Production Practices and Dry Bulb Onion Safety: Research Update

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Oregon State University

Dry Bulb Onion Food Safety Projects

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Contamination during pre-harvest production

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Improving food safety and minimizing recalls

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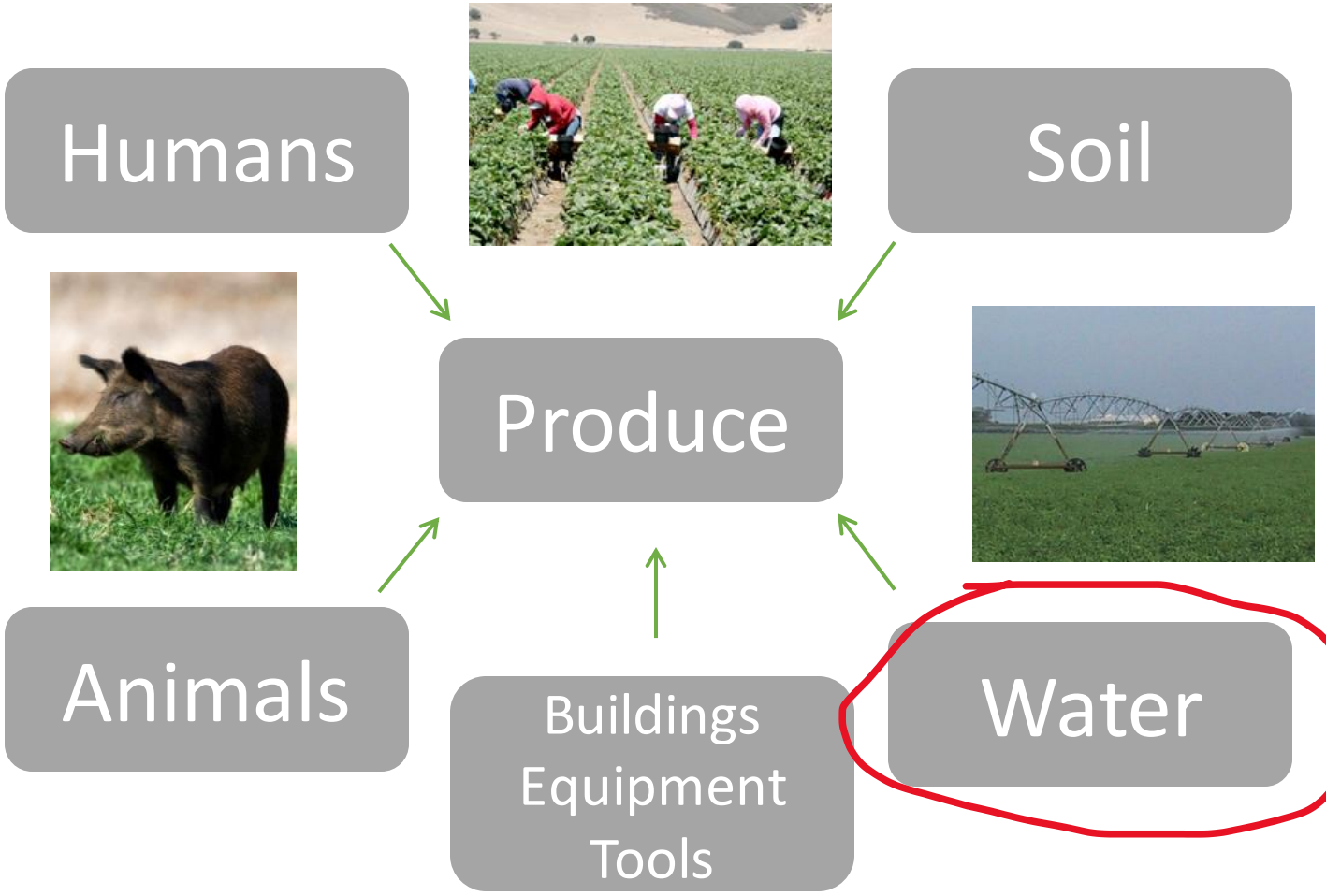
Why Onions?

- 2 Outbreaks 2020 & 2021
  - *Salmonella* linked to onions
  - >2,000 cases

Contamination Sources

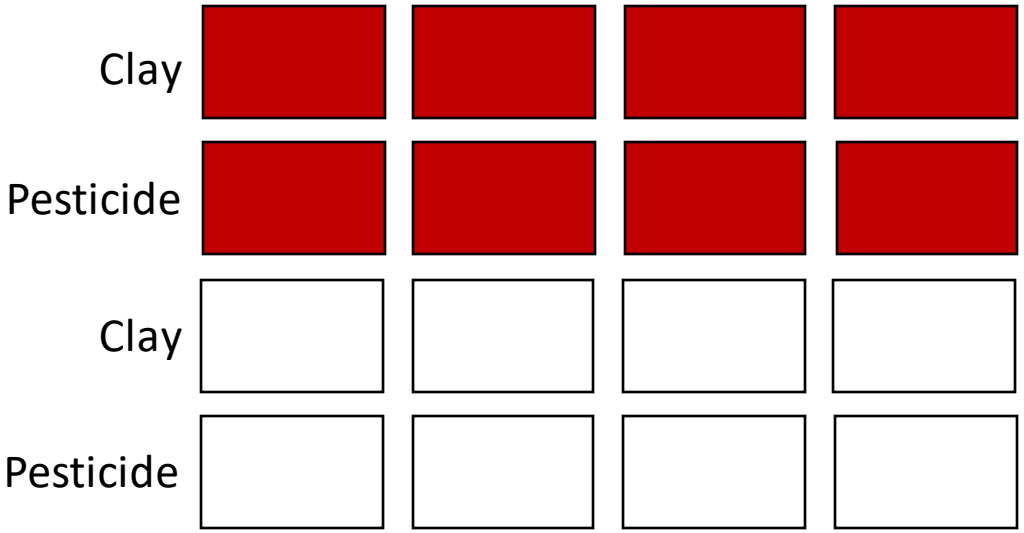
Water applications include irrigation, pesticide use and clay (Kaolin) application before field curing



Most likely source in onions

Can contaminated water contribute to an outbreak via pesticide or clay application?

Oregon



Clay vs Pesticide Application

16 fields, red and white onions

Inoculated August 23rd

Samples collected
Day 0, 0.25, 2, 4, 7, 16, 29

Field Curing September 21st

What did we find?

Percentage of Onions Positive w/ *E. coli*

Treatment	Onion Color	Hour 0	Hour 6	Day 1	Day 2	Day 7	Day 16	Day 29
Clay ~200CFU/100ml	White	52.5% ~3 cells/onion	20.0%	10.0% ~1 cell/onion	0.0%	0.0%	0.0%	0.0%
Pesticide ~500CFU/100ml	White	72.5% ~8 cells/onion	20.0%	7.5% ~1 cell/onion	0.0%	0.0%	0.0%	
Clay ~400CFU/100ml	Red	60.0% ~3 cells/onion	5.0%	7.5% ~1 cell/onion	0.0%	0.0%	0.0%	
Pesticide ~200CFU/100ml	Red	87.5% ~10 cells/onion	30.0%	10.0% ~1 cell/onion	0.0%	0.0%	0.0%	1.3%

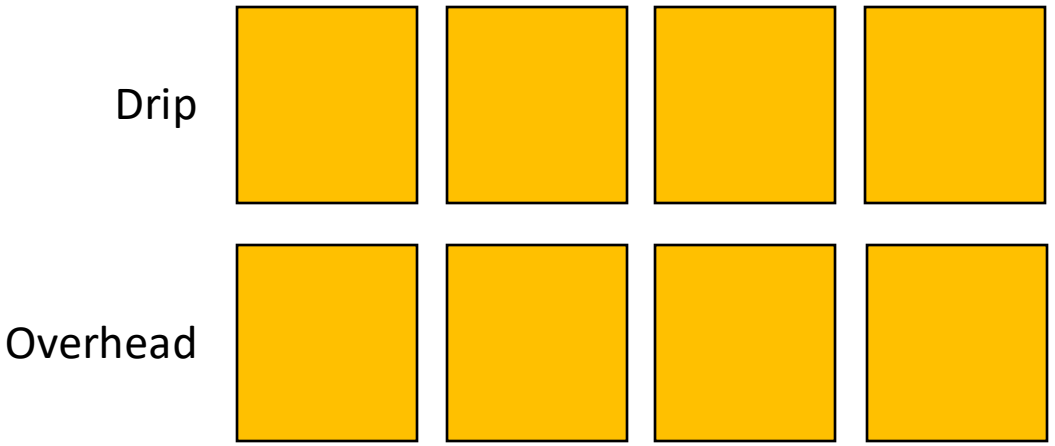
1/80 Onions!

What does this mean?

- Complete die off after two days, or was it...?
  - 1 positive after a month **might** mean there are more heading to storage

Does end of season irrigation cause contamination?

Washington



Drip vs Overhead Irrigation

8 fields, yellow onions

Inoculated August 17th

Samples collected
Day 0, 1, 2, 4, 7, 15, 28

Field Curing September 14th

What did we find?

Percentage of Onions Positive w/ *E. coli*

Treatment	Onion Color	Hour 0	Day 1	Day 2	Day 7	Day 15	Day 28
Drip ~1600 CFU/100ml	Yellow	0.0%	12.5% ~7 cells/onion	0.0%	0.0%	0.0%	0.0%
Overhead ~2000 CFU/100ml	Yellow	95.0% ~9 cells/onion	77.5% ~5 cells/onion	47.5%	15.0%	2.5%	0.0%

Almost 100% Contaminated!

What does this mean?

- Overhead spray irrigation initially showed almost 100% onions w/ *E. coli.*
  - Onions were positive longer via overhead spray.
  - Even so, none survived a month of curing.

Let’s Review

- Overhead spray irrigation might lead to higher contamination rates that take longer to die off.

Next Season

- Water application throughout the growing season will be analyzed closer.

Dry Bulb Onion Contamination Project

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Contamination during pre-harvest production

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Cleaning and Sanitizing on Farms

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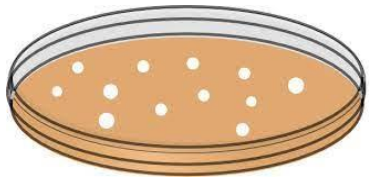
Oregon State University

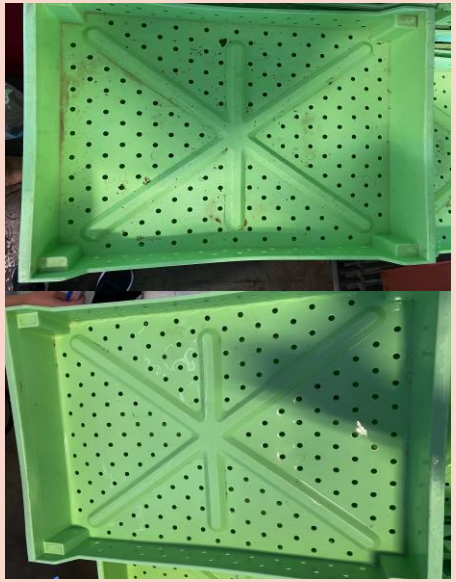
Cleaning and Sanitizing in Fresh Produce Environments

Goal: evaluate efficacy of current procedures

How many bacteria are on a dirty FCS?



Blueberry post-harvest containers



Blueberry harvest buckets

Onion packinghouse belts

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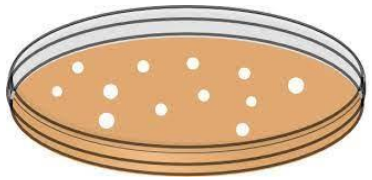

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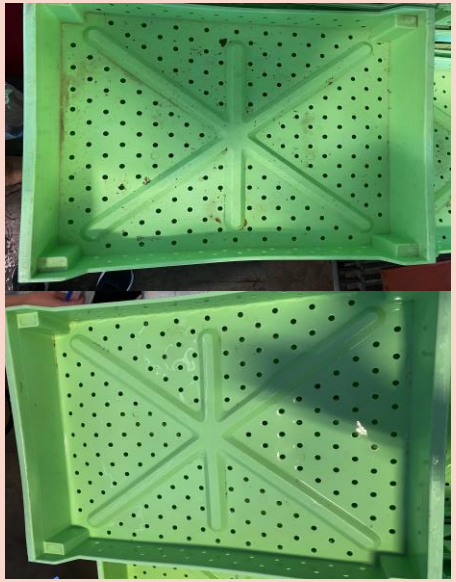


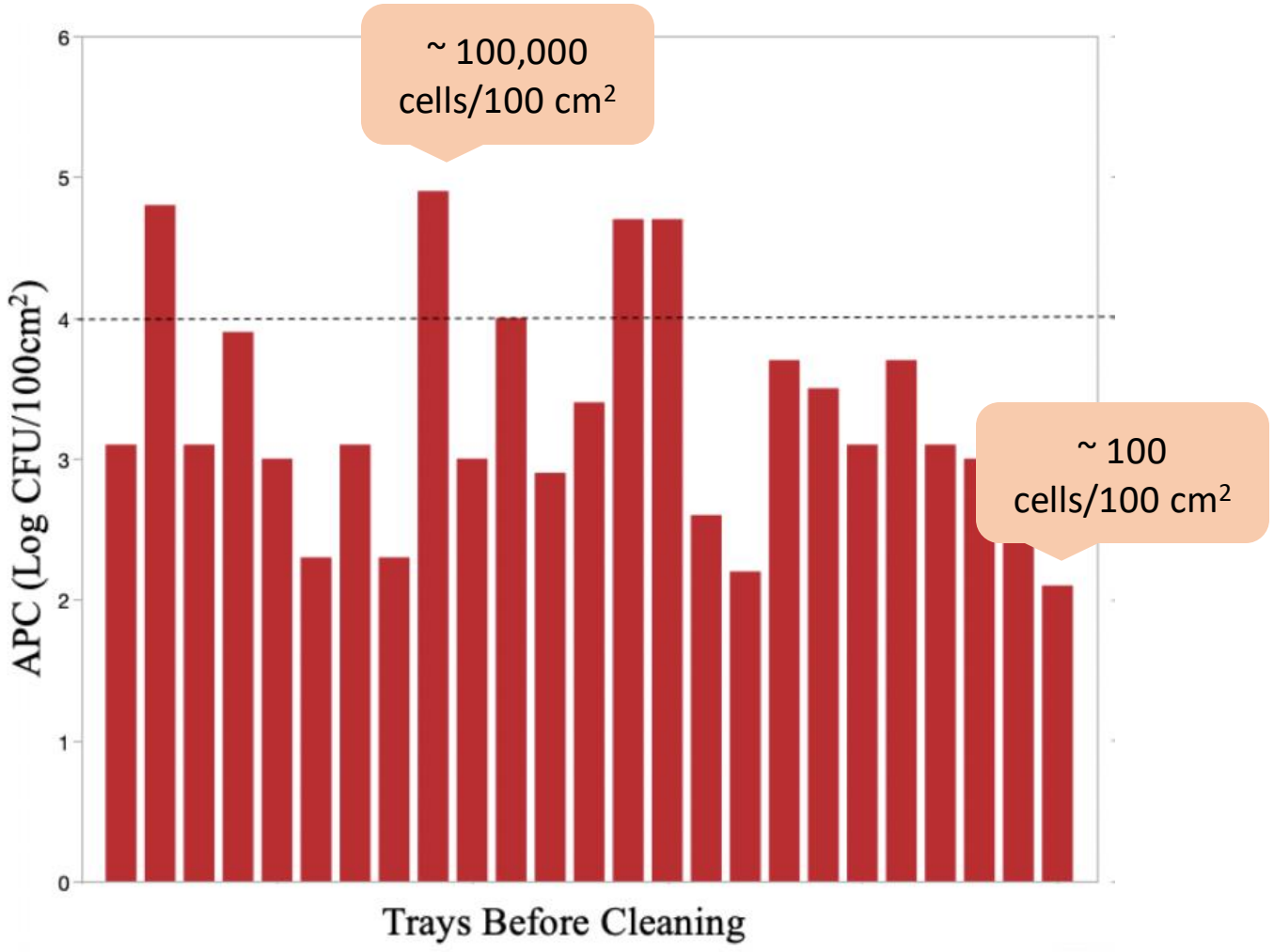
Wet clean only

Blueberry harvest buckets

Wet clean and sanitation

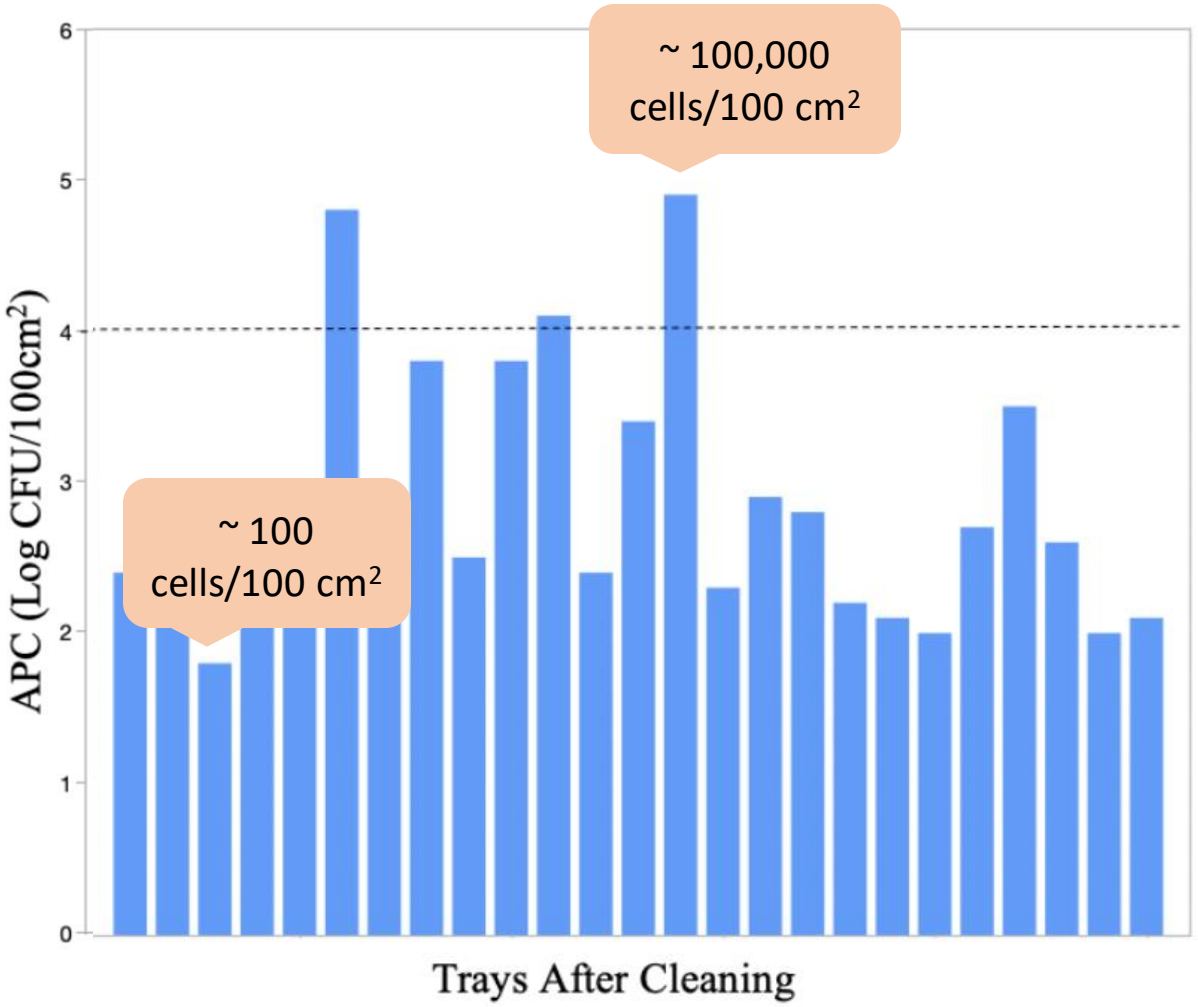
Onion packinghouse belts

Dry clean only



Results from blueberry post-harvest storage bins

(wet clean only)



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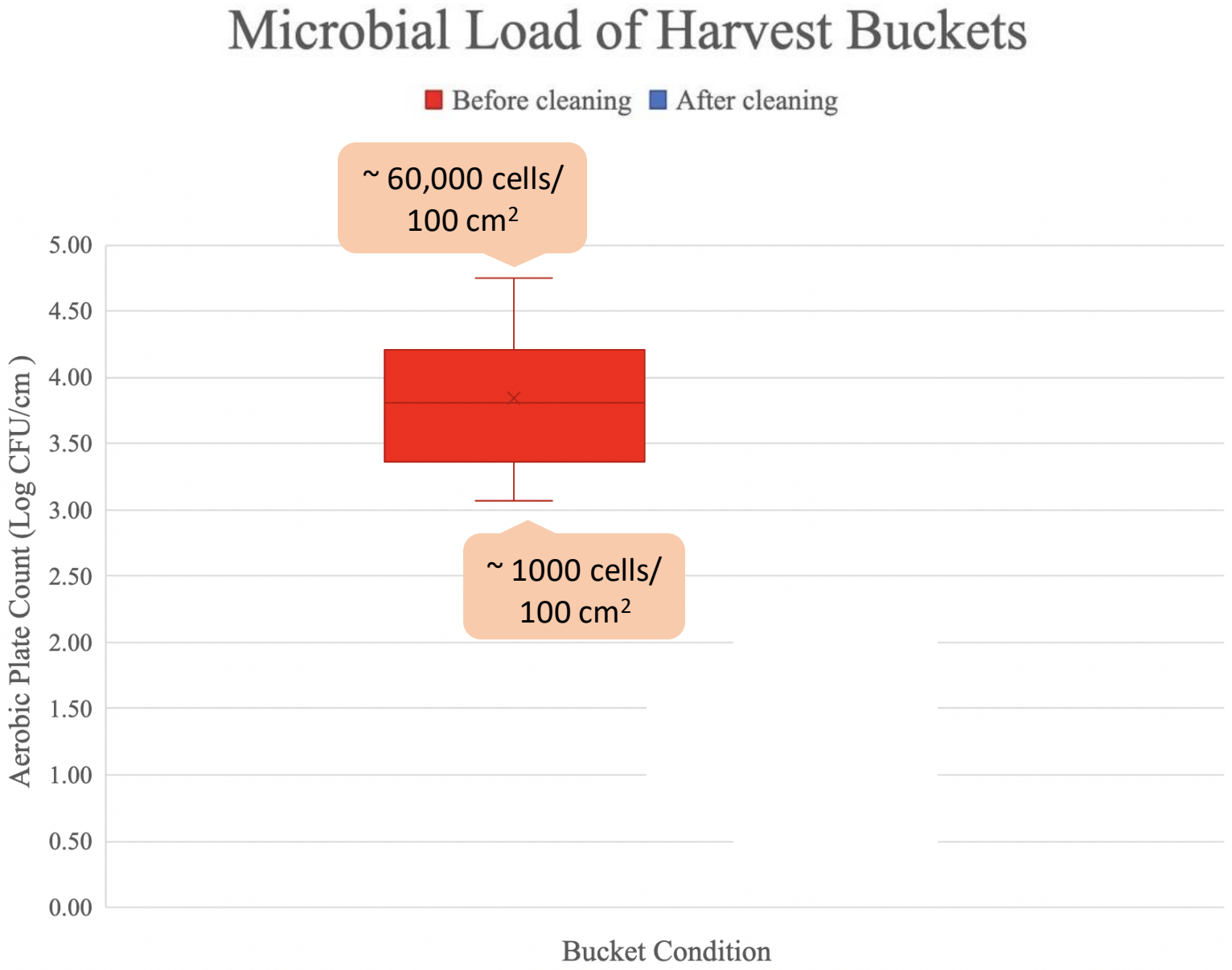

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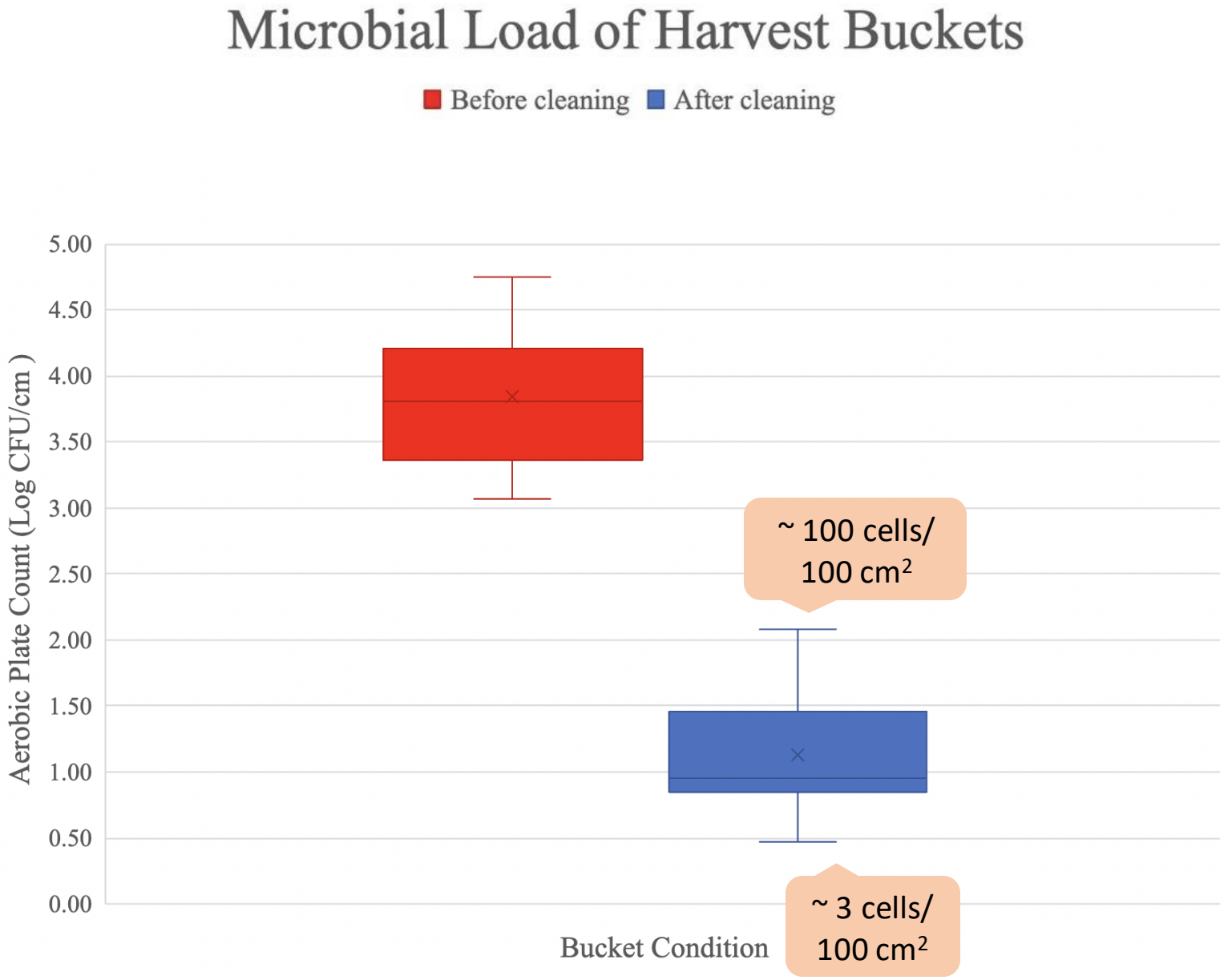

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FDA response to 2020 *Salmonella* outbreak in onions

How can we determine the extent of recalled product?

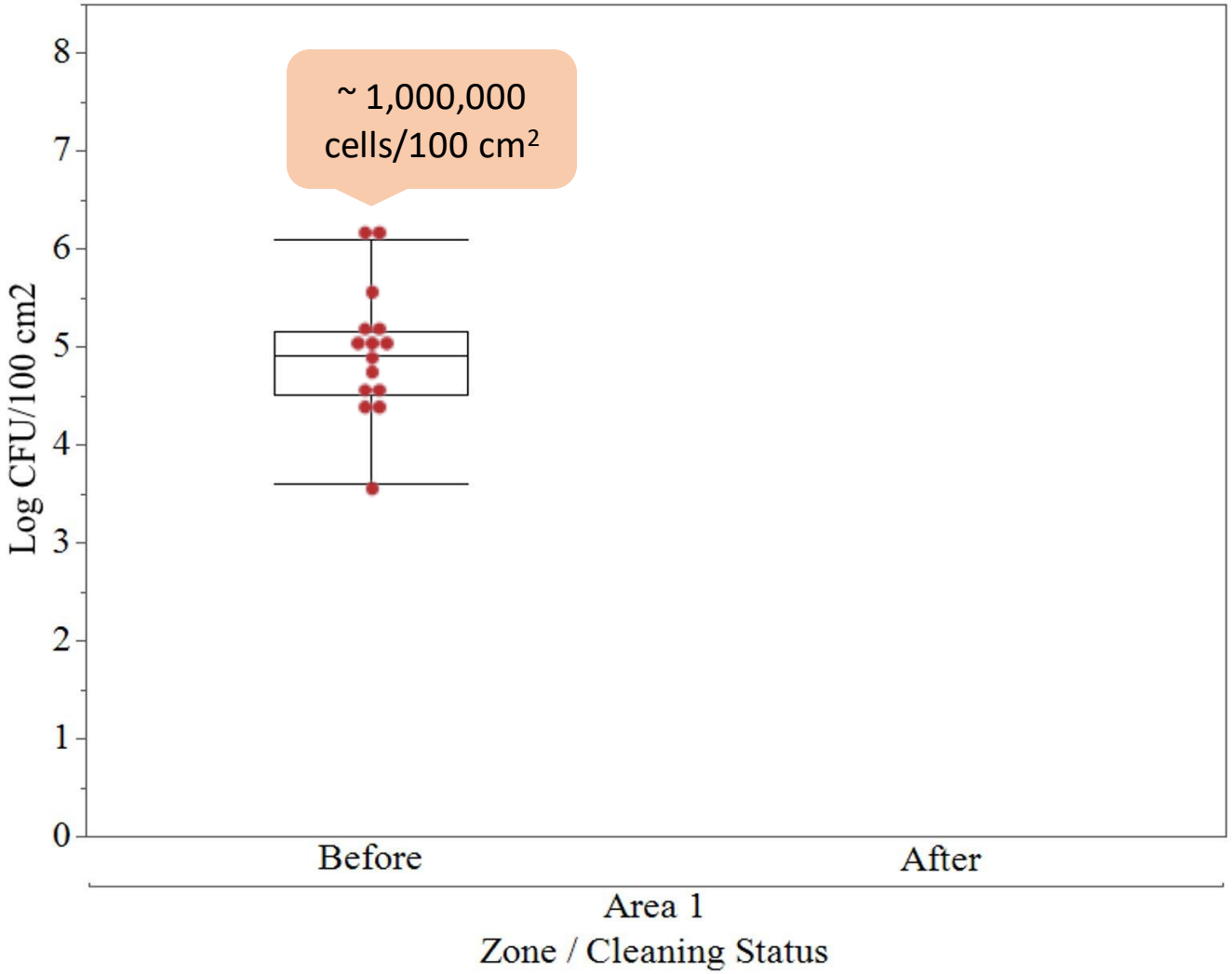
Are current practices effective?
What are barriers in industry?
What might work?

Does bacteria from onions transfer to FCS and onto new onions?

Are current practices effective? → What are barriers in industry? → What might work?

Results from onion packinghouse belts

(dry clean only)



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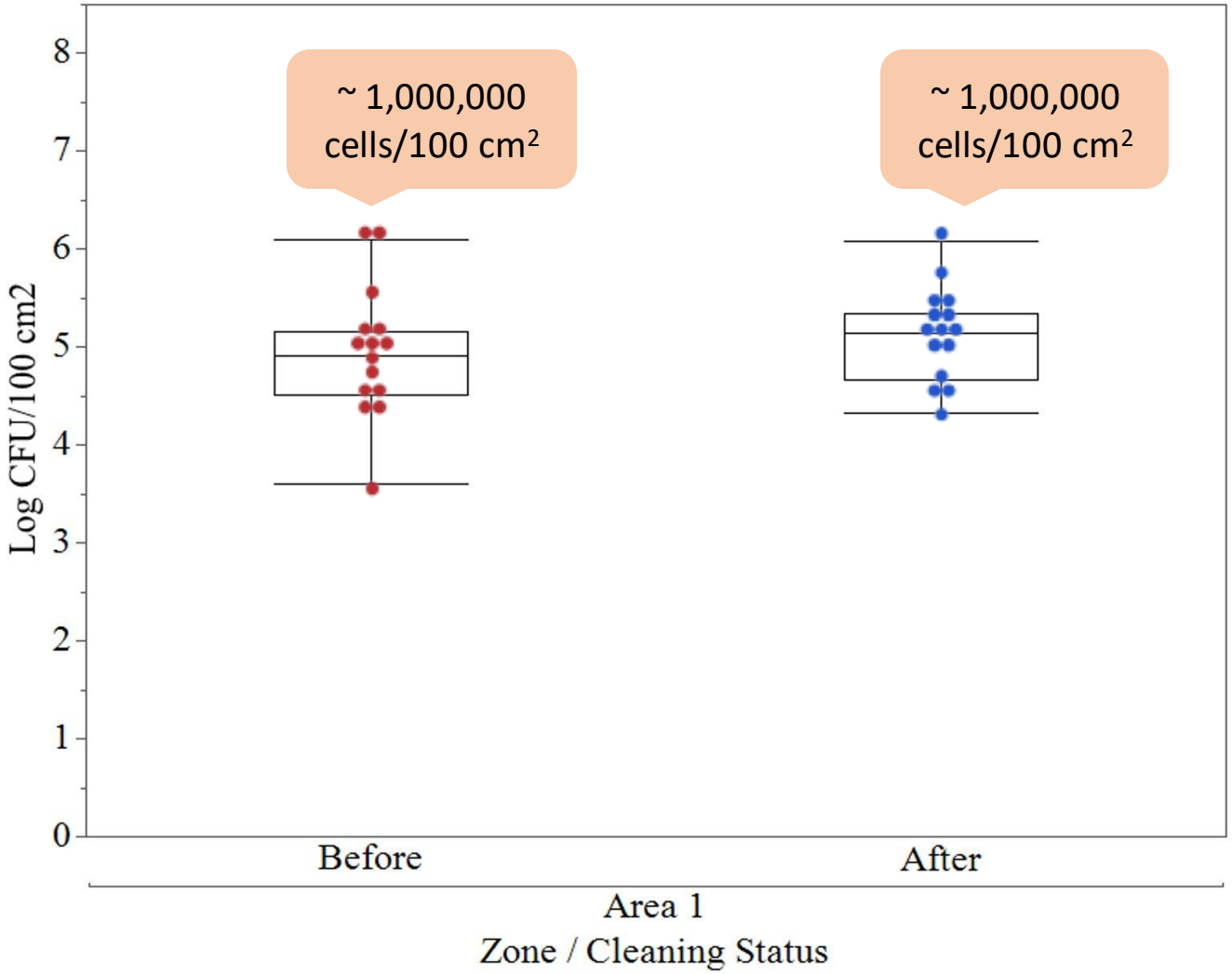

Are current practices effective? → What are barriers in industry? → What might work?

Input needed from industry

Information needed on post-harvest storage conditions:

- Current cleaning and sanitation practices
- Food contact surface types
- Products considered and barriers?

Interested in participating?

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Are current practices effective? → What are barriers in industry? → What might work?

New methods for sanitation?

- Establishing practical and tolerable methods for sanitation

For participation in interviews or site visits:

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- Dr. Stuart Reitz
- Dr. Tim Waters
- Dr. Faith Critzer
- Dr. Linda Harris
- Dr. Jovana Kovacevic
- Dr. Dave Stone

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- Idaho-Malheur Onion Growers
- Columbia Basin Onion Growers

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CENTER for PRODUCE SAFETY

Center for Produce Safety Grant

USDA

USDA Care Grant

WSDA

Washington Specialty Crop Block Grant

To participate in interviews or site visits, please contact

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