serving industries like Marine, Energy, Food production and Water treatment

Patents

4,200+

Continuous investment in R&D, 100 new products every year

Not only development of equipment, but also process related i.o.w. implementation of existing technologies for new applications



Alfa Laval Fermentation System

The food **fermentation** challenge

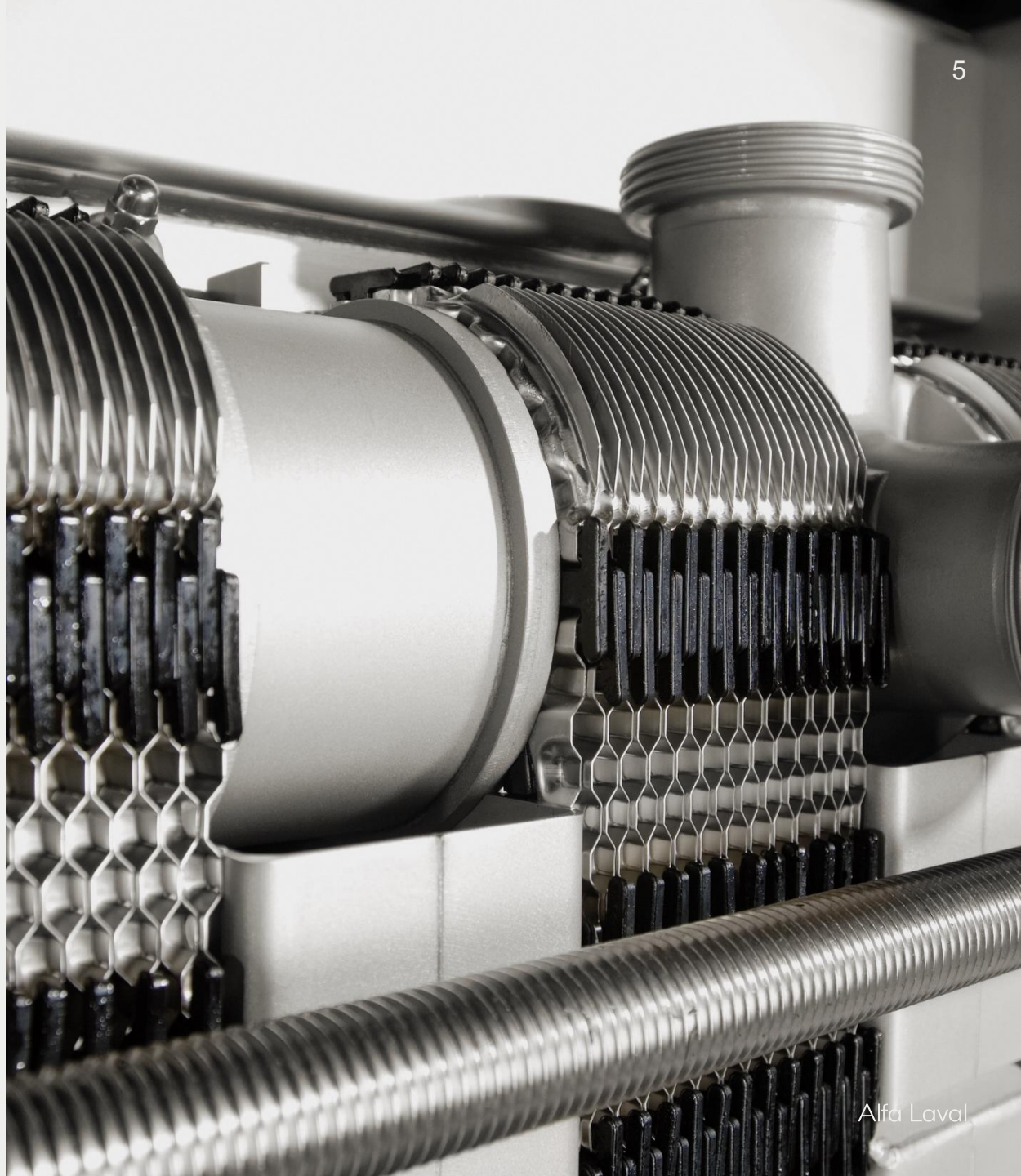
- Cost efficiency drives competitiveness
- High capital expenditure for production facilities
- Learning from pharma without inheriting the cost base
- Consistent product quality and food safety
- Managing scale-up risk between lab and commercial production

- Expensive feedstocks and high energy use
- Complex downstream processing
- Water use and waste stream management

The **fermenter** challenge

Technical challenges **increasing with scale**

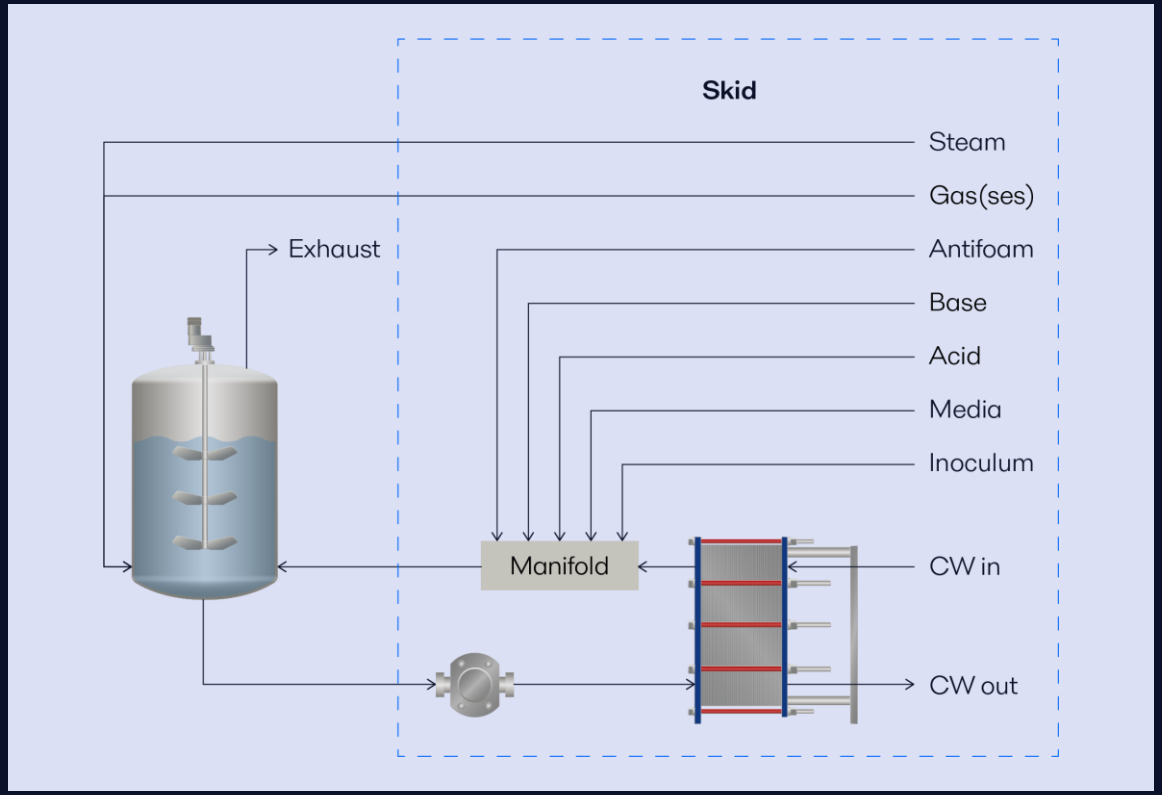
- Heat removal in dense microbial cultures
- Hygiene and contamination prevention
- Oxygen transfer limitations at large scale
- Mixing inefficiencies and nutrient gradients
- Foam formation



The concept
Loop-flow fermenter

Modular, scalable, and flexible

- **Modular system with external cooling loop**
  - Improved cleanability without internal coils
  - Can be scaled to any cooling duty
- **Integrated dosing manifold**
  - Improved dosing and mixing performance as the media is returned to a mixing “hot zone”.
- **Built on proven, scalable technology platforms**
  - Designed for flexible scale-up and industrial deployment
- **Efficient cooling options**
- **Retrofit-friendly**



The development journey

- **Hands-on testing** at Kolding Application & Innovation Test Centre (liquid handling, 3.5 m³ scale)
- **Previous experience** in pharma and industrial fermentation
- **Trials** with filamentous fungi and yeast
- **Expertise** in external cooling for baker’s yeast processes
- **Legacy fermenter experience** for enzyme production and pharma applications

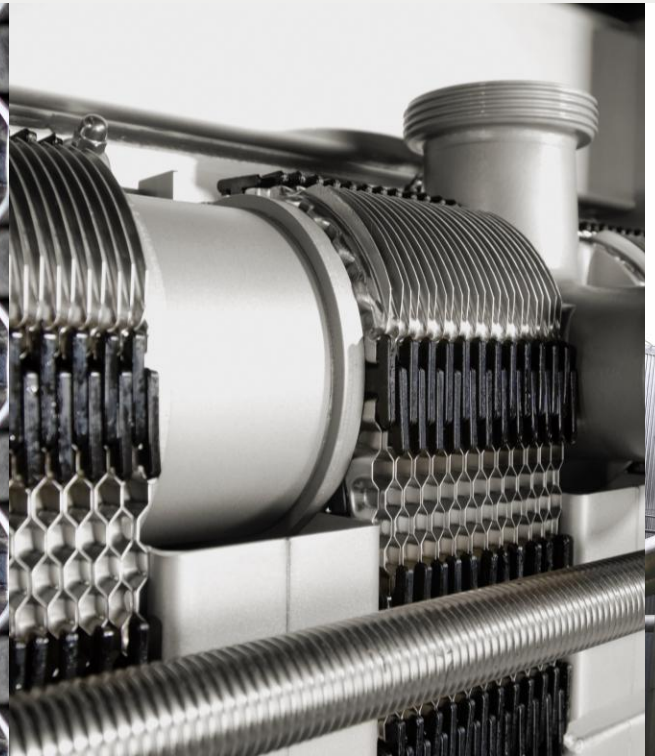
Key benefits of our Fermentation System

Smarter cooling:
No jacket required

Modular simplicity,
maximum uptime

Built to scale,
easily expand

Retrofit **without starting over**



The importance of **scale-up infrastructure**

Why it matters

Alfa Laval Food Application & Innovation Centre

- Large-scale production is critical for cost competitiveness
- Infrastructure drives cost, efficiency and scalability
- Industrial scale introduces major process challenges
- Fermenter performance determines yield and productivity

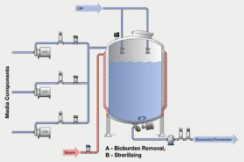
Evaluating fermenter concepts

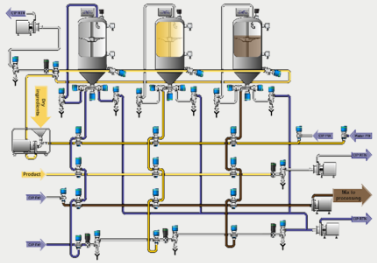
- Oxygen transfer, mixing and heat removal
- Energy efficiency and operating cost
- Scalability from pilot to commercial scale
- Reliability, sterility, and cleanability

Bridging the gap between upstream and downstream

A holistic solution

Upstream
Media preparation such as sterilization and liquid blending and powder-mixing technologies



Fermentation System

Downstream
Separation, purification and concentration technologies





Future outlook

Collaboration is key

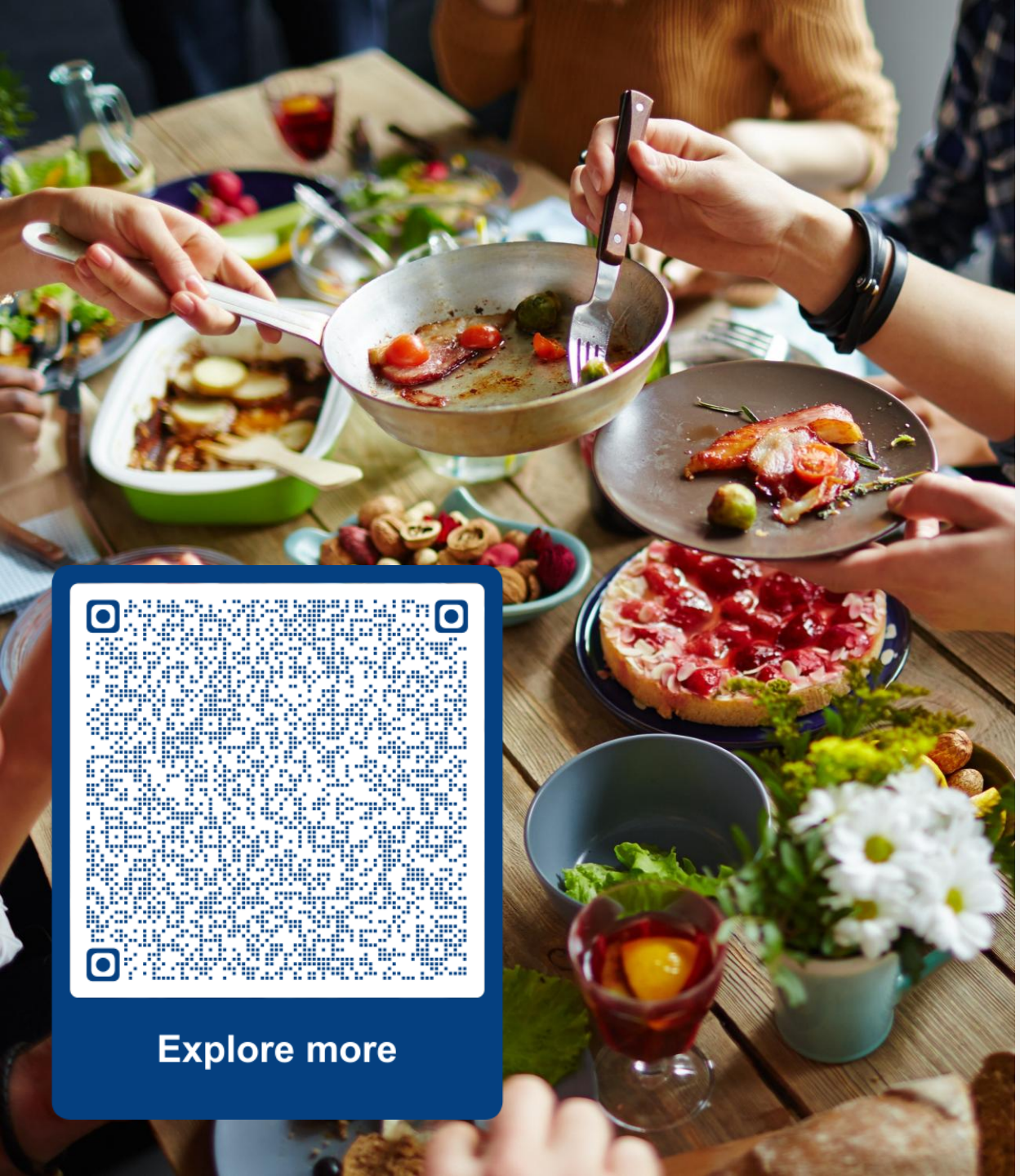
Create a collaborative platform for testing, scale-up and industrialization.

Evaluate and develop next-generation fermenter concepts together.

Combine expertise across biology, process engineering and manufacturing.

Accelerate commercialization through open collaboration and shared learning.

Enable sustainable, large-scale food production for the future.



Let’s continue the **discussion**

Visit us at our booth B04 to explore collaboration opportunities.

Discuss scalable fermentation infrastructure and future fermenter concepts.

Connect with us to shape the next generation of sustainable food production together.

Thank you