CRAFT BREWERS CONFERENCE

& BrewExpo America®

BA BREWERS ASSOCIATION

#CraftBrewersCon

Draught Beer Quality Workshop

2022

Winning On Premise

Our Mission: Increase Volume of Beer Served from Kegs

BLEFA.
THE KEG – POWERED BY FRANKE

Hillebrand GORI

MICRO MATIC

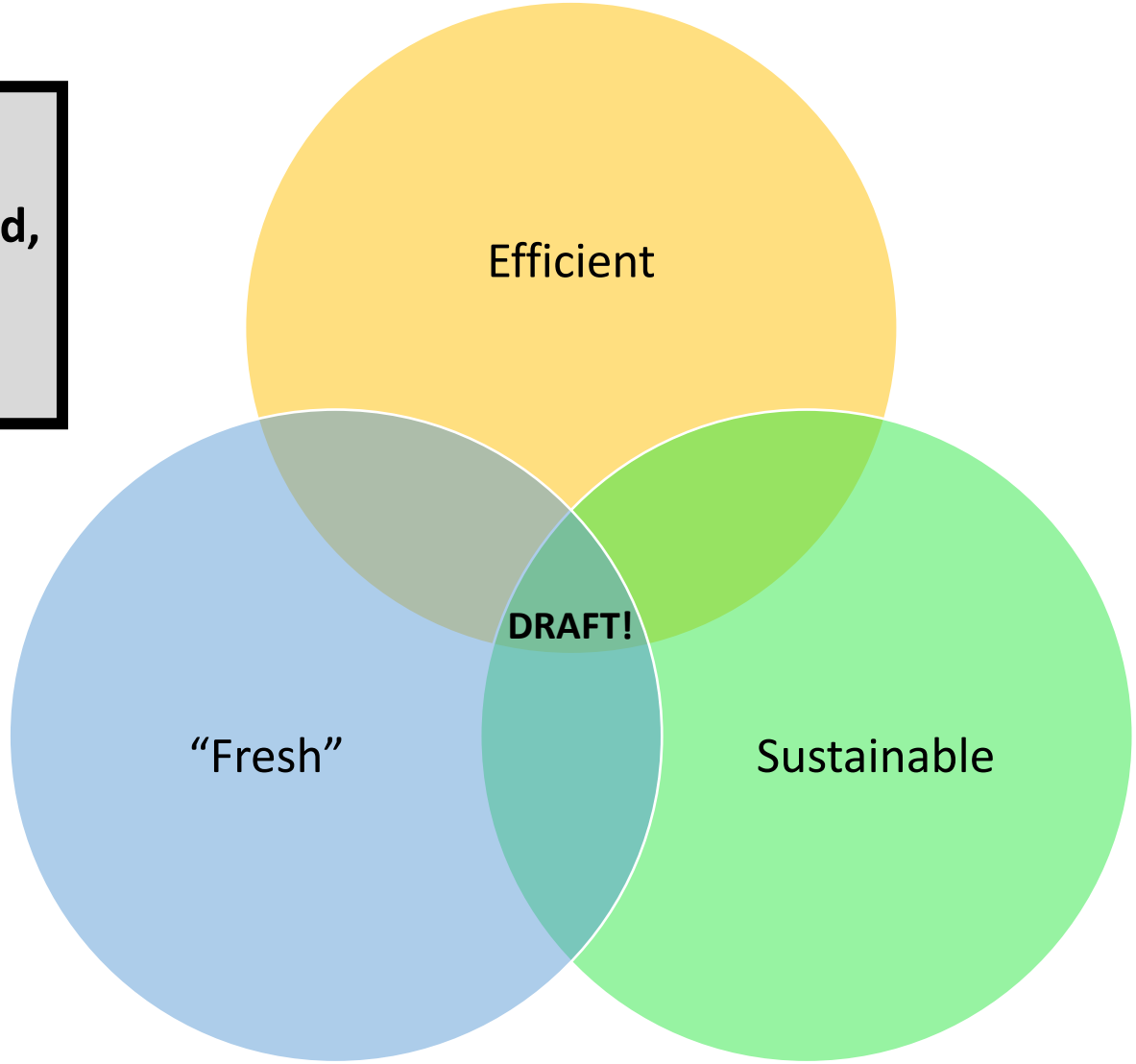
M★

SCHÄFER
CONTAINER SYSTEMS

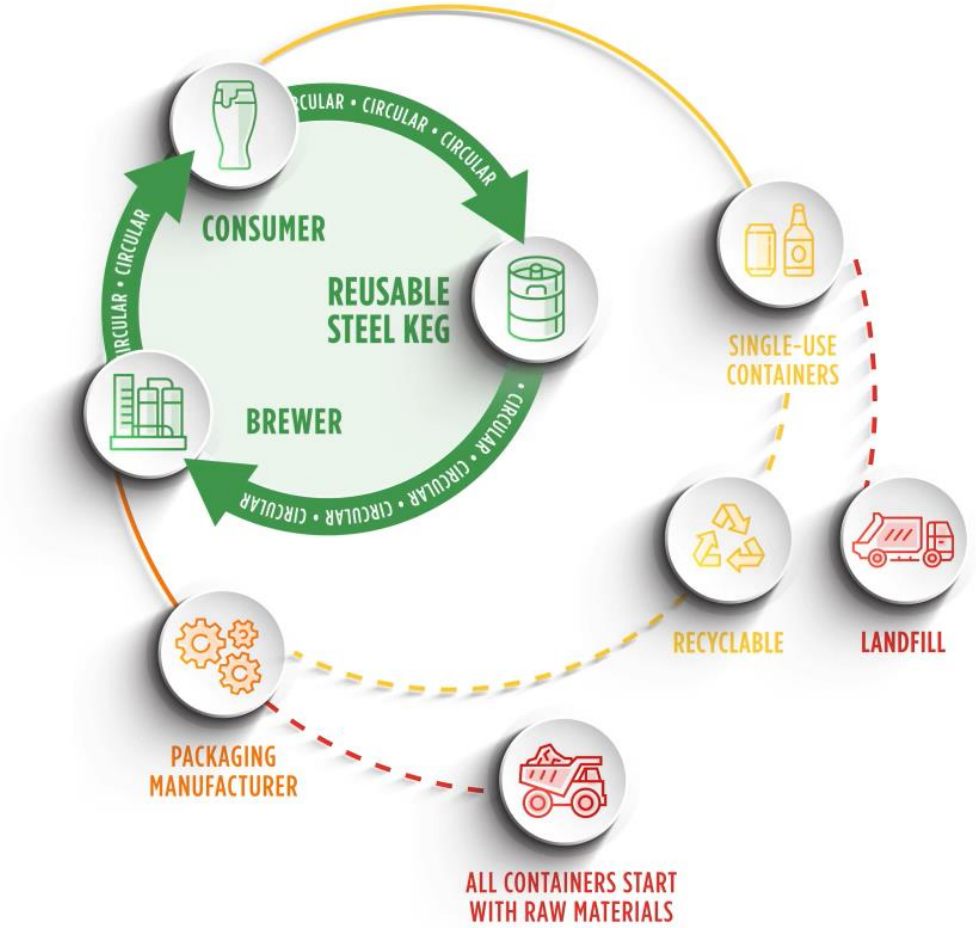
THIELMANN
THE CONTAINER COMPANY

Just Because We're Biased, Doesn't Mean We're Wrong

Draft beer is Craft's most differentiated, ownable weapon on premise!

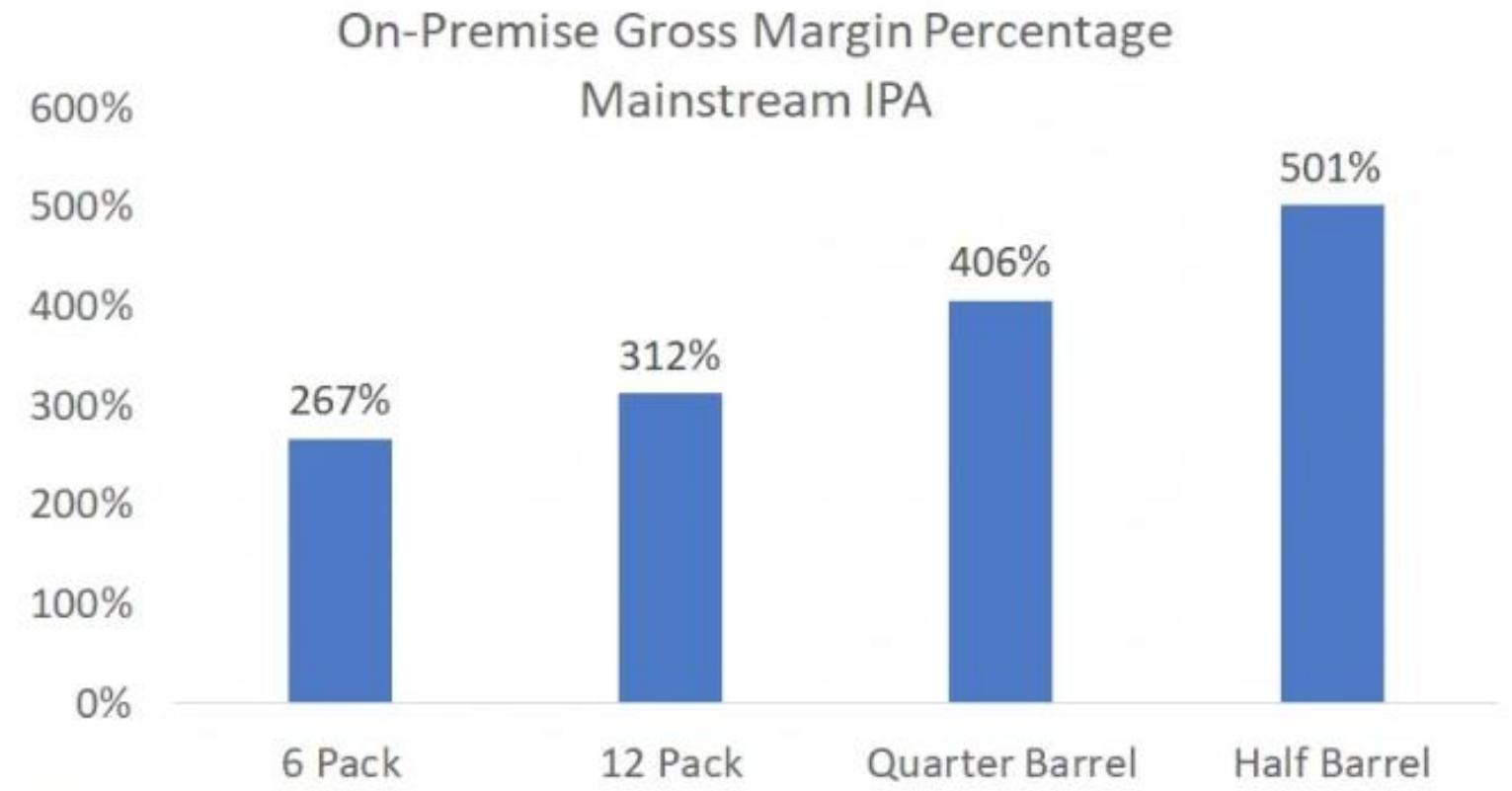


Draft is the most circular / sustainable choice on premise



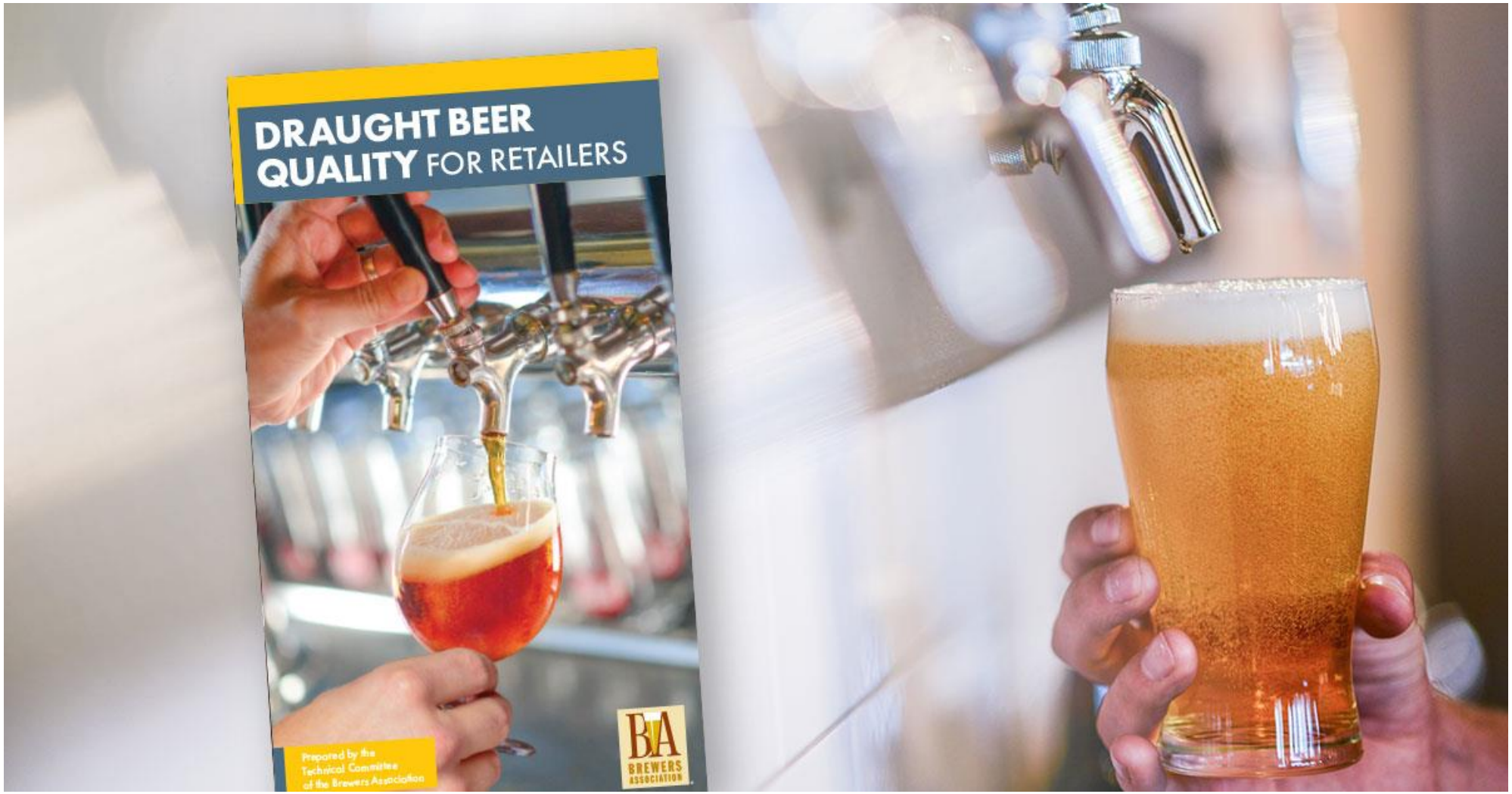
REUSABLE > RECYCLABLE > LANDFILL

Resource Efficiency Frequently Correlates with Economic Efficiency



Source: Seventh Point Analytic

Kegs Deliver a Uniquely Fresh Experience



Battling Biofilms in Beer Draught Lines

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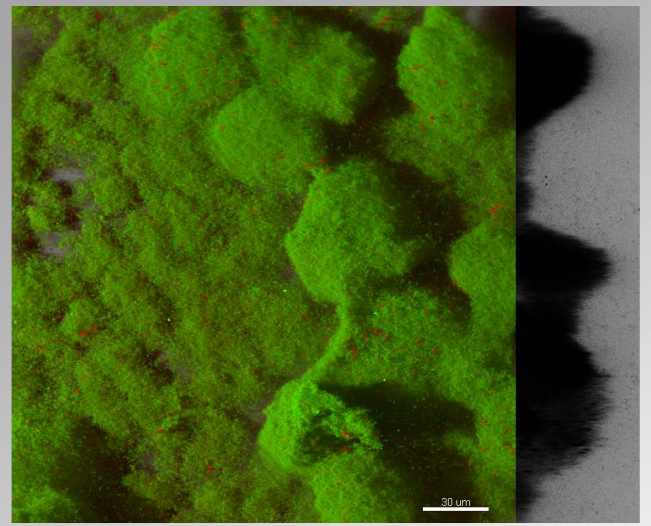
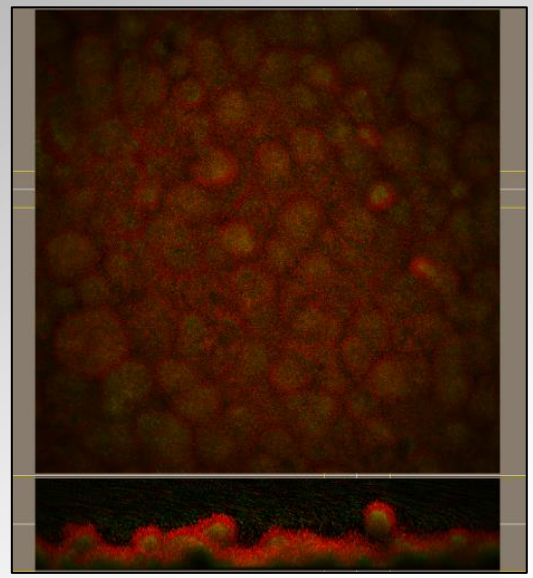
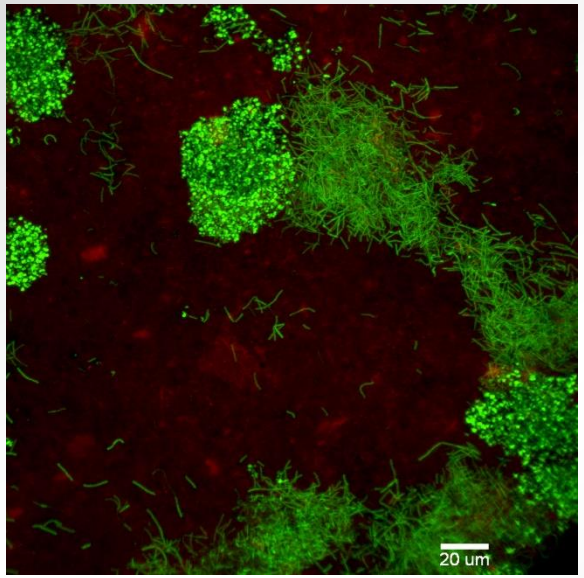
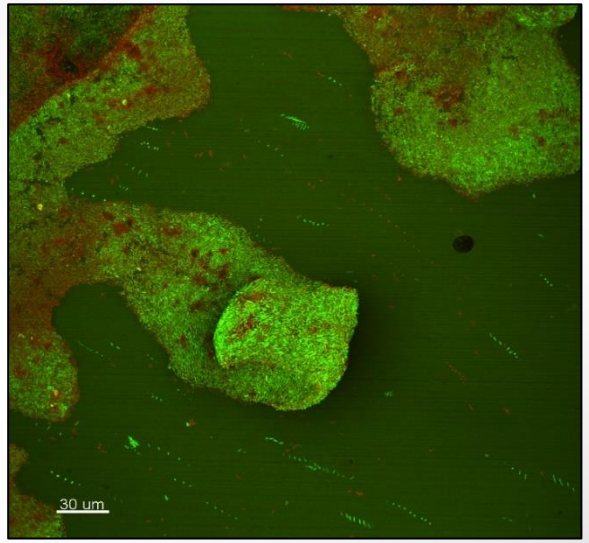
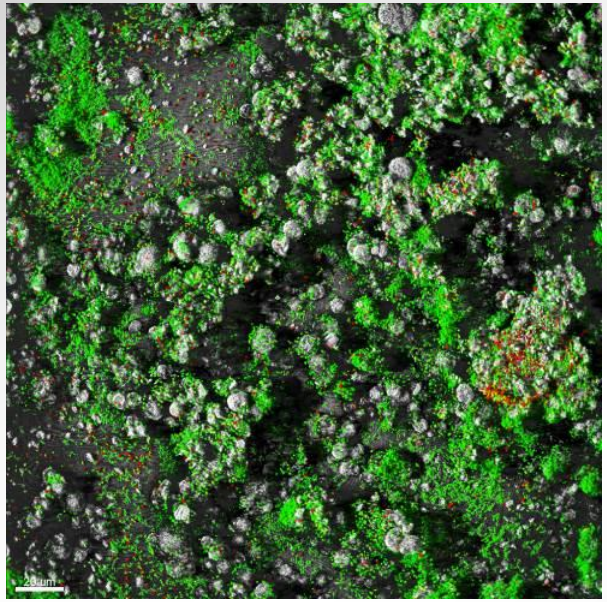


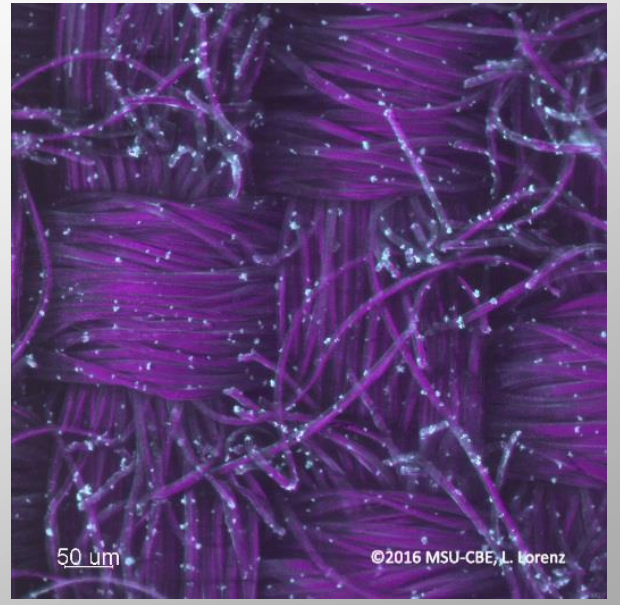


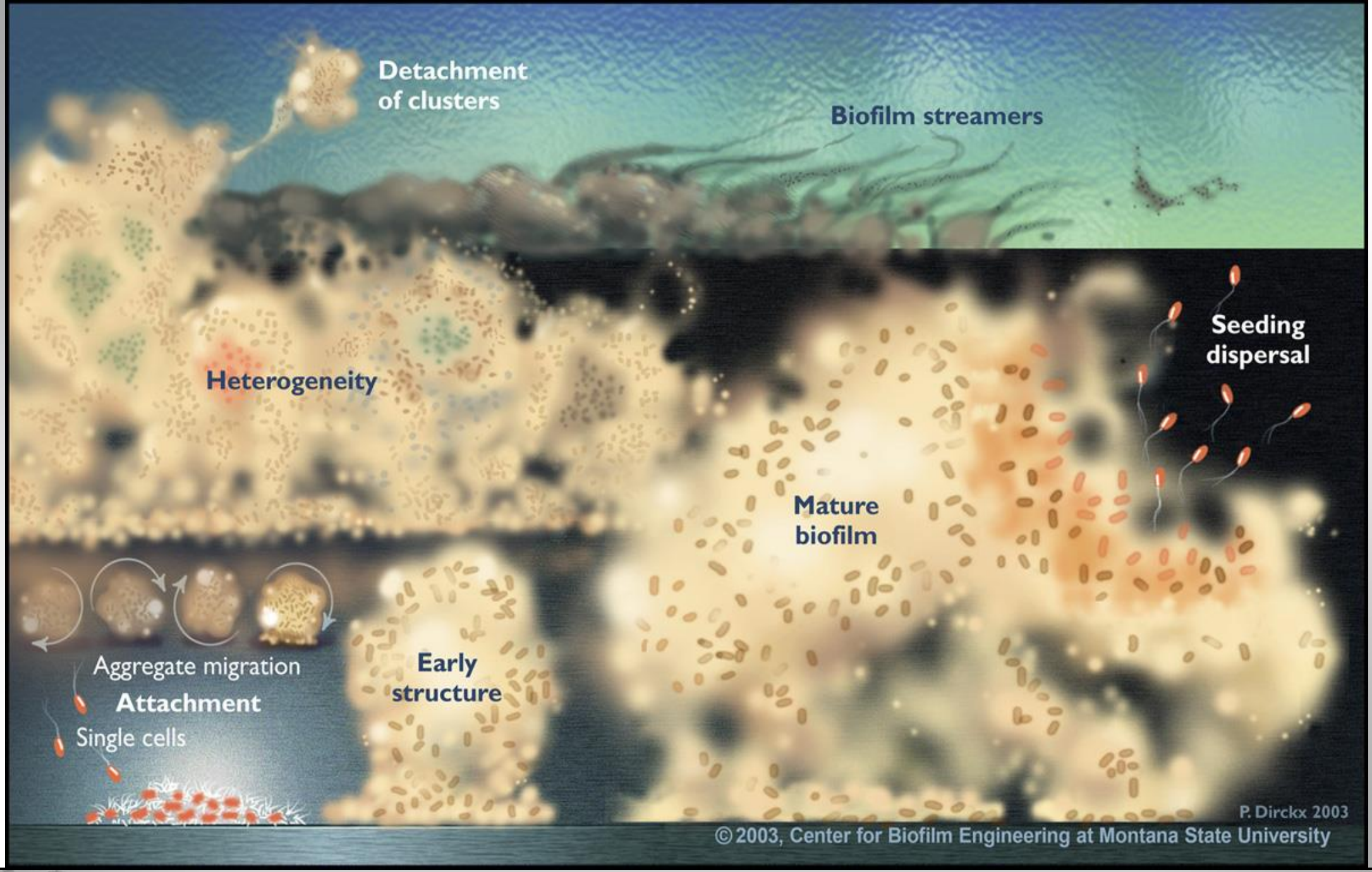






Biofilm bacteria are a self-organized, cooperative community of microorganisms embedded in a matrix of extracellular polymeric substances.



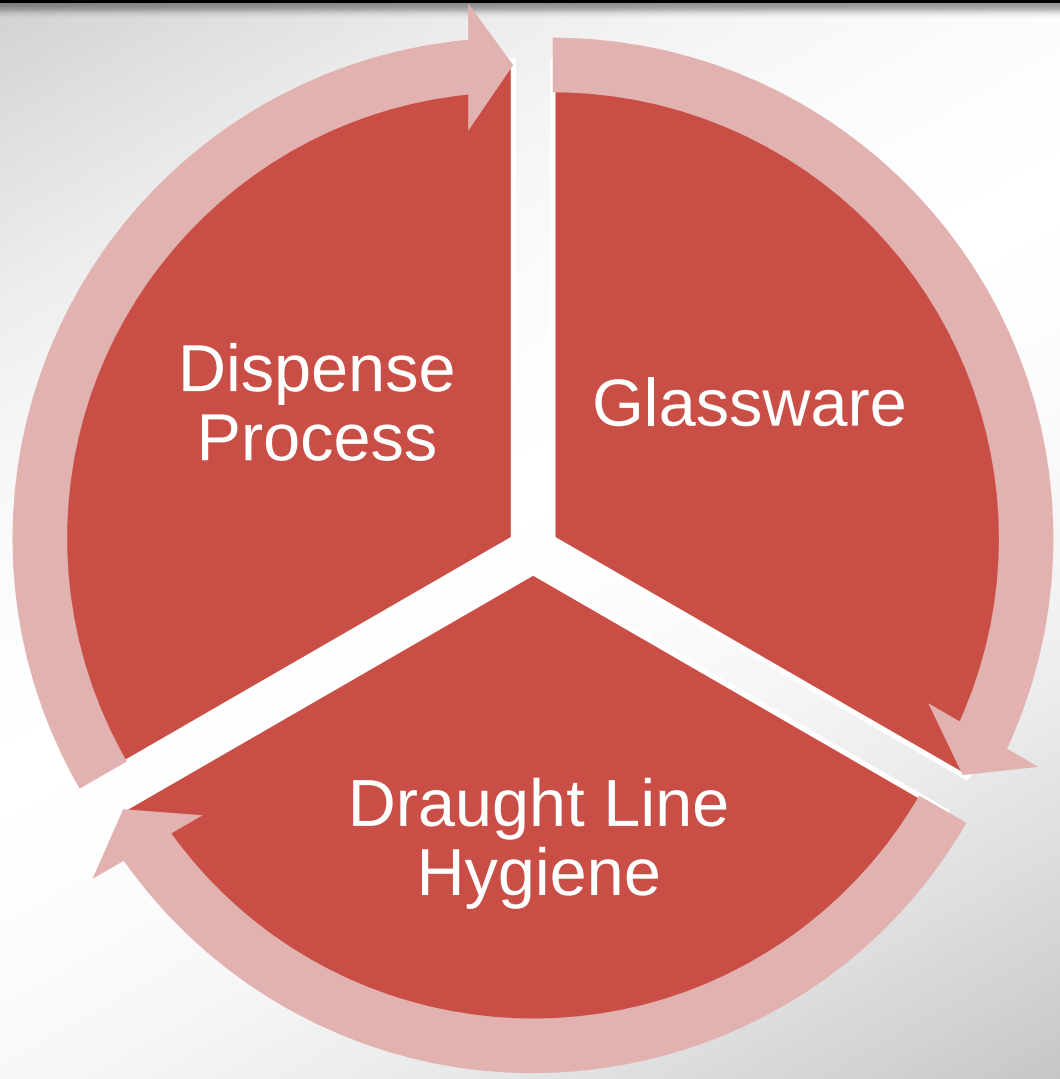

Detachment
of clusters
Biofilm streamers
Heterogeneity
Seeding
dispersal
Mature
biofilm
Aggregate migration
Attachment
Single cells
Early
structure
P. Dirckx 2003
©2003, Center for Biofilm Engineering at Montana State University

Why do we care about biofilm?

- Tolerant to antimicrobials
- Public health
- Structure & equipment degradation
- Safety
- Aesthetics & **taste**
- Bioremediation & biofuels

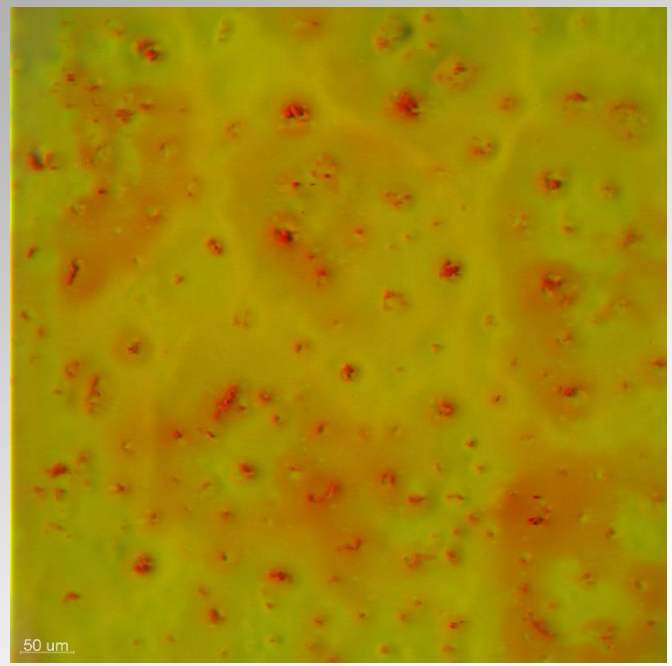

NRS

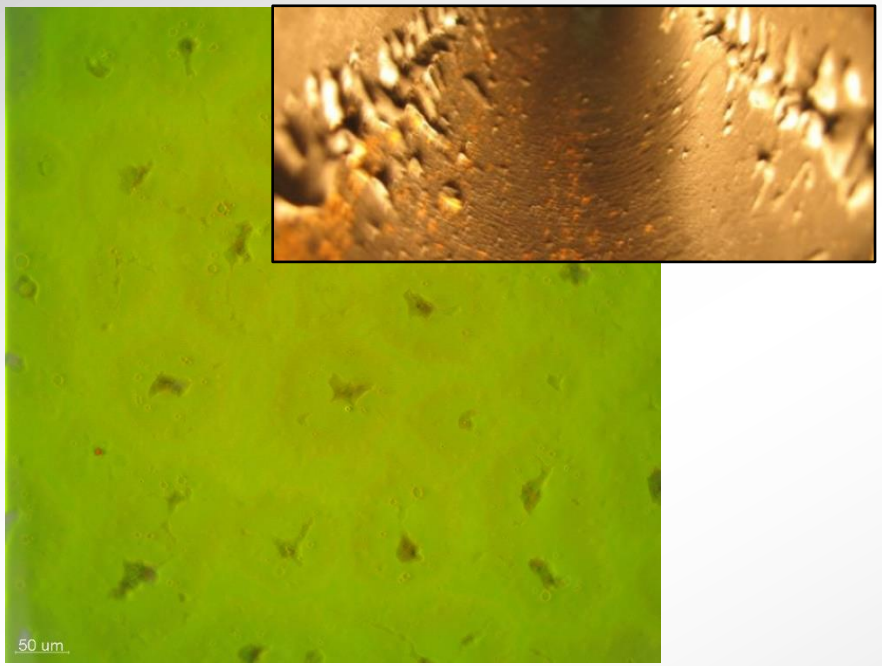
Great Tasting Beer



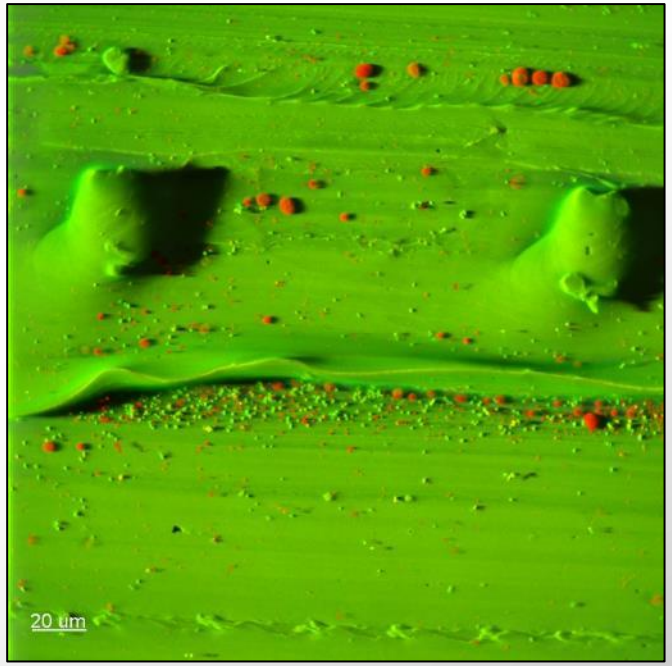
Biofilm & Beer

Biofilm grows in compromised tubing





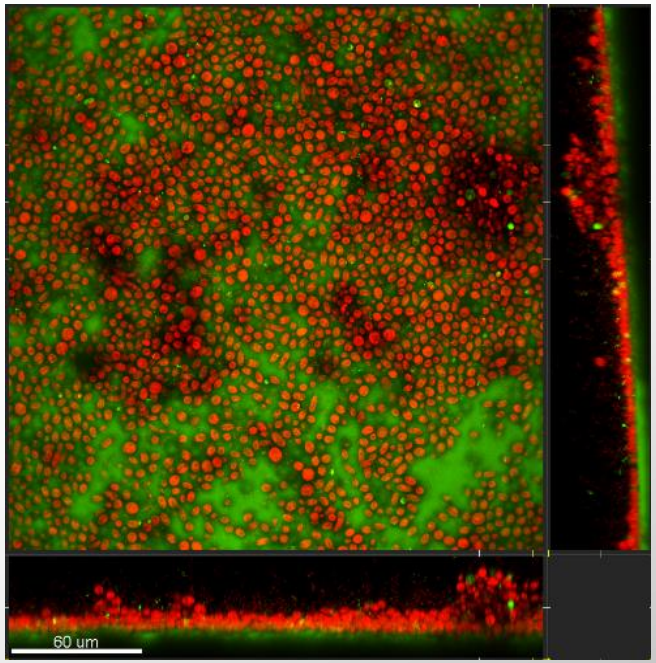
Images of beer line tubing collected from a bar



Images of etched beer line tubing in the laboratory

Research Question

- Does beer draught line tubing aged to simulate 1, 2 and 5 years of cleaning support more biofilm growth?
- Is the resulting biofilm more challenging to kill?



L. Miller, 2020

Age Vinyl Beer Tubing

*390 minutes
**60 minutes

Inoculum

Prepared in Barney Miller Medium + pale ale beer:

- *Pediococcus damnosus* ATCC 29358
- *Acetobacter aceti* ATCC 15973
- *Lactobacillus rhamnosus* ATCC 8538

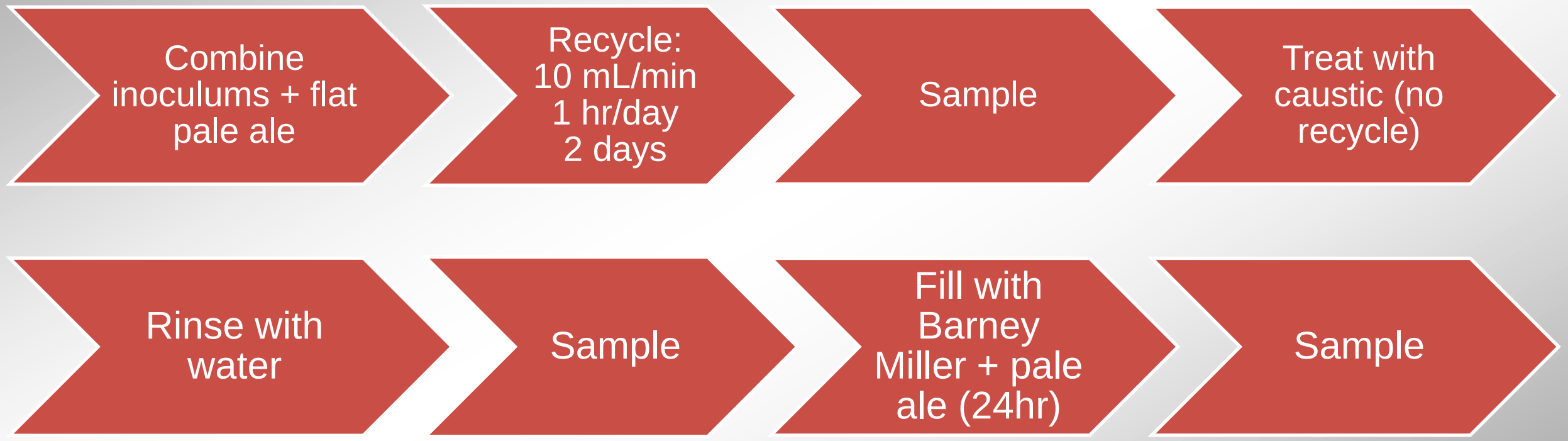
Prepared in Yeast Peptone Dextrose*:*

- *Saccharomyces cerevisiae* (Safale yeast packet)

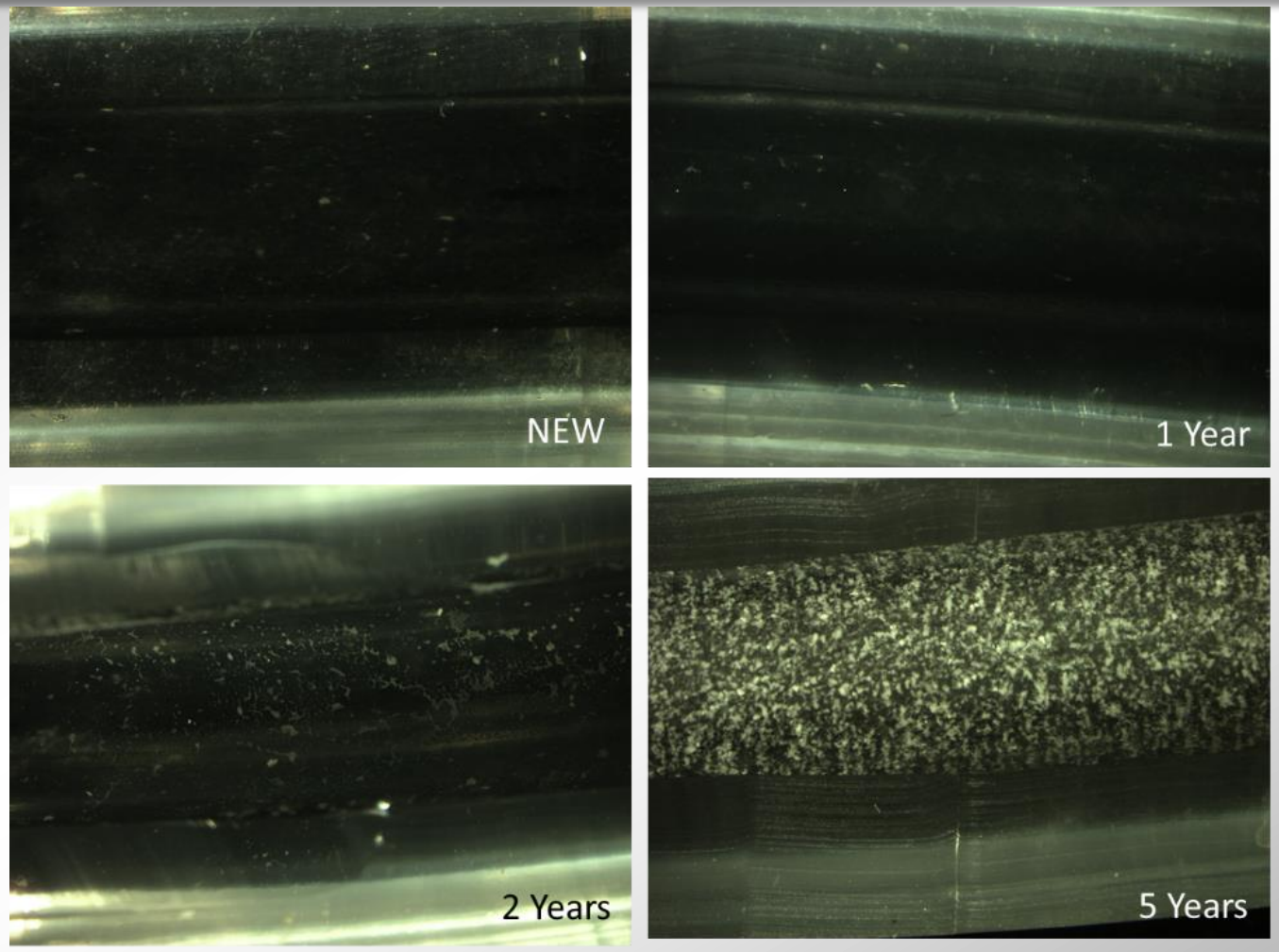
Acetobacter aceti

Incubated at 4 ºC for 3 days. Target density = 10^4 – 10^6 CFU/mL

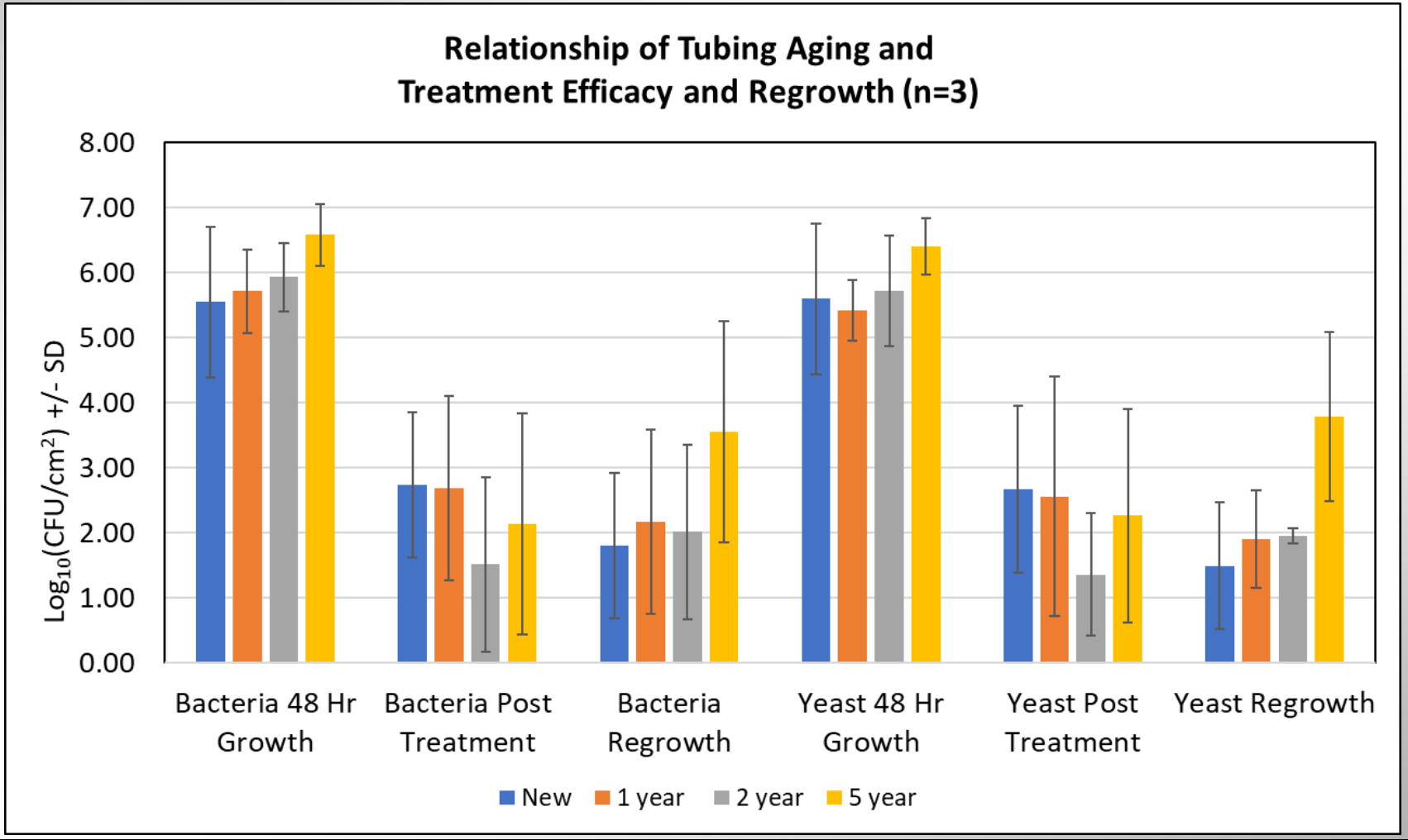
Experimental Design



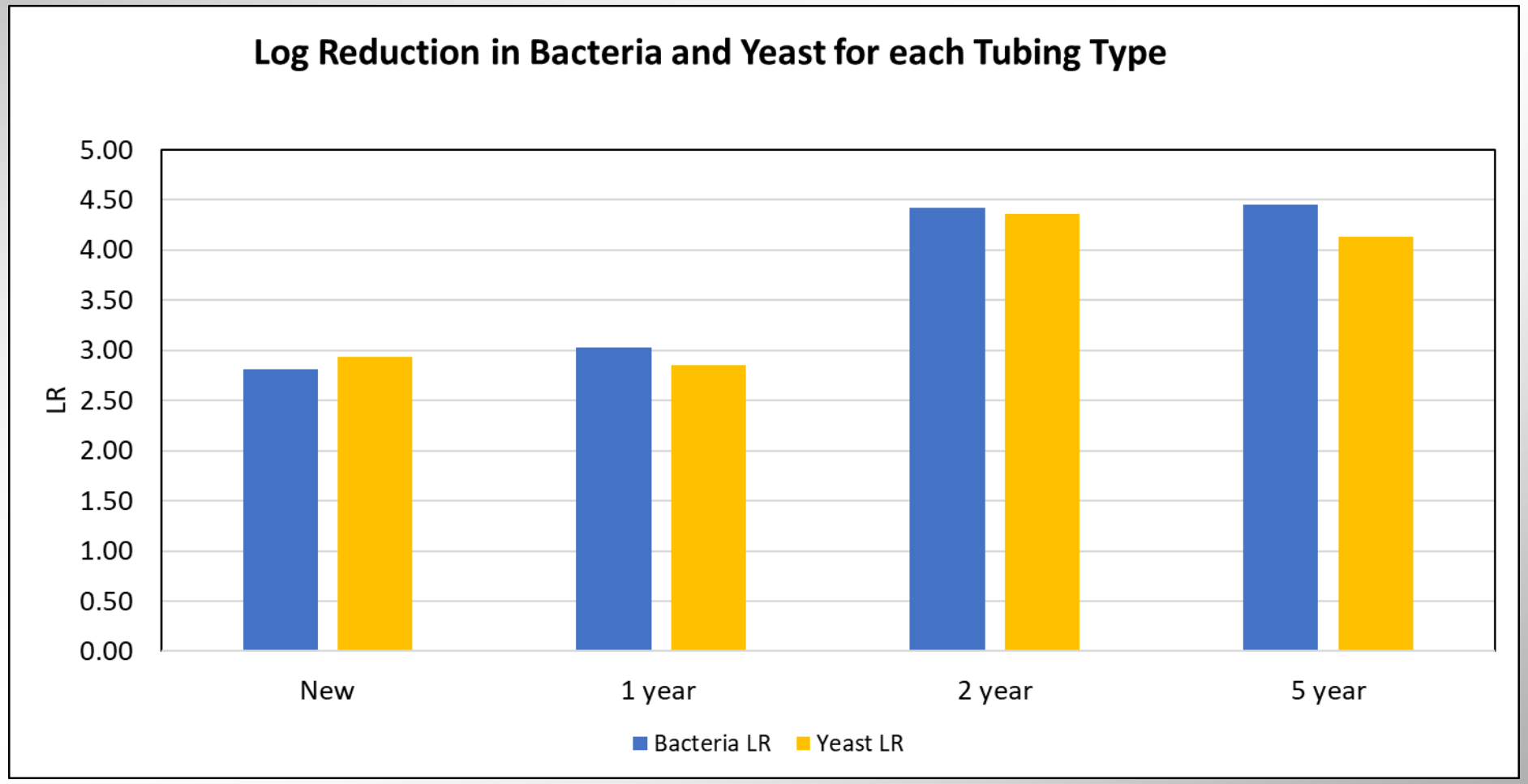
Results: tubing visually changes after 2 years of simulated treatment



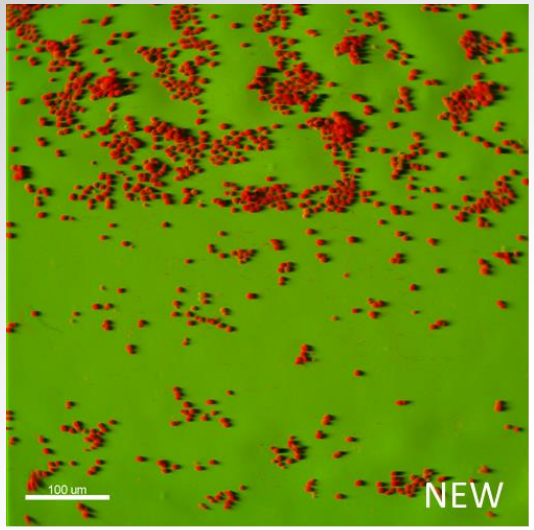
Results: more biofilm harvested from aged tubing; more regrowth

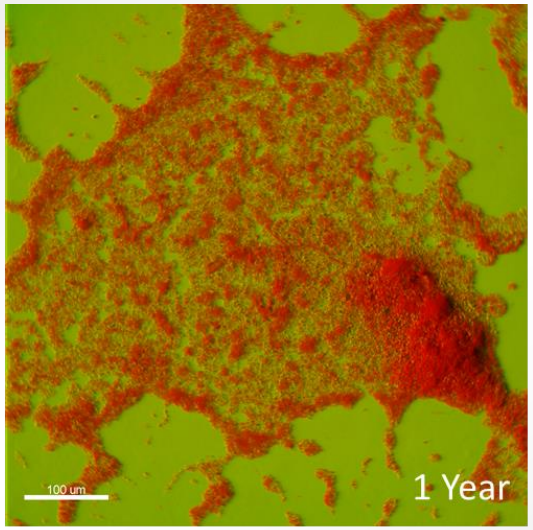


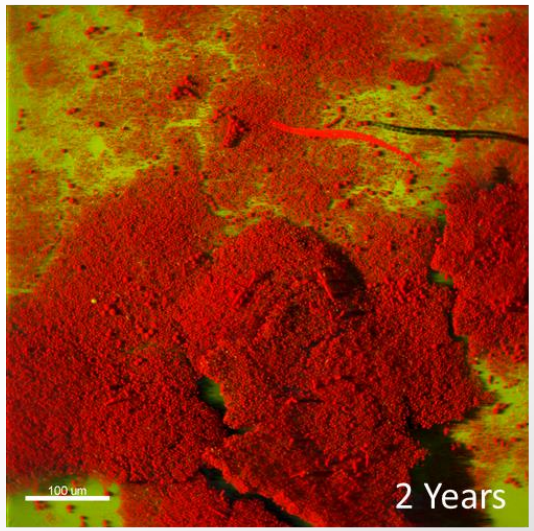
Results: caustic was effective against biofilm in aged tubing

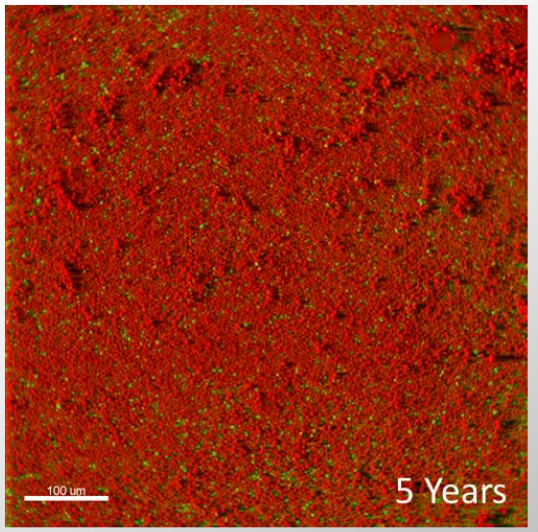


Images confirm plate counts: 48 hr growth

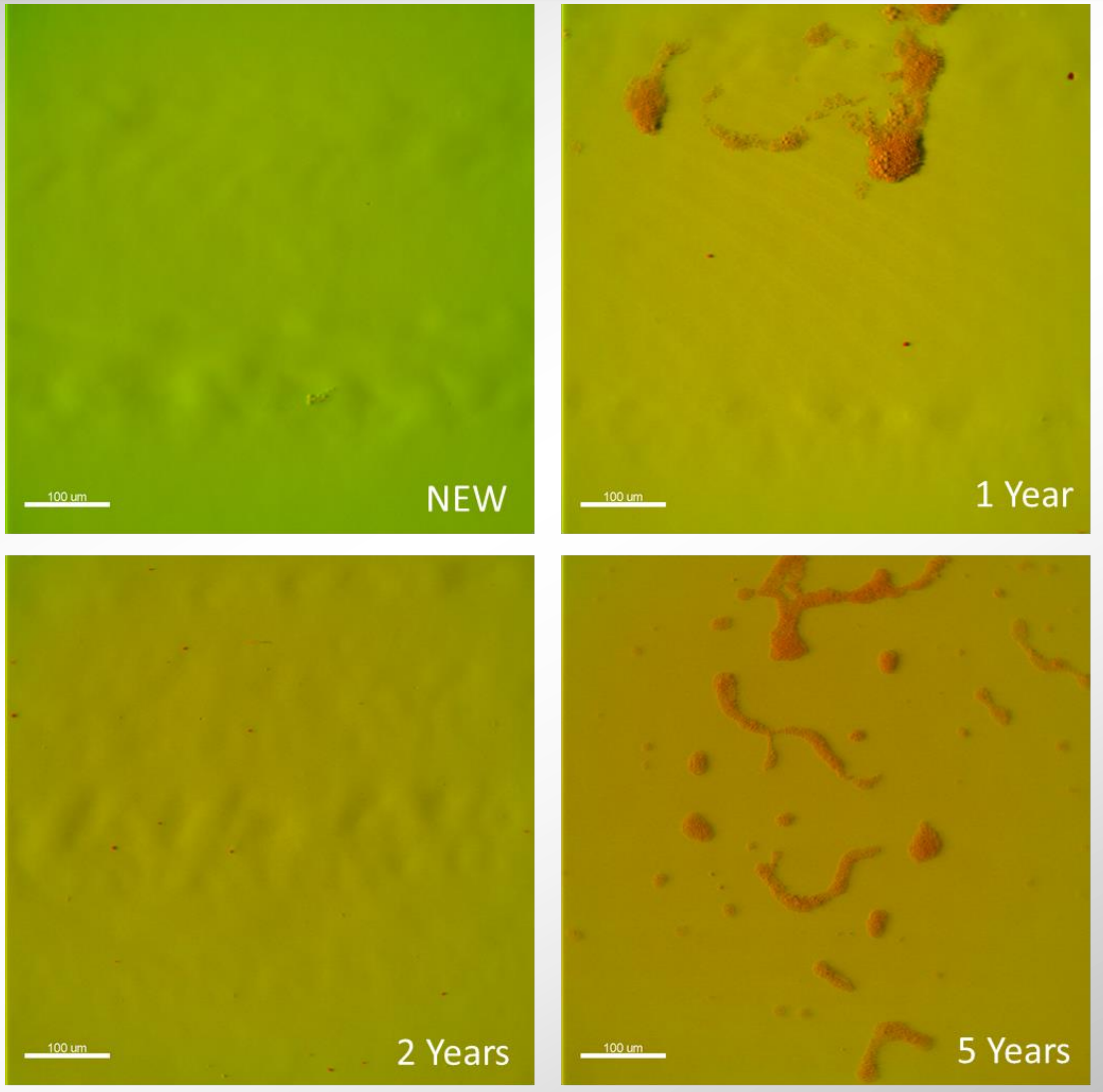




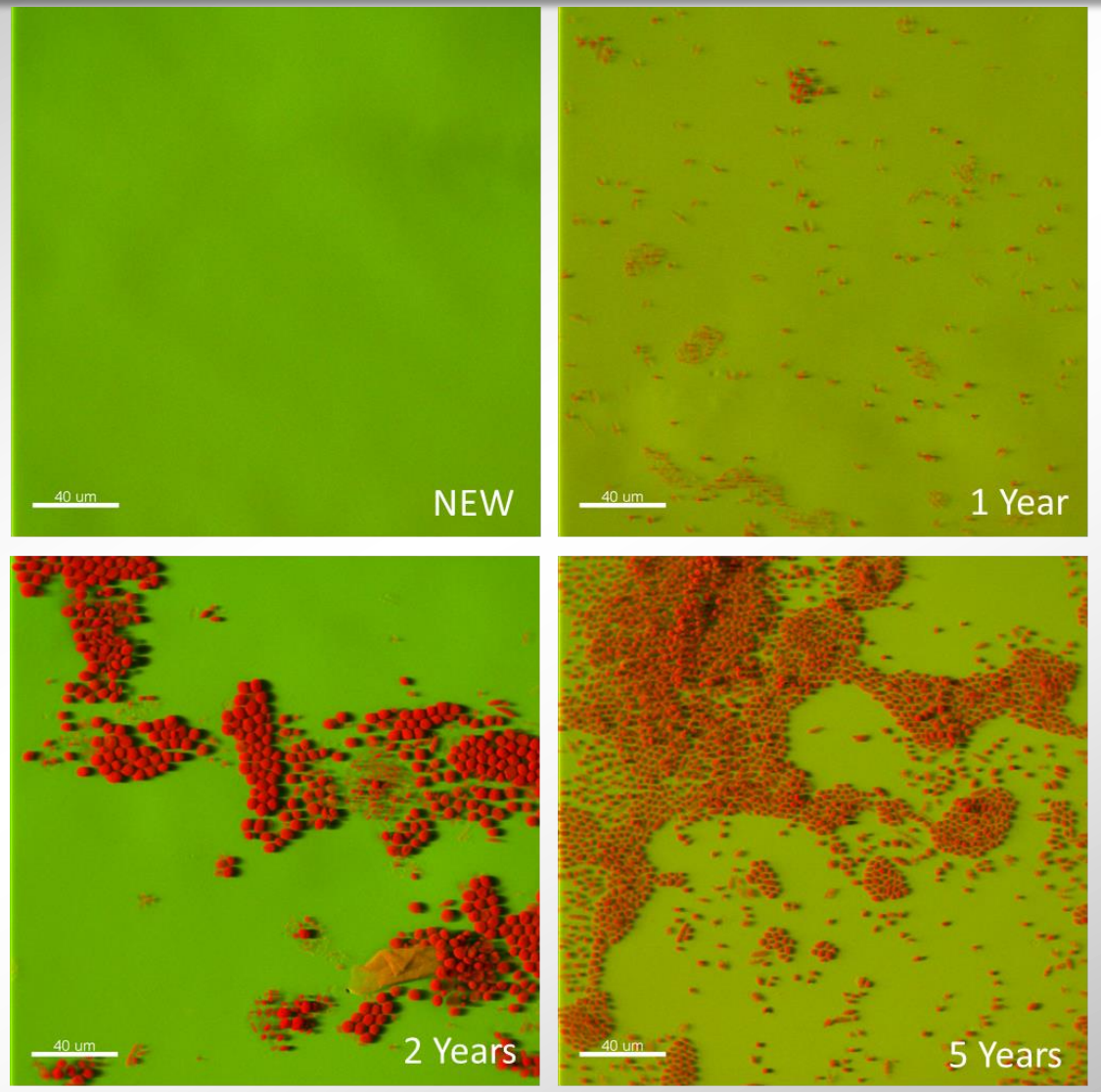




Images confirm plate counts: following treatment



Images confirm plate counts: regrowth



Summary

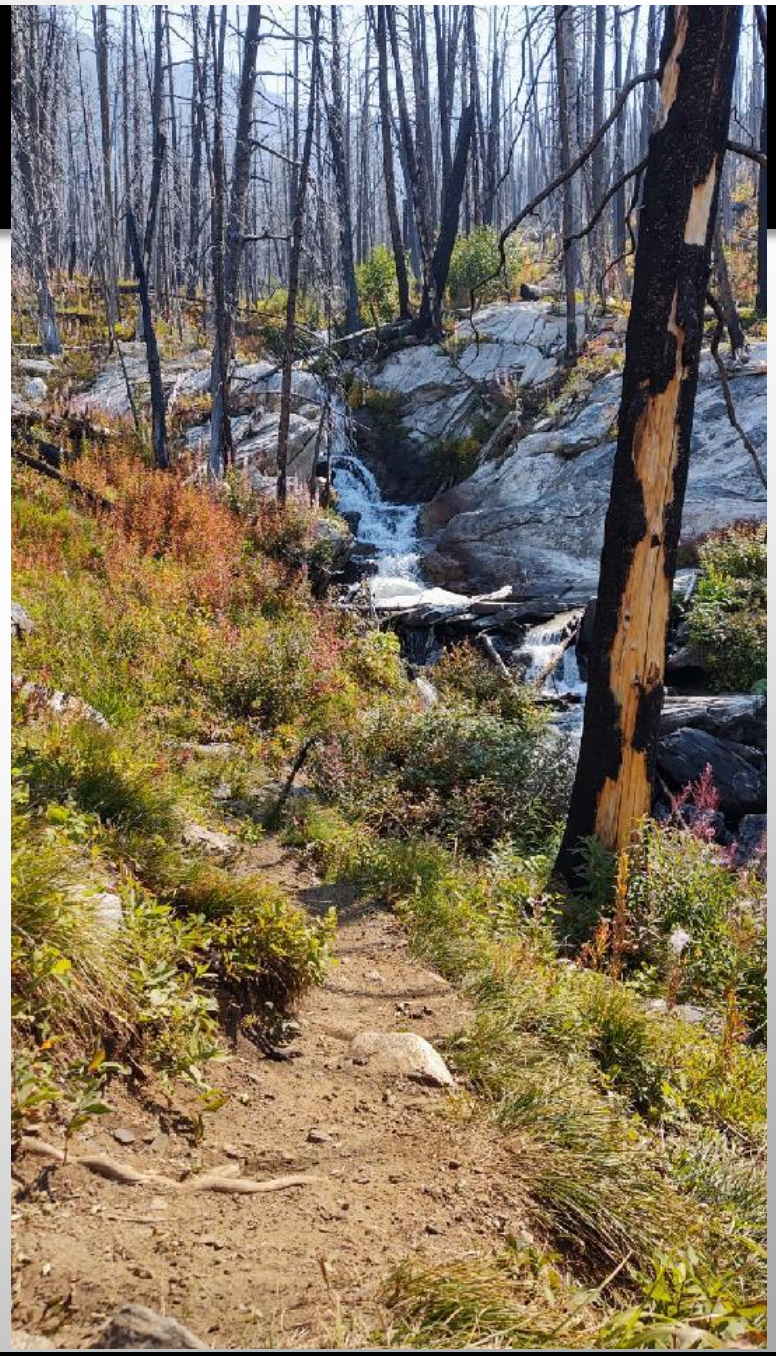
- Data demonstrated a trend between biofilm accumulation and age of tubing.
- Extended exposure to caustic and acid compromised tubing integrity.
- Caustic effectively killed/removed biofilm, regardless of tubing age.
- Biofilm recovered more quickly in aged tubing, suggesting the caustic will cease to be as effective as system ages.

Recommendations

- Always consider biocide and material compatibility
- Consider changing system components ‘more frequently’
- Challenge the industry to develop a biosensor that monitors microbial contamination in real time to optimize cleaning protocols

Path(s) Forward

- **Prescriptive path** – follow best practices specified in the Draft Beer Quality Manual
- **Performance path** – build consensus on clean-in-place performance standards for beer draught lines
  - Target level of: surface cleanliness, control, removal, and/or kill
  - Reporting guidelines
  - Testing guidelines



Cheers

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