

# Undefined mixed starter cultures

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Agroscope, Liebefeld, Suisse; www.agroscope.ch

Strains isolated from whey and cheese since 1901



Stored at -80 °C



or in freeze-dried form



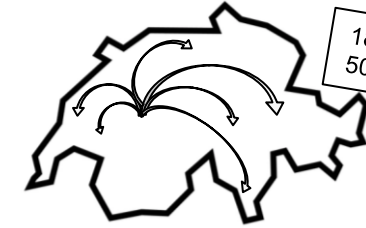
Produced every week



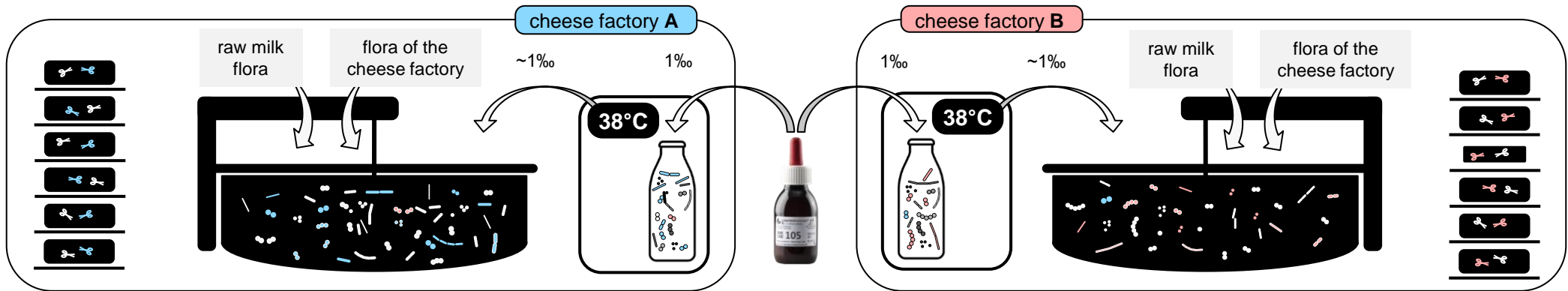
Packaged in 80 ml bottles



Shipped fresh every week throughout Switzerland

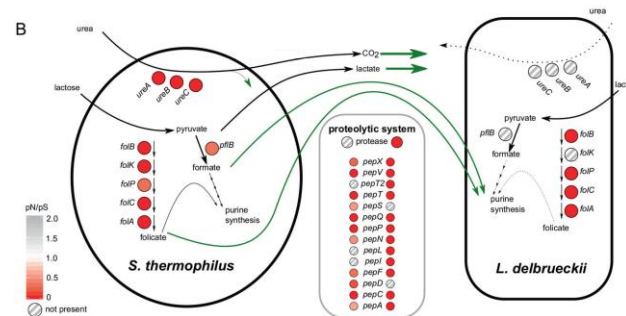


>20 different types



- Contributes strongly to the complex flavour of the cheese
- Mandatory in many Swiss PDO cheeses
- 1 bottle makes up to 8000 kg of cheese

- >40 different and undefined strains
- *Streptococcus thermophilus* and *Lactobacillus delbrueckii*
- express themselves differently depending on incubation conditions (milk, temperature and duration)
- differ greatly according to their resistance to phages
- Bacteria-phage interaction differs from the usual 'kill the-winner' dynamic.



**Publication**  
Somerville and al. 2022, Functional strain redundancy and persistent phage infection in Swiss hard cheese starter cultures *ISME J.* 2022

## Take home message

- Undefined mixed starter cultures:
- ✓ Composed of undefined strains of bacteria.
  - ✓ Isolated from whey and cheese from good cheese dairies from 1970.
  - ✓ Present a variety of phage profiles
  - ✓ Contribute to the uniqueness of Swiss cheeses.
  - ✓ Are a symbol of Switzerland's unique bacteriological heritage