



Tessa Tuytschaever
Tessa.Tuytschaever@ugent.be

Tessa Tuytschaever^a, Christine Faille^b, Katleen Raes^a, Imca Sampers^a
^a Research Unit VEG-i-TEC, Department of Food Technology, Safety and Health, Faculty of Bioscience Engineering, Ghent University, Campus Kortrijk, Graaf Karel de Goedelaan 5, 8500, Kortrijk, Belgium
^b Univ. Lille, CNRS, INRAE, Centrale Lille, UMR 8207 - UMET - Unite Matériaux et Transformations, F-59000 Lille, France



INFLUENCE OF TEMPERATURE, MATERIAL, SLOPE AND STRAIN ON *LISTERIA MONOCYTOGENES* BIOFILMS

Introduction

The persistence of *Listeria monocytogenes* in the food industry remains a problem despite the efforts. Biofilms can be the cause for this and their growth and structure are influenced by many factors. A better understanding of these factors that influence biofilms can help in developing elimination/prevention strategies. In this research, the influence of temperature, material, slope, and strain on the biofilm formation of *L. monocytogenes* was investigated.

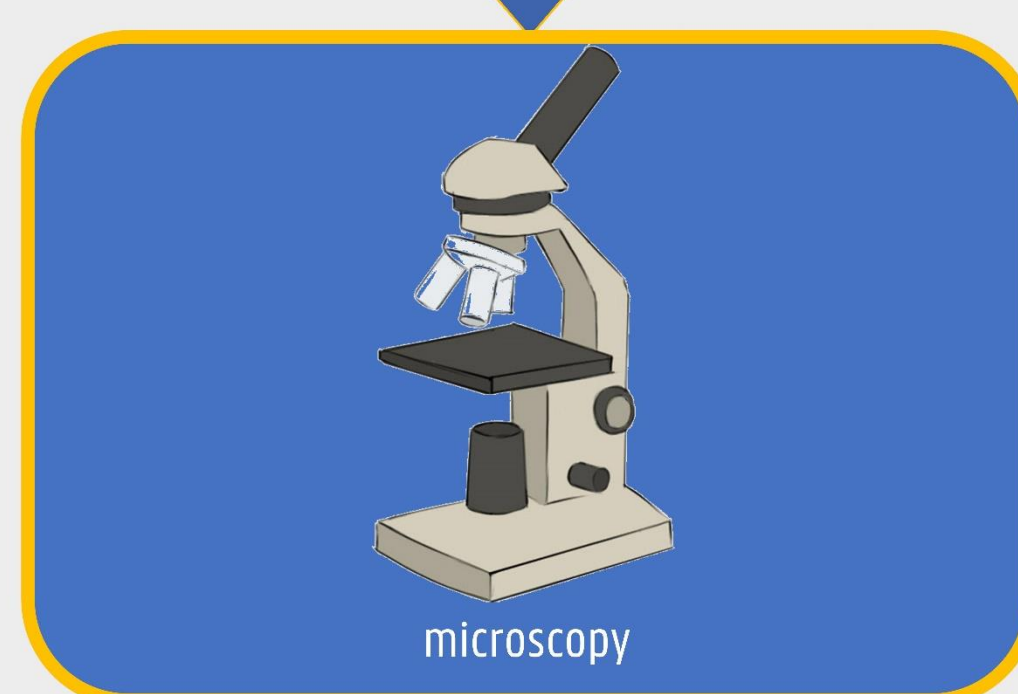
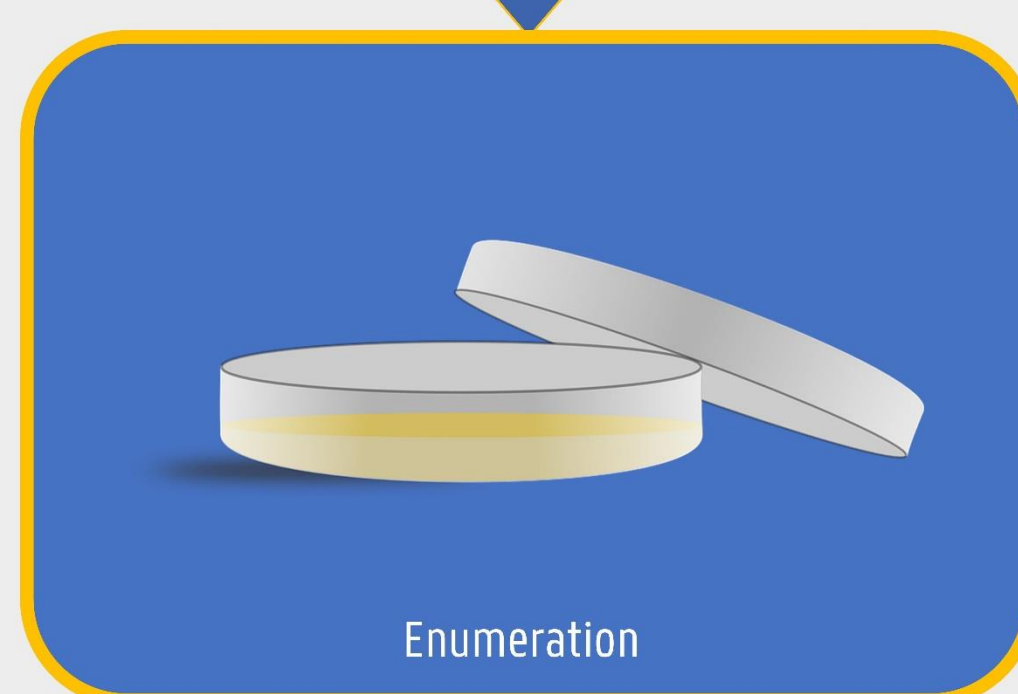
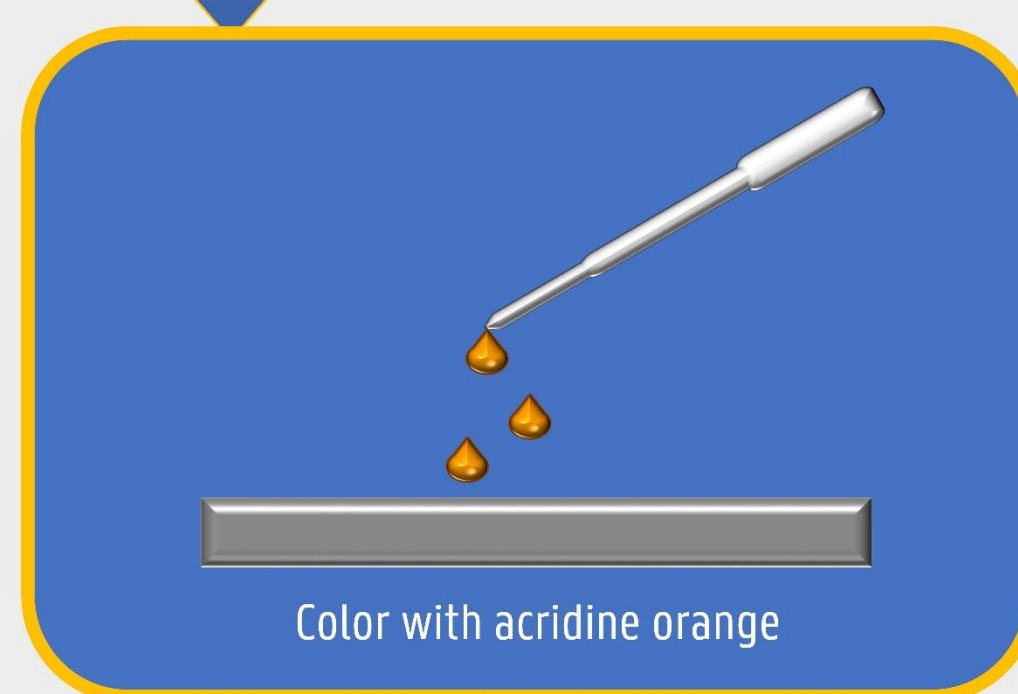
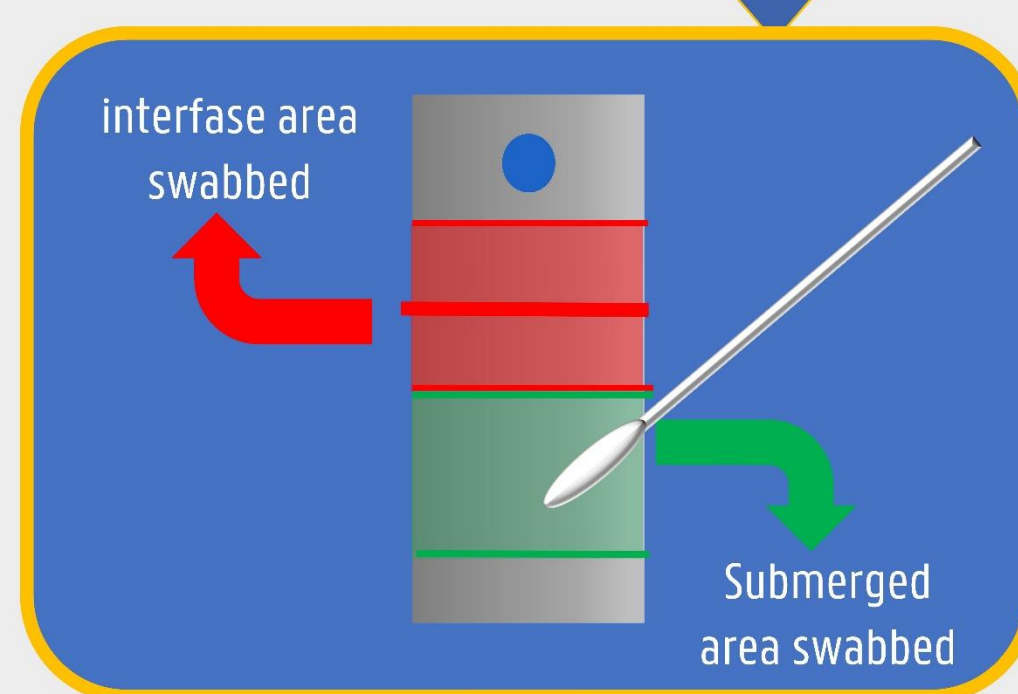
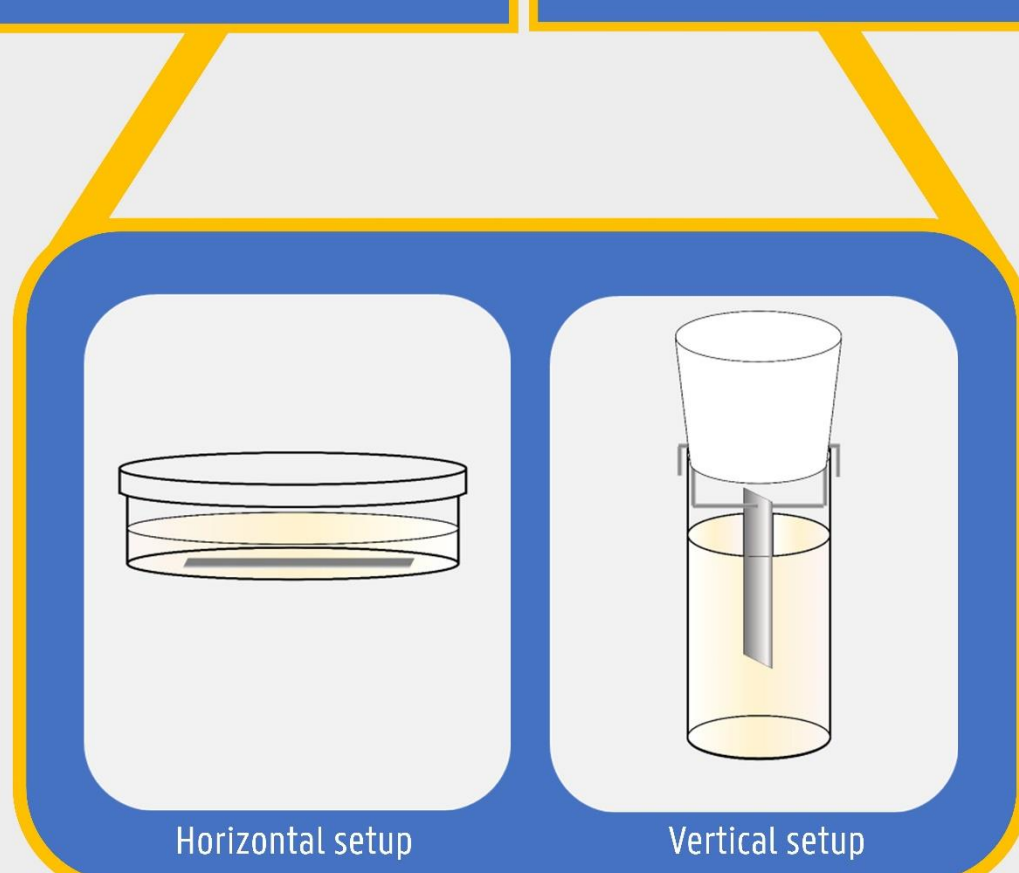
Material and methods

Parameters of interest

Temperatures: 4°C, 21°C(flagella), 30°C (no flagella)
Strains: *L. monocytogenes* 1049 (Greenyard), *L. monocytogenes* 207, *P. aeruginosa* LMG 28185
Materials: stainless steel 304L type R, stainless steel 304L type B, glass, polypropylene
Angle: horizontal, vertical

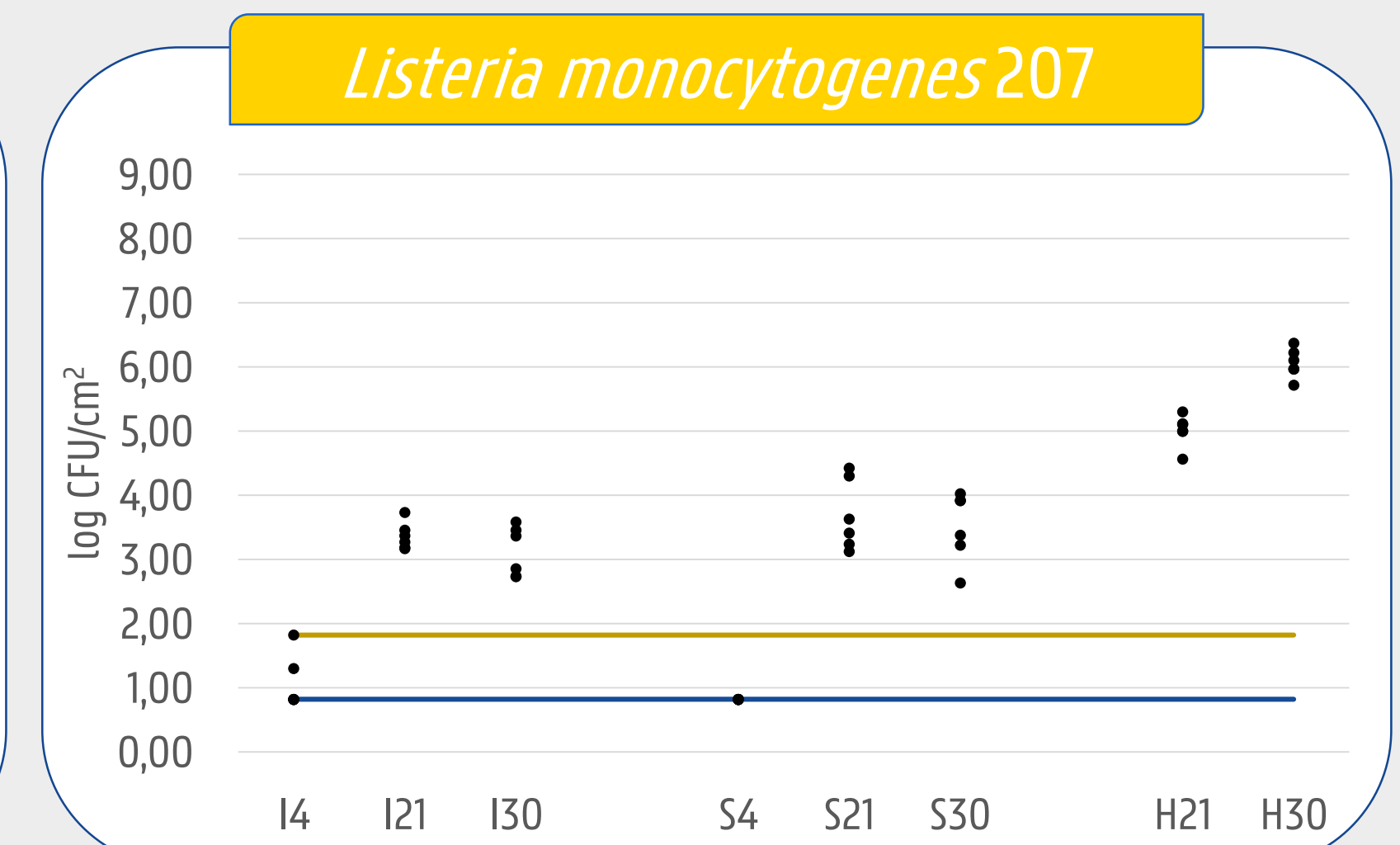
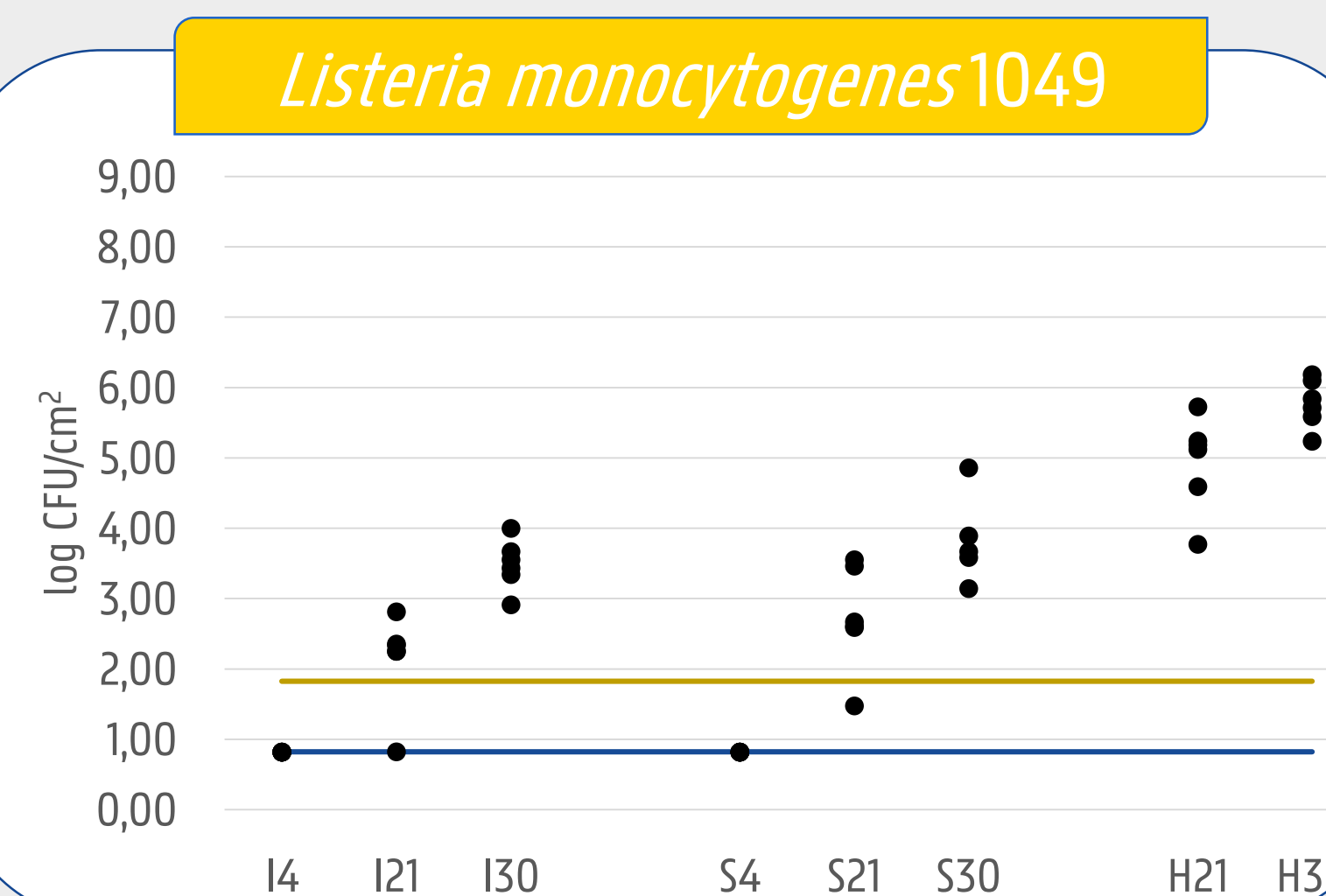
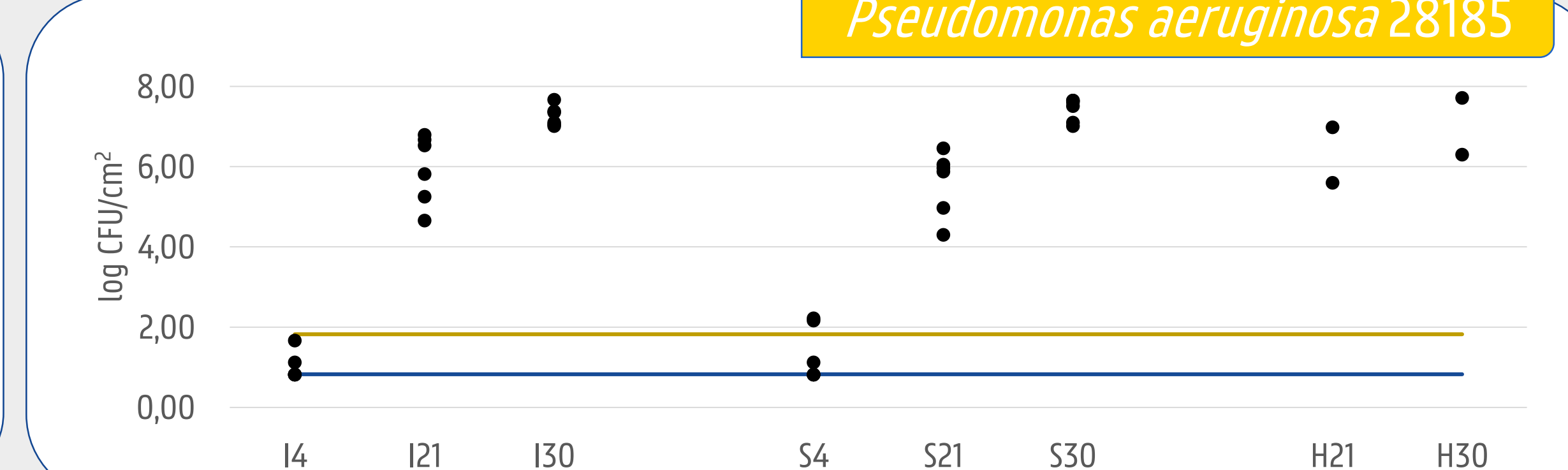
Fixed parameters

Media: 10% TSB
Incubation time: 24h
Inoculation level: 5 log CFU/ml
Flow characteristics: static

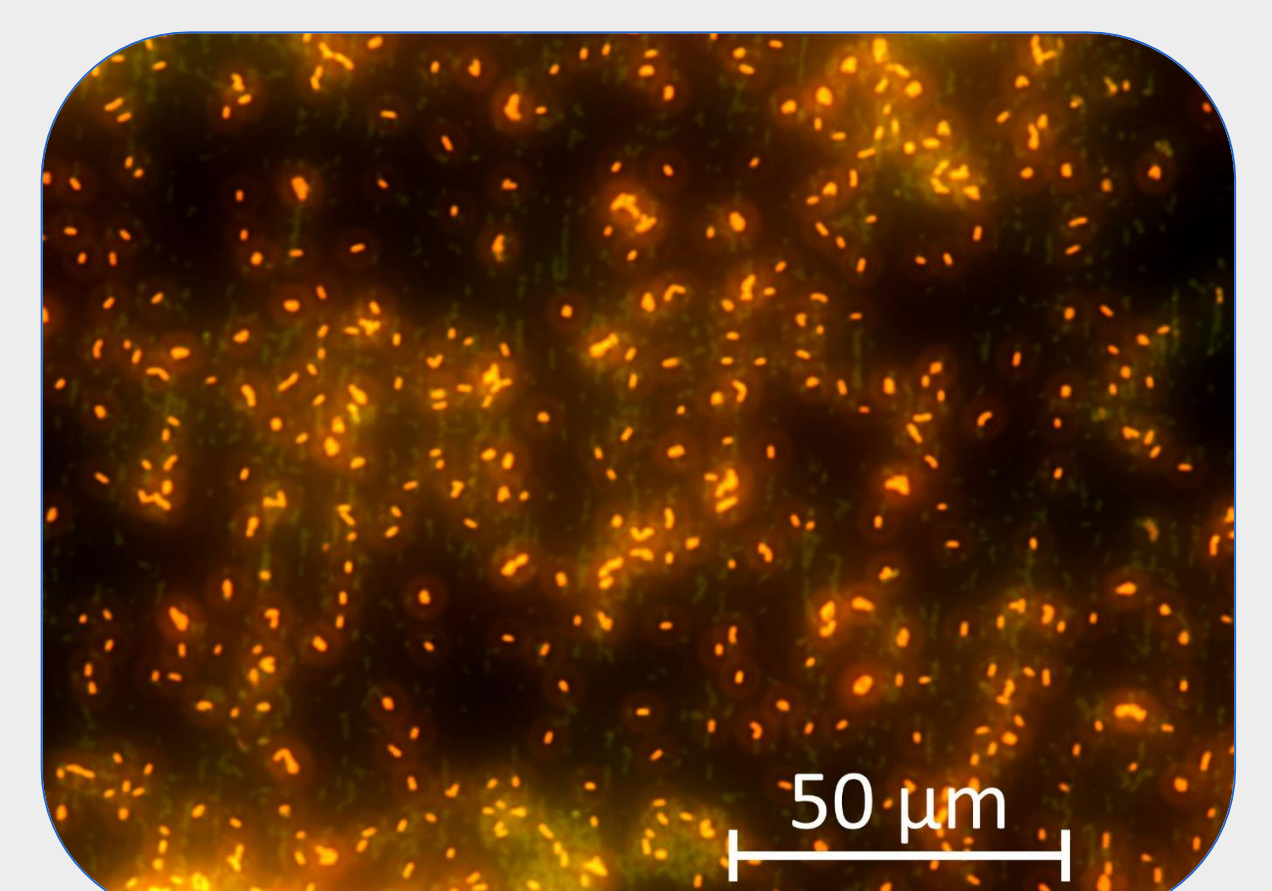
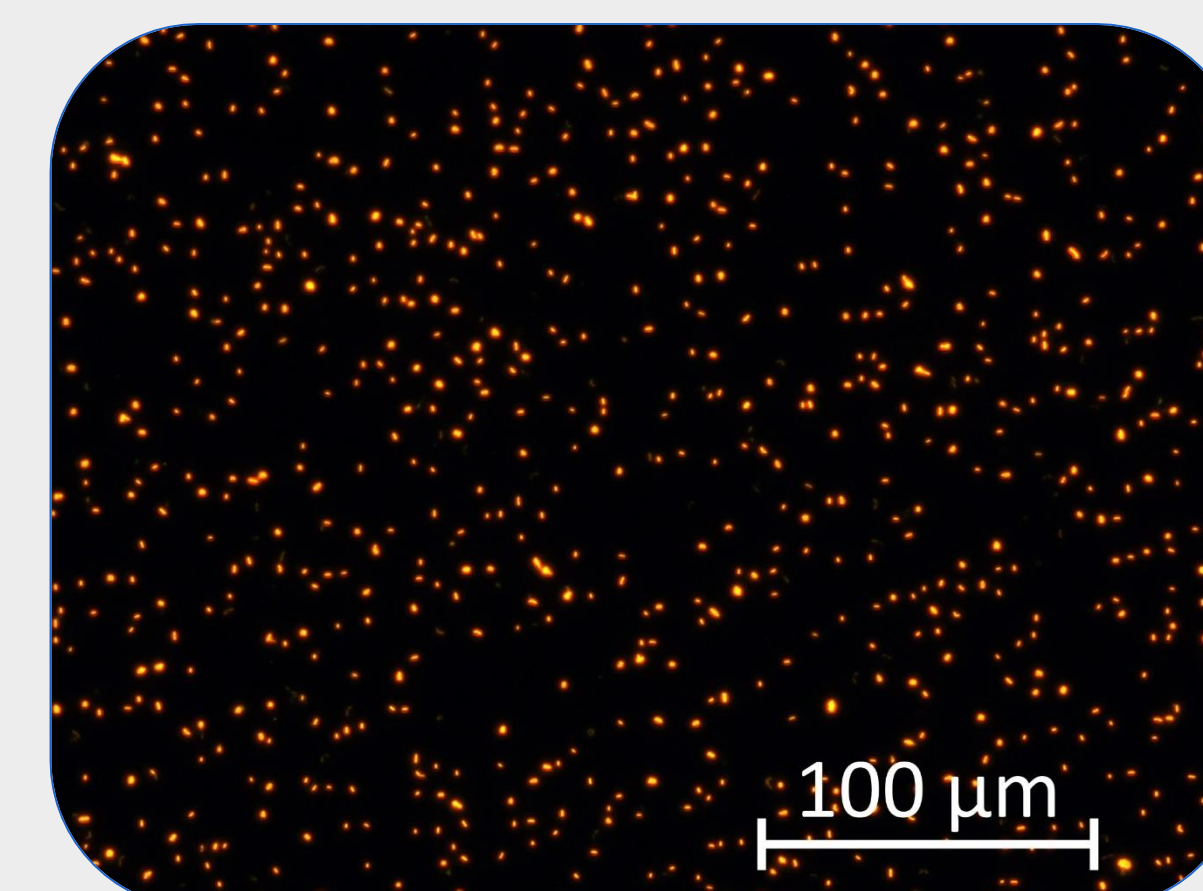


Results

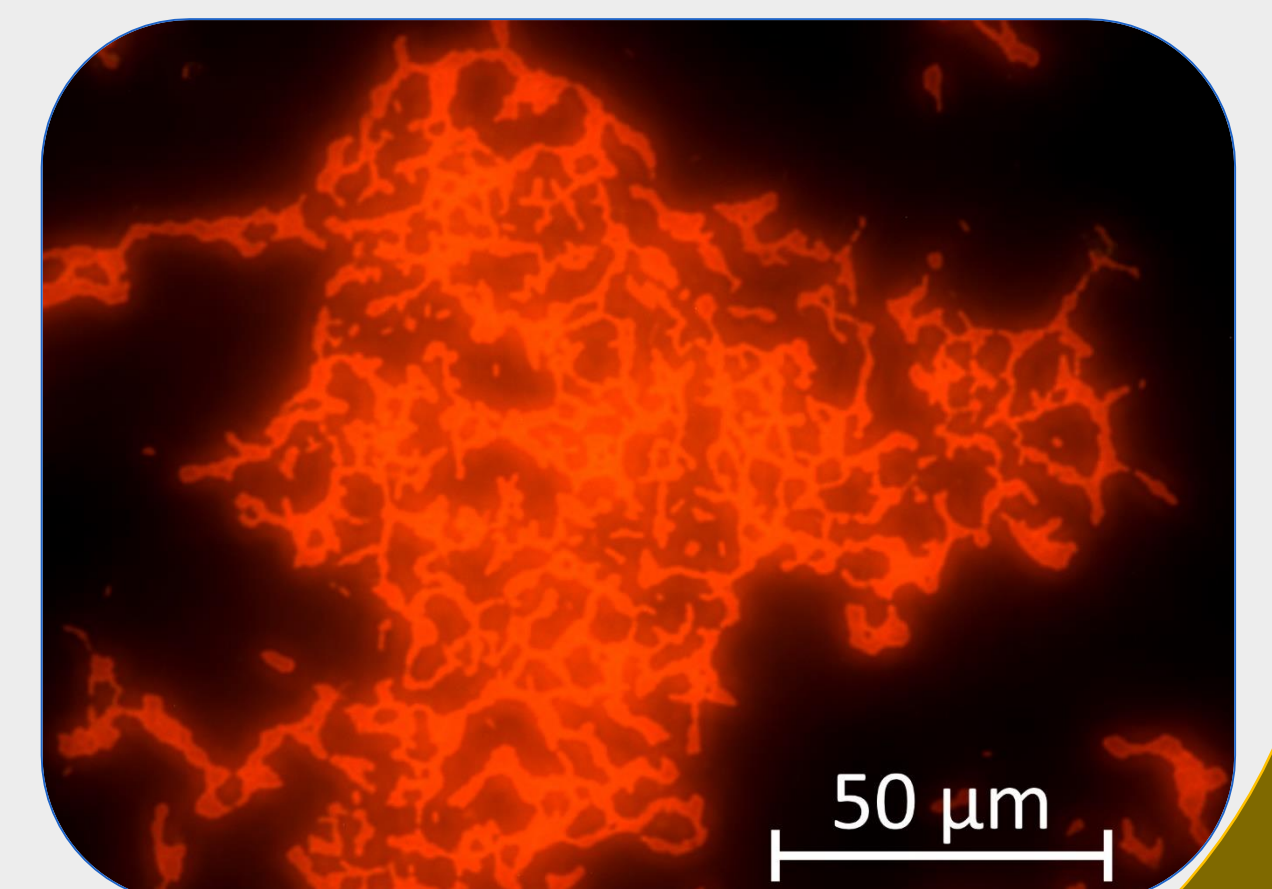
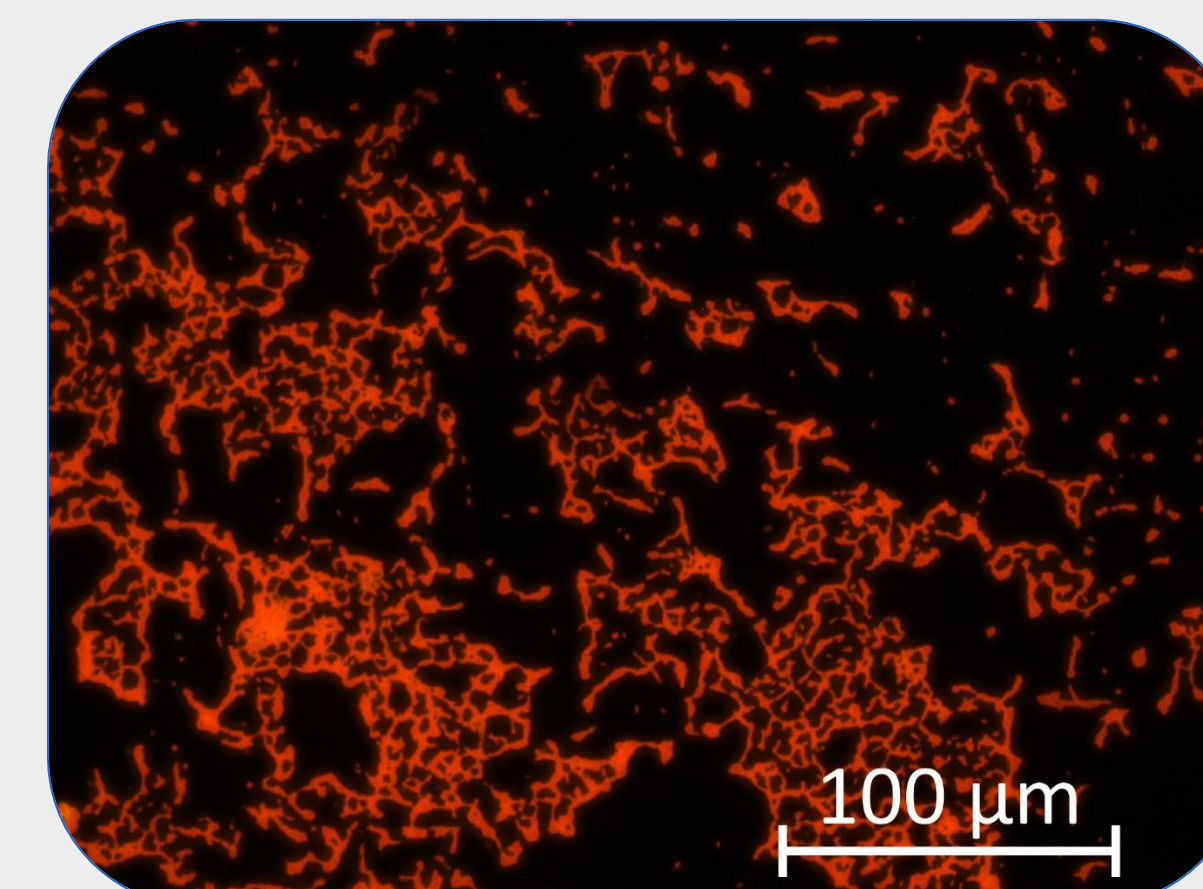
LOD: 0.82 log CFU/ml
 LOQ: 1.82 log CFU/ml
 IX: interphase at temperature X
 SX: submerged at temperature X
 HX: horizontal at temperature X
 All graphs are of stainless steel 304L type R



***Listeria monocytogenes* 1049 30°C stainless steel 304L type R vertical**



***Listeria monocytogenes* 1049 30°C stainless steel 304L type R horizontal**



Overall conclusions

- **Strain:**
 - *Pseudomonas aeruginosa* 28185 knew higher cell counts (21 and 30 °C) than *Listeria monocytogenes*
 - No relevant difference between the *Listeria monocytogenes* strains
- **Temperature:**
 - Rarely growth on 4°C
 - *Pseudomonas aeruginosa* 28185: ↑temperature → ↑cell count
 - For the vertical biofilms: *Listeria monocytogenes*: ↑temperature → ↑cell count for strain 1049, not for strain 207

- **Angle:**
 - Cell counts of *Pseudomonas aeruginosa* 28185 are not influenced by the angle
 - Higher cell counts found for the *Listeria monocytogenes* strains in horizontal setup compared to vertical setup for 21 and 30 °C
 - A more structured biofilm was seen for *Listeria monocytogenes* in the horizontal setup compared to no structure in the vertical setup
- **Material:**
 - No difference between interface/submerged and material (stainless steel 304L type R, stainless steel 304L type B, glass and polypropylene)

Take home message

A horizontal setup increases the cell count of *L. monocytogenes* mono-species biofilms and cell clusters were identified, which indicate the formation of a real biofilm. This indicates the slope as an important aspect in the hygienic design or identification of critical locations in the food processing industry as more prone to contamination and biofilm formation independent of the temperature and material.

