Τμήμα Επιστήμης και Τεχνολογίας Τροφίμων

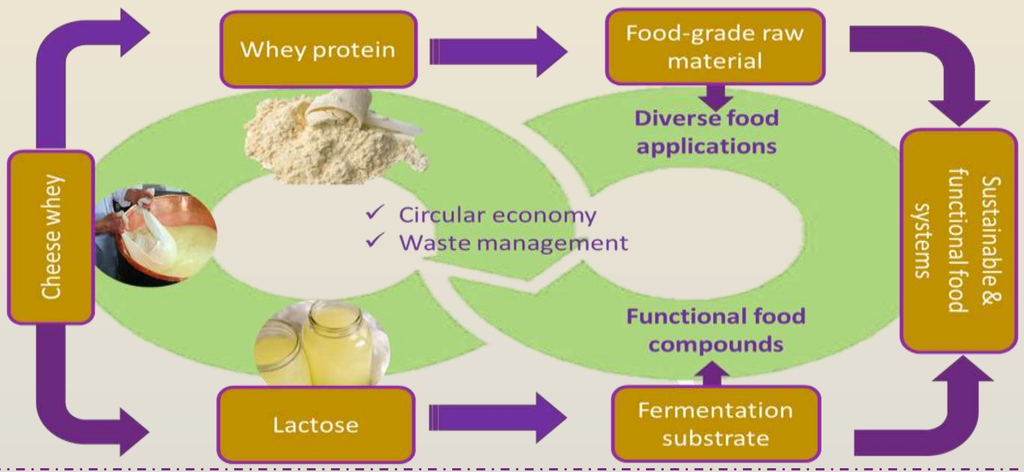
Circular valorization of cheese whey using indigenous lactic acid bacteria for the production of antimicrobial biosurfactants and functional edible films

Dimitra Alimpoumpa

Department of Food Science and Technology, Ionian University, Argostoli, 28100, Kefalonia, Greece

Introduction

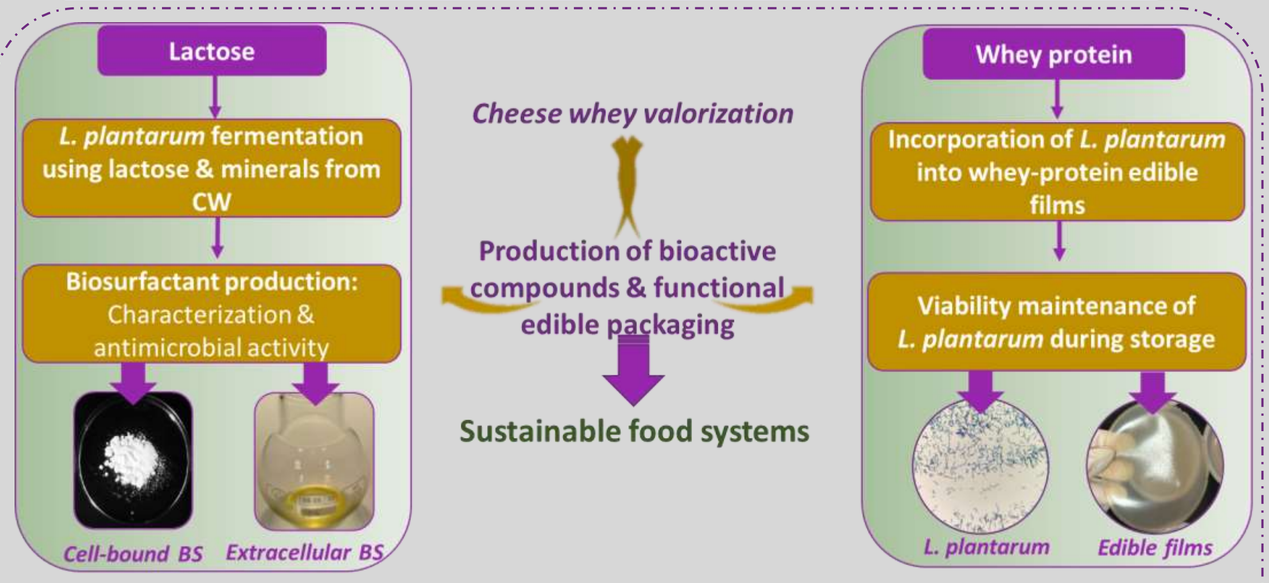
Cheese whey (CW) is a major **high-polluting by-product** of the food industry due to its high **lactose** and residual **protein** content. **Valorizing** this nutrient-rich by-product towards the production of value-added compounds, such as **biosurfactants (BS)** and **probiotics**, can reduce environmental impact while supporting innovative strategies within the circular bioeconomy.



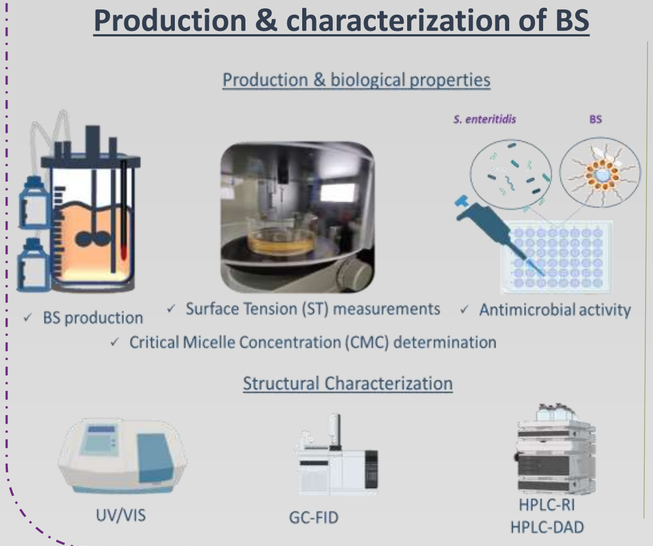
Objectives

- **CW-lactose** valorization as **substrate** for **BS** production from ***L. plantarum*** isolated from traditional Kefalonian feta-type cheese.
- Characterization of **physicochemical and antimicrobial properties of BS.**
- **CW-protein** valorization for the production of **functional edible films** incorporating *L. plantarum* biomass.
- Assessment of *L. plantarum* viability in edible films during storage at 5 °C and 25 °C to ensure adequate probiotic levels.

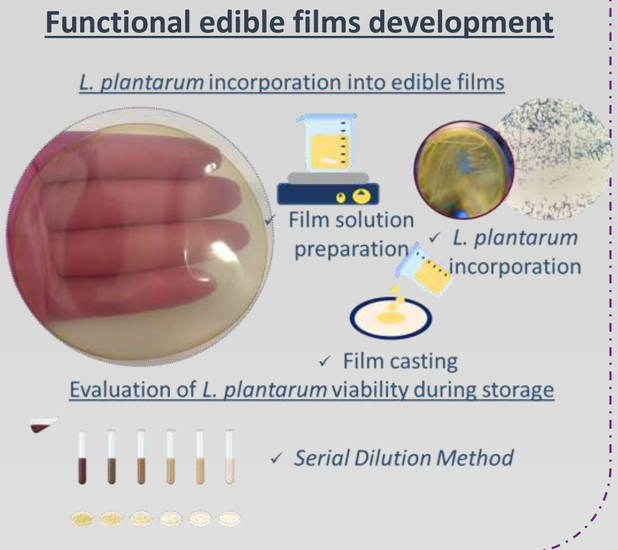
Materials & Methods



Production & characterization of BS



Functional edible films development



Results & Discussion

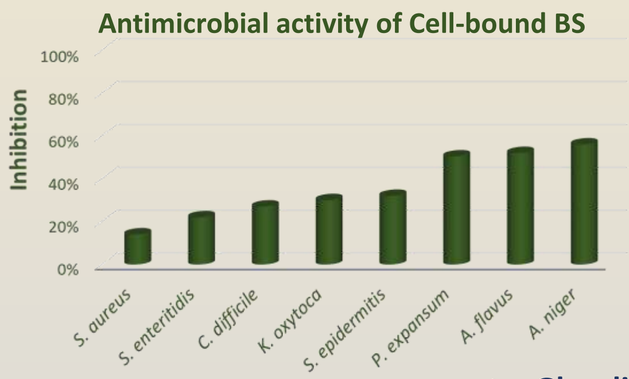
- **CW-lactose valorization for BS production**

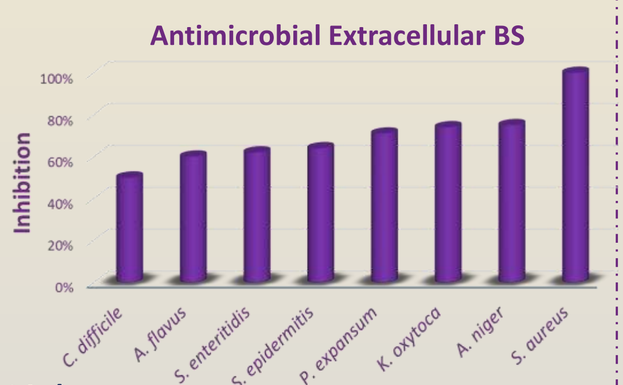
Cell bound BS

- **STmin: 33.8 mN/m**
- **CMC: 0.2 g/L**
- **BS Concentration: 0.25 g/L**

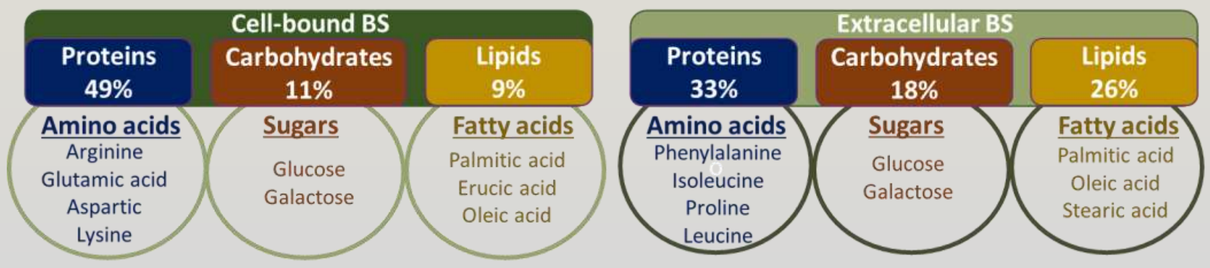
Extracellular BS

- **STmin: 26.0 mN/m**
- **CMC: 1.0 g/L**
- **BS Concentration: 0.5 g/L**



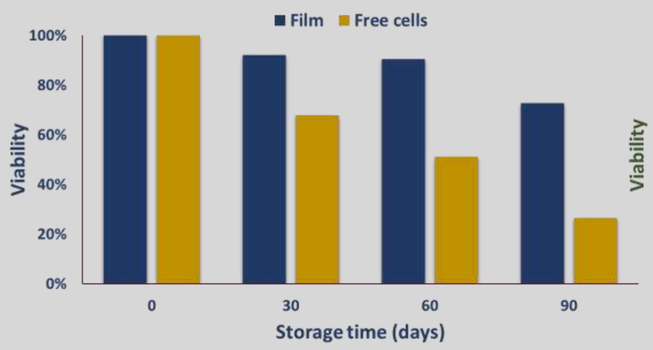


Glycolipids/ Glycolipoproteins

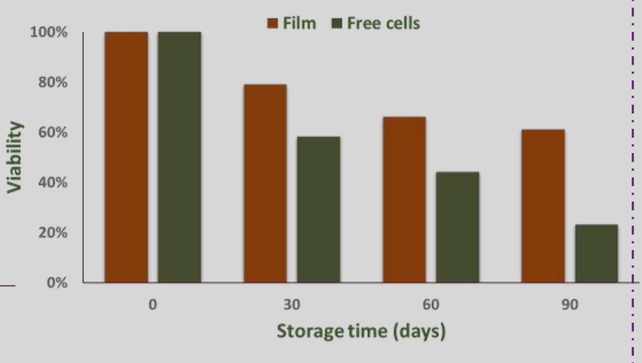


- **Functional whey protein edible films**

***L. plantarum* storage stability at 5°C**



***L. plantarum* storage stability at 25°C**



✓ Edible films maintained *L. plantarum* viability at desirable probiotic levels under both storage conditions.

Conclusions

- ✓ **CW, a major food industry by-product, can be valorized for the development of innovative functional food products.**
- ✓ **CW-lactose can serve as a substrate for *L. plantarum* fermentation, enabling simultaneous production of probiotic biomass and BS.**
- ✓ **The produced BS showed promising properties, with low CMC values and antimicrobial activity, indicating potential for future food applications.**
- ✓ **Edible films represent a promising strategy for extending *L. plantarum* probiotic viability during storage at refrigeration and room-temperature conditions.**

The research was supported by HFRI PhD Fellowships (Fellowship Number: 20.689)

ΕΛΙΔΕΚ Ελληνικό Ίδρυμα Έρευνας & Καινοτομίας

research-day ΙΟΝΙΟ ΠΑΝΕΠΙΣΤΗΜΙΟ

Ημέρα Έρευνας 2026

Τρίτη 17 Μαρτίου 2026 - Ιόνιο Πανεπιστήμιο

https://conferences.ionio.gr/research-day