

NOSB

Sanitizer Panel Discussion

NOVEMBER 12, 2012

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Materials Considerations



WHY

- Functional benefit of using the specific chemical.
- Alternatives and efficacy.
- Equivalence.
- Include at least one alternative for each purpose.



WHAT

- Fertilizers
- Cleaners
- Surfactants
- Sanitizers
- Disinfectants



HOW

- Application Methods
- On what surface(s)
- Protocols and recommendations for proper use

Food Safety is Hurdles Based

- Food safety hazards include biological, physical, chemical, and radiological agents.
- Reducing/eliminating them from the food is the goal of a food safety program.
- The use of chemicals (pesticides, fertilizers, cleaning agents, sanitizers, processing aids, disinfectants etc.) provides one hurdle that limits contamination by pathogens.
- A soil to package view of hurdles provides opportunities for appropriate control, and each operator must have risk management options.
- In evaluating materials, recommended uses, actual uses and overall impact should be evaluated

At which step in the sanitation process is the material required?



Water Quality – Differs tremendously

Consistency – Protocols used at all steps determine effectiveness.

Sanitizer efficacy – Rotation is recommended. Scientific basis for when to change is complex and not well understood.

Sanitation Protocol

Chemical – Use the right chemical, in the right solution and concentration, and at the right time

Physical Action – Scrubbing

Contact Time – Applying the chemical (series of chemicals) and allowing them to come into contact with the target surface being treated for the recommended amount of time.

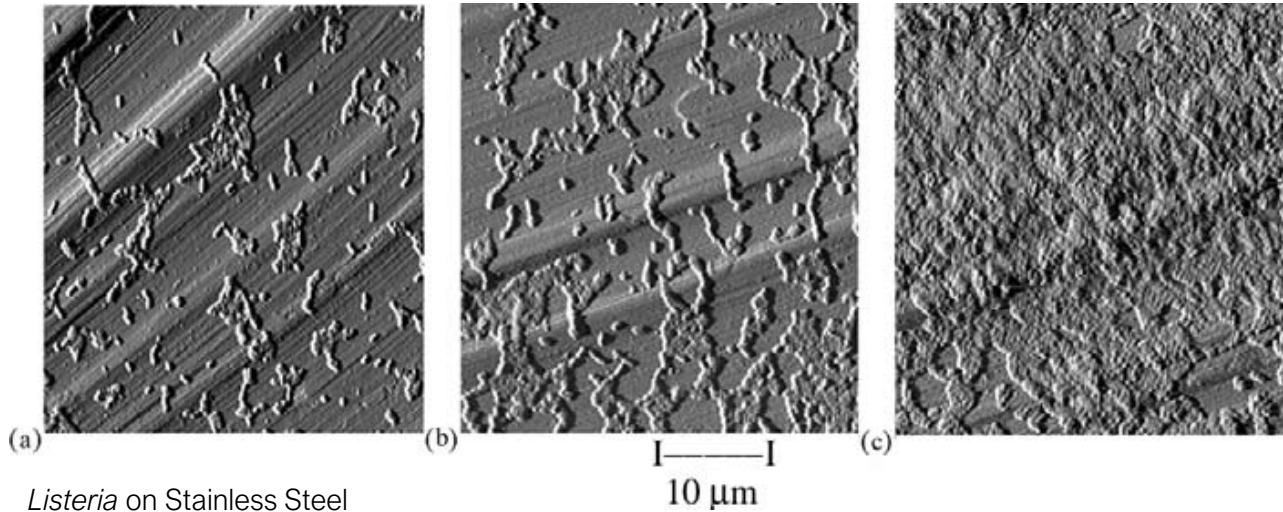
Notes:

- Sanitizers do not work on unclean surfaces
- Harvesting equipment, transportation, personnel, processing equipment, facility, product itself

Biofilms are ubiquitous

Soil, Water, Animal digestive tract.

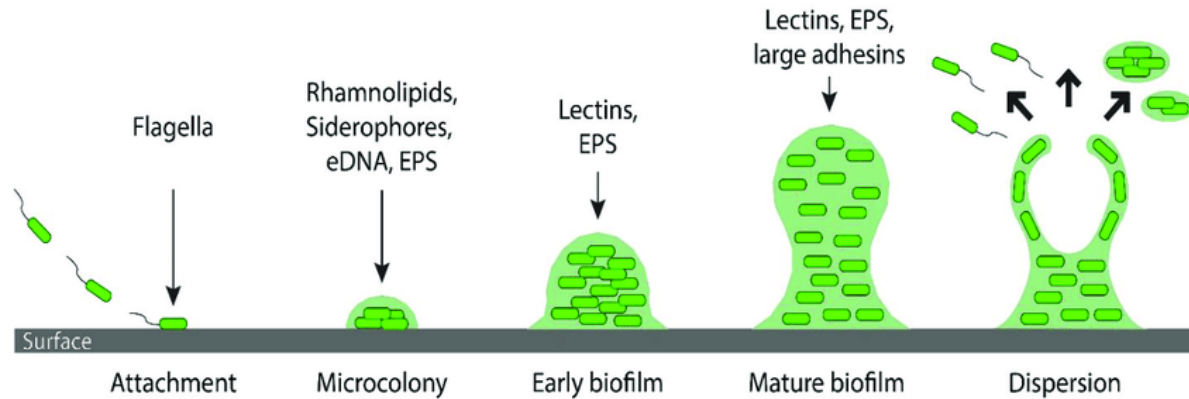
Studies show Biofilms can be found in 9.3% of food and non-food contact surfaces in a food processing plant.



Listeria on Stainless Steel
Takhistov, Paul 2015

Biofilm initiation and development is a complex process that includes several major stages.

Bacteria live in communities



Daniel Passos Da Silva, 2017 [An Update on the Sociomicrobiology of Quorum Sensing in Gram-Negative Biofilm Development](#)

Biofilms are living communities that possess complex organization, defense mechanisms, hierarchy, team work between members of the community, are able to communicate and have “memory”.

- Made of bacteria (including pathogens), yeast, mold, viruses, sugars, proteins etc.
- Biofilms are ubiquitous throughout the food system and should be considered in all biocide efficacy studies.
- Biocide studies using biofilm targets are difficult to design and evaluate.
- Cleaning protocols may remove topmost layer while preserving biofilm infrastructure.
- Complex interactions exist between members of the biofilm and biocides.

Evaluation Criteria for Materials Based on Effectiveness

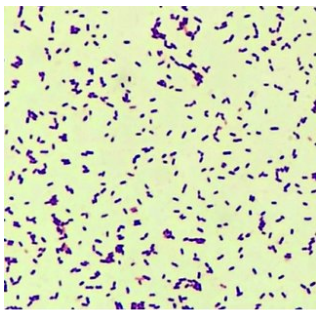
Studies:

Soil removal, pathogen elimination, residue reduction

Evaluation methods:

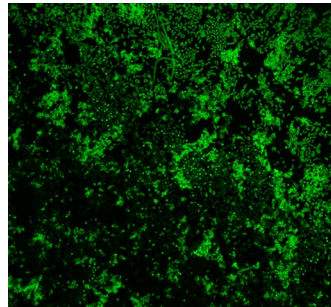
Study design, microbiological methods used, evaluation criteria, target organisms etc.

Planktonic (free floating)



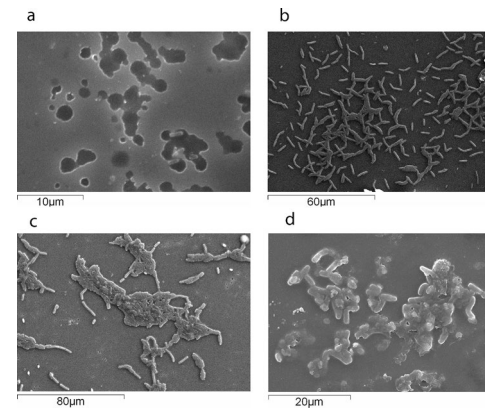
Listeria cells under the microscope

Sessile Form (Biofilm)



Confocal microscopy of *E. coli* O157:H7 biofilm

Listeria Biofilm on Stainless Steel



Swapnil, et. al 2015.
Biofilm-Forming Abilities of *Listeria monocytogenes* Serotypes Isolated from Different Sources

Addition and removal criteria

- Is a viable alternative available for operators to use?
- Does the product provide alternatives for protecting foods that have fewer processing steps, or are consumed raw?
- Does the product address a unique hurdle that has not been addressed previously?
eg: In –field cleaning of harvesting equipment
- Poultry, dairy, produce, grain, offer different long term use challenges with certain sanitizers.
eg: monitoring microbiome trends
- Does the use cause more harm to the product or environment than the benefits offered?
- Natural extracts, Gas, light alternatives to traditional biocides need similar efficacy, effectiveness studies and long term monitoring.
- Re-evaluation based on data
- Antimicrobial resistance vs. persistence considerations.