

Diversify Your Food Safety and Quality Data: Where Are My Results and What Are They Telling Me?

Moderator: Matt Hahs and Mark Carter, Hygiena

Organized by *IAFP's Applied Laboratory Methods PDG & Data Management & Analytics PDG*

Sponsored by the



Please consider making a contribution

This webinar is being recorded and will be available to IAFP members within one week.

Webinar Housekeeping

- It is important to note that all opinions and statements are those of the individual making the presentation and not necessarily the opinion or view of IAFP.
- All attendees are muted. Questions should be submitted to the presenters during the presentation via the Questions section at the right of the screen. Questions will be answered at the end of the presentations.
- This webinar is being recorded and will be available for access by IAFP members at www.foodprotection.org within one week.



International Association for
Food Protection®

Webinar

Diversify Your Food Safety and Quality Data

Where Are My Results and What Are They Telling Me?

- 1 Introduce the Topic
- 2 Speaker Introductions
- 3 Mindy Brashears Presentation
- 4 Karen Beers Presentation
- 5 Q&A Discussion
- 6 Thank you



Mission:

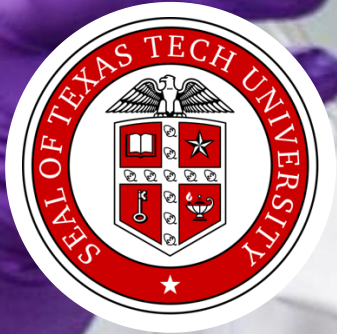
We create innovative diagnostics for a healthier world

Customer Focus:

We provide integrated One Health Diagnostics™ from farm to fork to our customers around the world in the areas of environmental monitoring, production animals, food manufacturing, water, food service, healthcare and other industrial fields. We embrace the “One Health” belief that the health of people is closely connected to the health of animals in our shared environment.



Where Are My Test Results and What Are They Telling Me?



Data Digitization for Holistic Food Safety and Quality Management

New Approach to Microbial Testing to Keep up with New & Innovative Advances

Maximize Your Testing Budget for Actionable Data-Driven Decision-Making

Volume Overwhelm

Large testing data volume leading to operational and cost inefficiencies.

Fragmented Data Sources

Different data sources creating information silos

Delayed Decision-Making

Slow alerts and analysis prevents quick action on food safety issues.

Ever-Changing Compliance

Keeping data ready for stringent and evolving regulations.

Proactive Risk Management

Moving from reactive to predictive in identifying safety risks.



Meet our Speakers



Webinar Moderator
Matthew Hahs
Sr Global Product Manager,
Hygiena



Webinar Moderator
Mark Carter
Sr. Global Software Product
Manager, Hygiena



Webinar Presenter
Mindy Brashears
Director of ICFIE at
Texas Tech University



Webinar Presenter
Karen Beers
Director of
Lab Services
at Pilgrim's





Microbial Testing for Process Control:

Supplementing Indicators with Pathogen Testing

*Mindy Brashears, PhD
Texas Tech University*

Angelica Sanchez, MS



Overview

- Historically we have used indicators to measure process control, especially in raw/fresh product production areas
- Evolution of rapid testing platforms allows us to supplement indicator testing with pathogen testing giving additional insight into process control



TEXAS TECH UNIVERSITY SYSTEM™

Microbial Testing for Process Control in a Beef Fabrication Facility

Environmental Monitoring Programs

Verifies cleaning, sanitation, and pathogen controls to prevent cross-contamination of the finished product from the environment.

Microbial Indicators

- Aerobic counts (AC)
- Enterobacteriaceae (EB)
- Generic *E. coli* (EC)

Pathogens

- *Salmonella* spp.
- Shiga toxin-producing *E. coli*.
O26, O45, O103, O111, O121, and O145.



Sampling Time Points

- 5:30 am pre-operation
- 8:30 am morning break.
- 11:30 am before cleaning.
- 12:30 pm after cleaning.
- 3:00 pm at the end of the shift.



Study 1: Enviro-mapping

Sampling

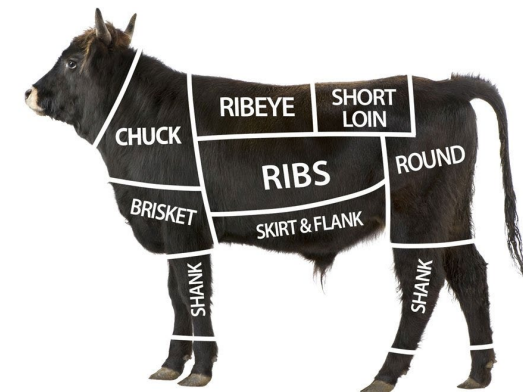
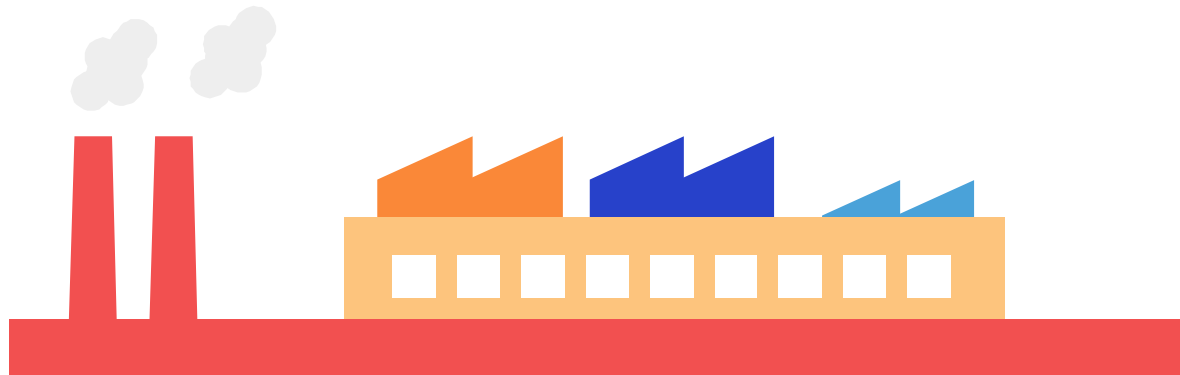


MicroSnap™



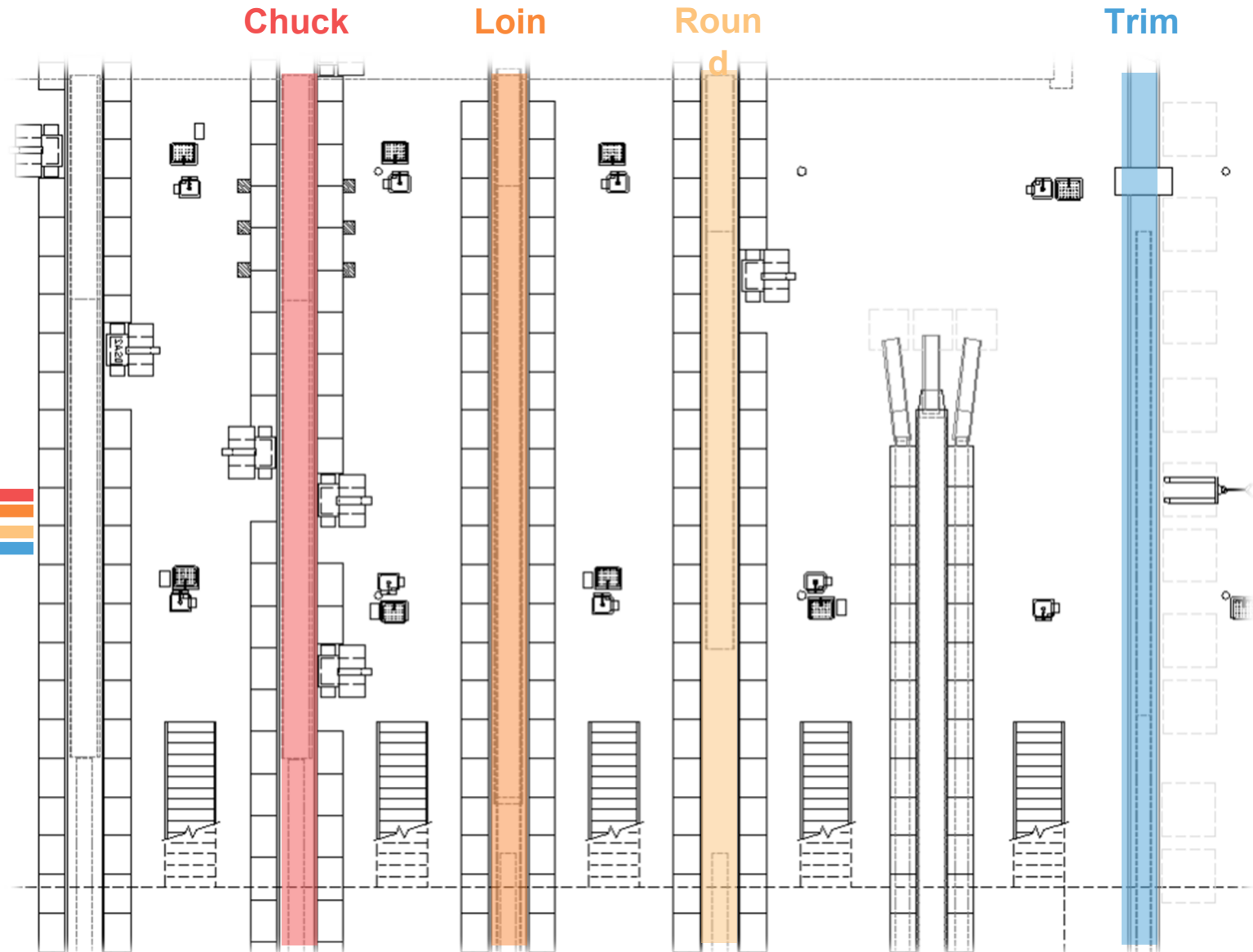
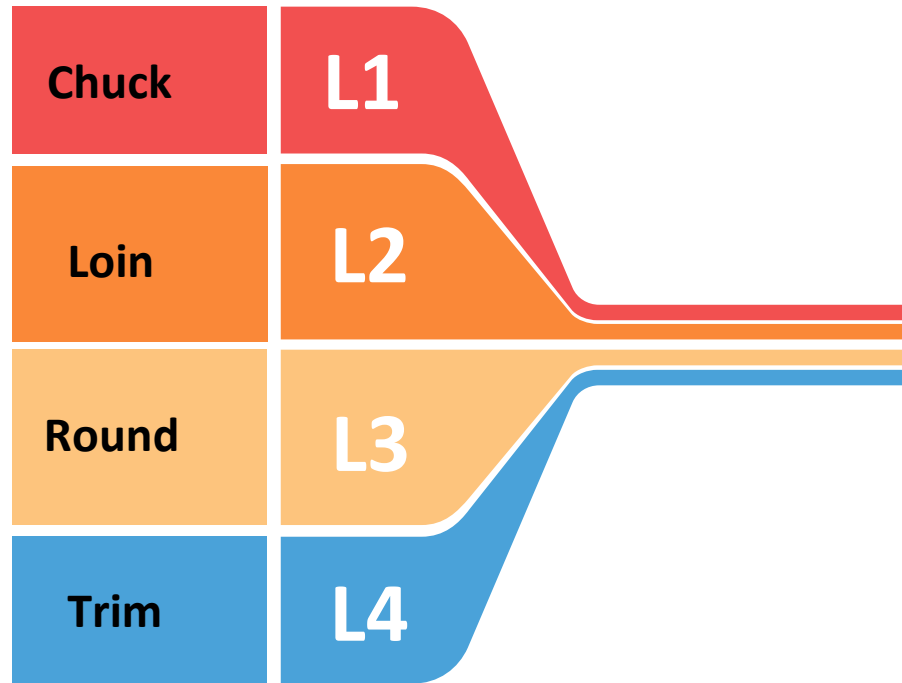
Enviro-mapping baseline of a beef fabrication floor

- **Objective:** identify microbial harborage sites and evaluate concentration over time throughout the day in the fabrication area of a beef processing facility.
- **Hypothesis:** bio-mapping of microbial indicators in the facility's environment can provide data for processors to make decisions to prevent cross-contamination with potential pathogens.





Sampling Location





Sampling Sites

Z1 Conveyor Belts: N = 60

Areas:

- L1 = 17.40m²
- L2 = 20.11m²
- L3 = 21.2m²
- L4 = 8.95m²

Cutting Boards: N = 90, 0.5 m².

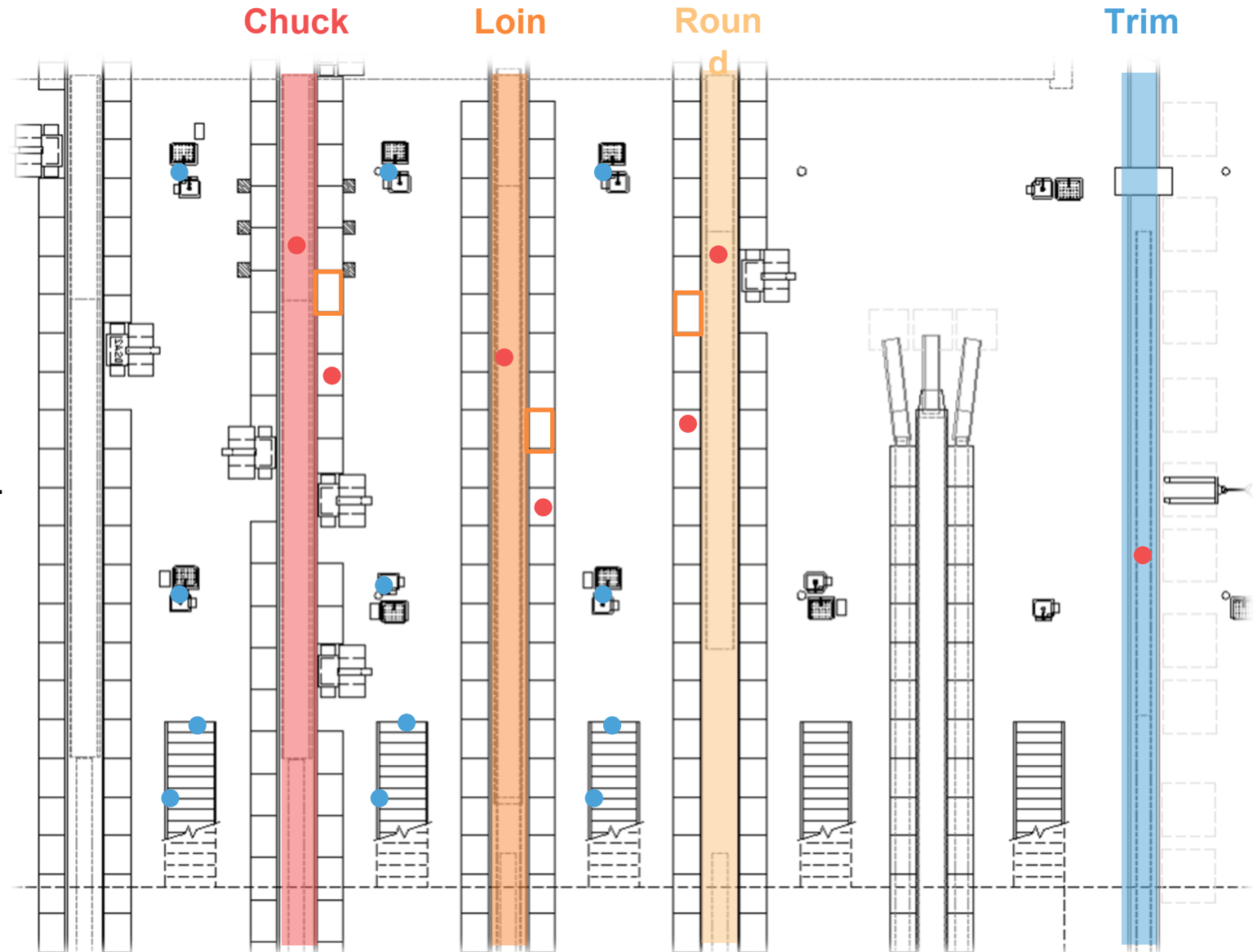
Knives: N = 90, ~20 cm².

Z2 Board frames: N = 90, 90cm².

Z3 Drains: N = 90, 320 cm².

Handrails: N = 18, 37 cm².

Stairs: N = 18, 25 cm²



Sampling Sites

Z1 Conveyor Belts: N = 60

Areas:

- L1 = 17.40m²
- L2 = 20.11m²
- L3 = 21.2m²
- L4 = 8.95m²

Cutting Boards: N = 90, 0.5 m².

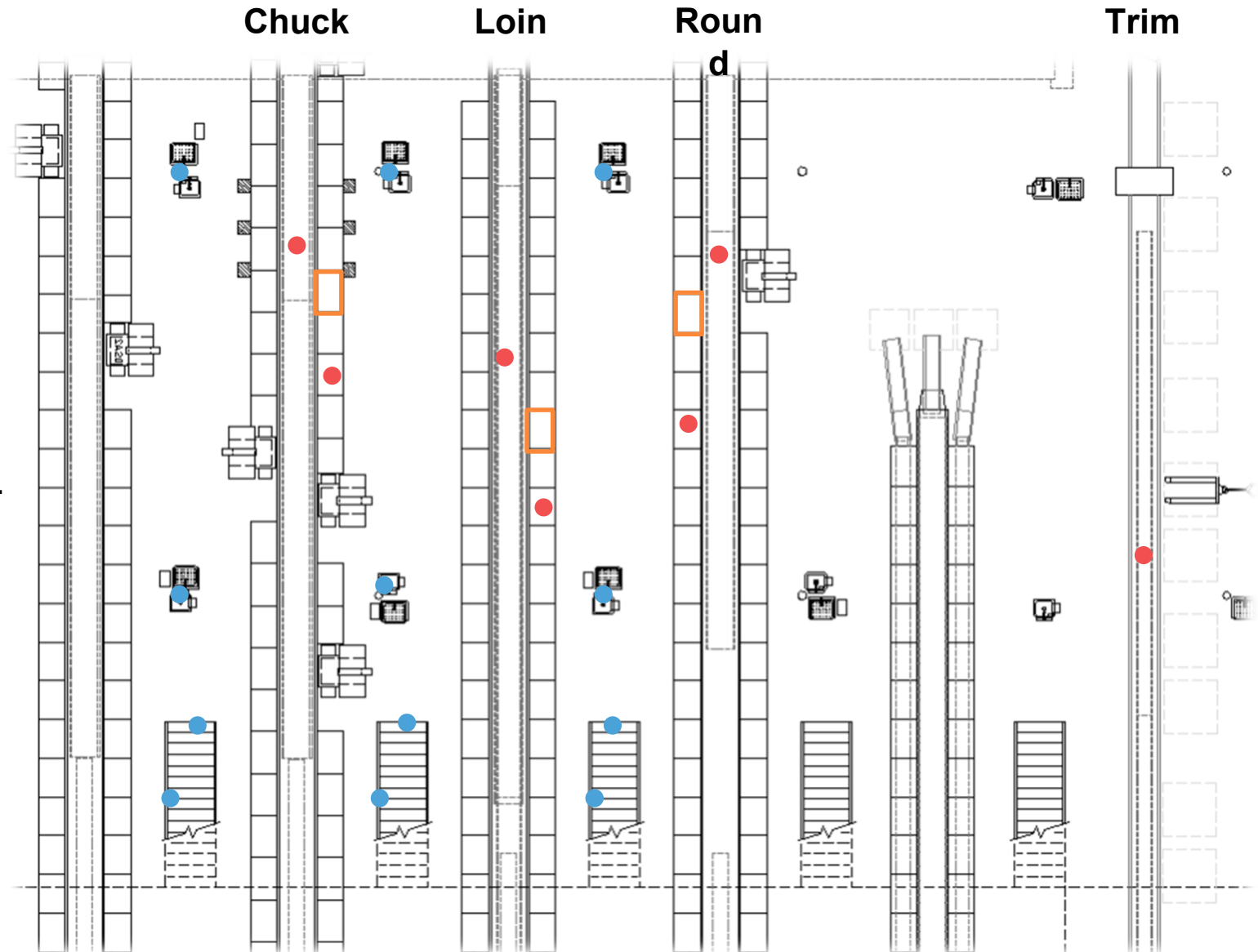
Knives: N = 90, ~20 cm².

Z2 Board frames: N = 90,
90cm².

Z3 Drains: N = 90, 320 cm².

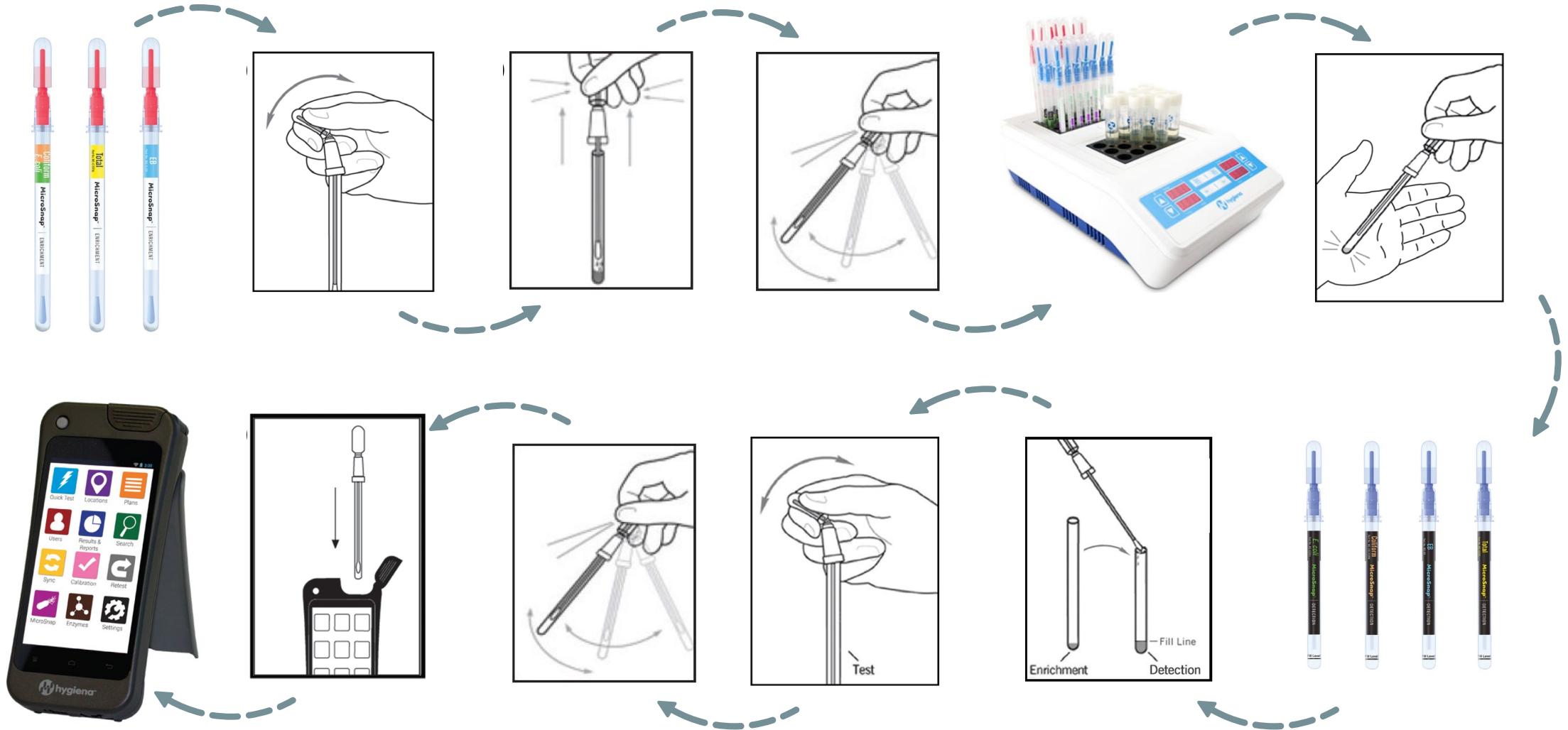
Handrails: N = 18, 37 cm².

Stairs: N = 18, 25 cm²





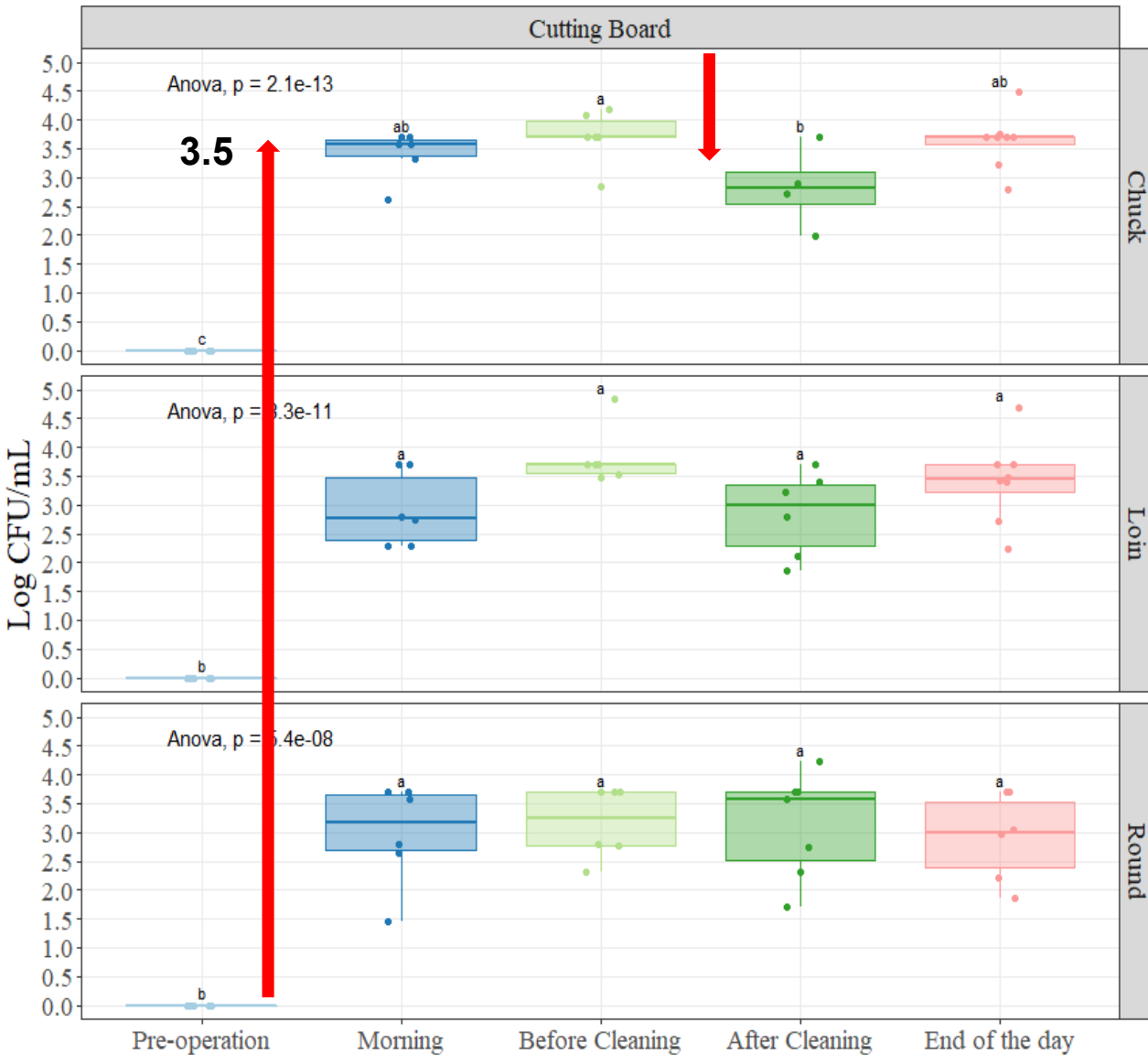
Sample Processing: MicroSnap



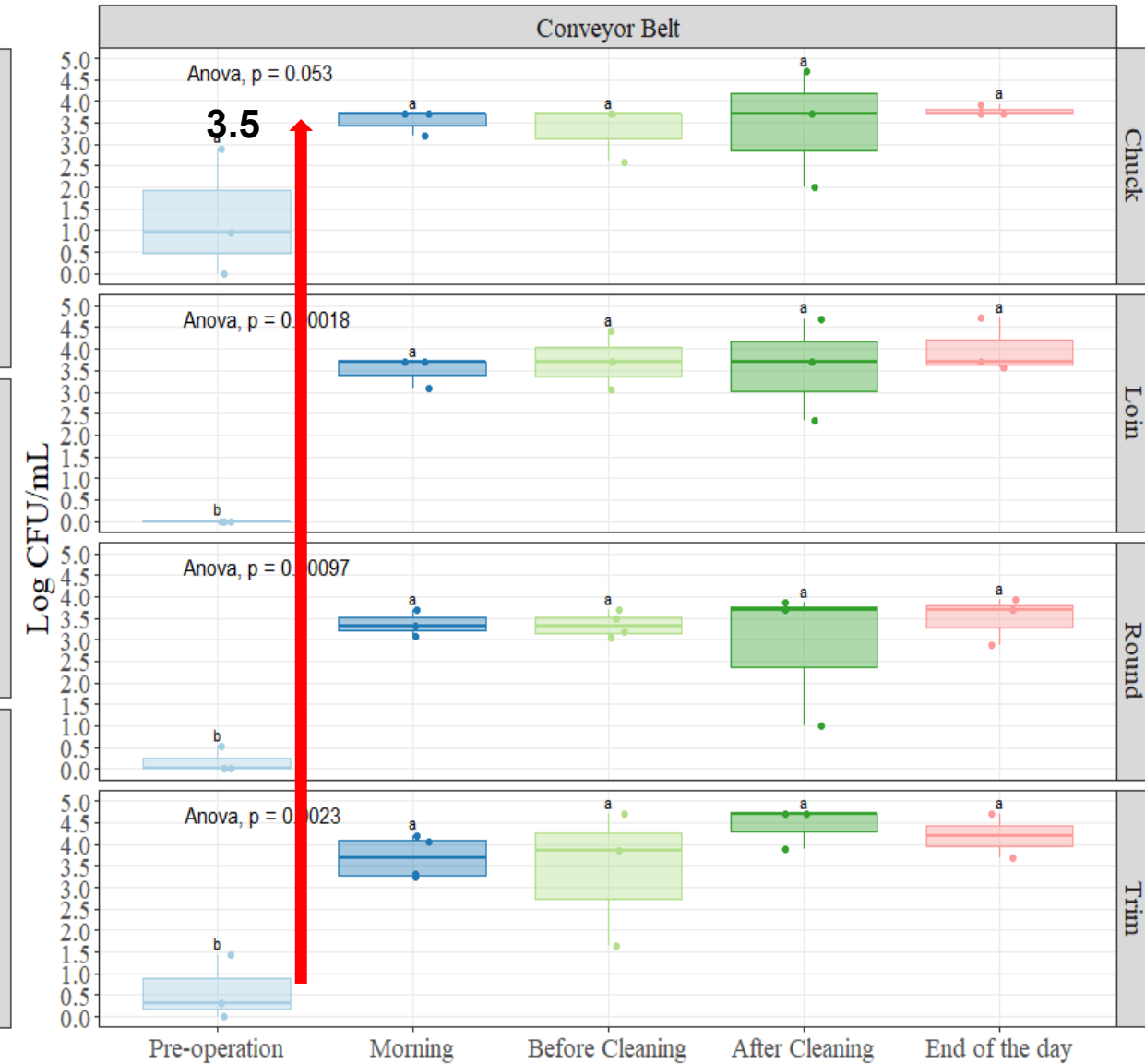


Results: Aerobic Counts

Study 1: Enviro-mapping



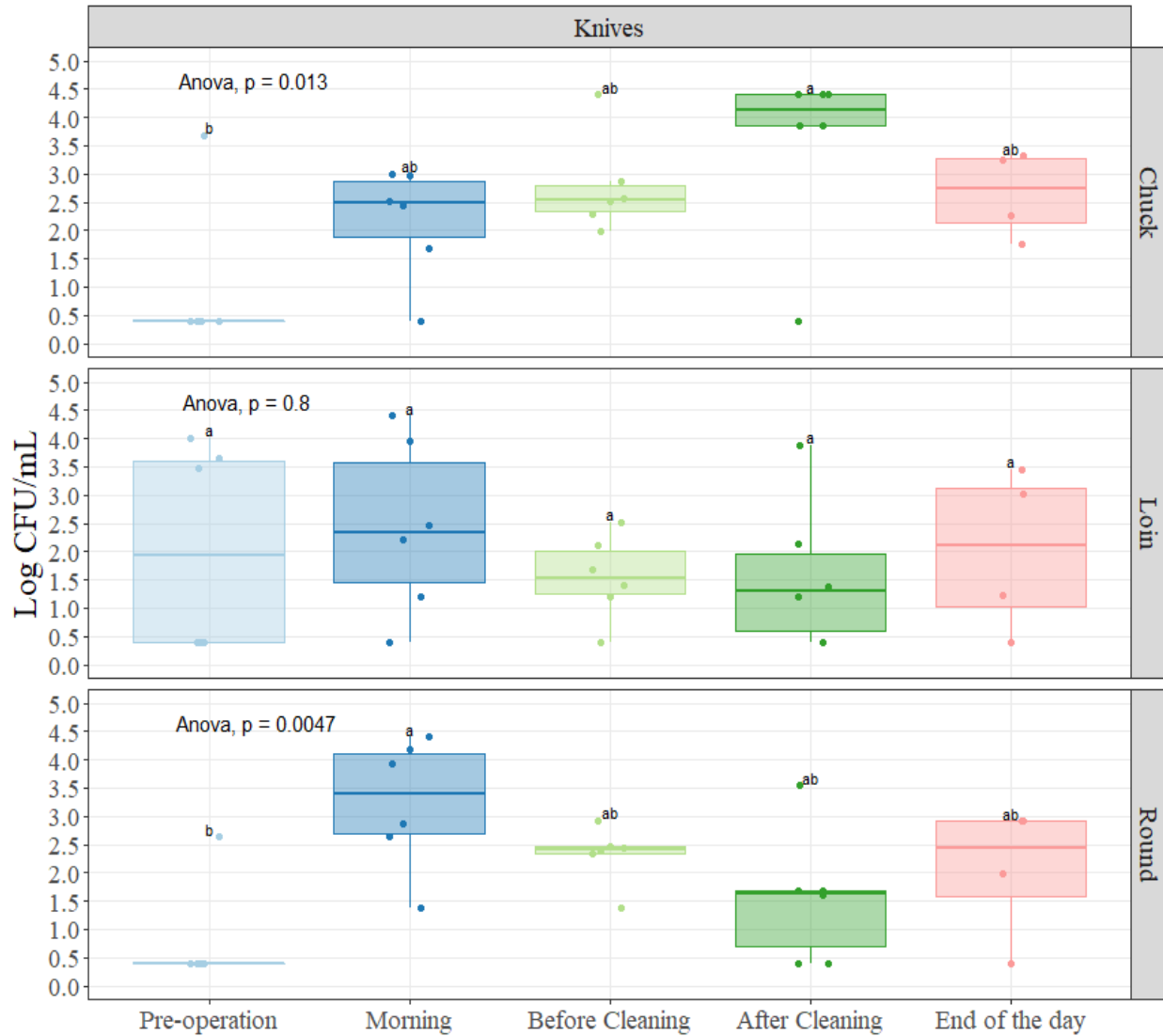
*N = 90



*N = 60



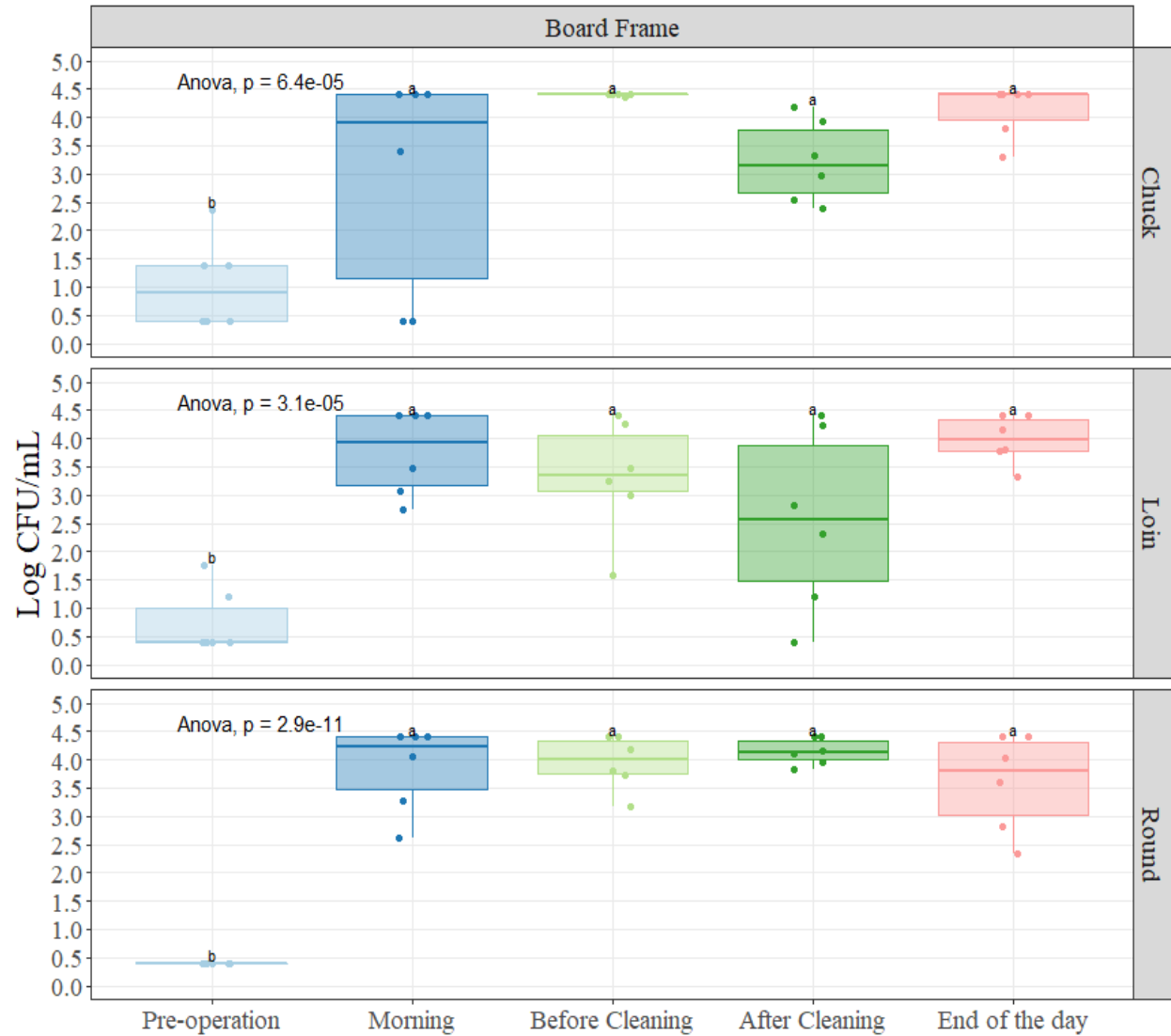
Results: Aerobic Counts



*N = 90

Study 1: Enviro-mapping

02

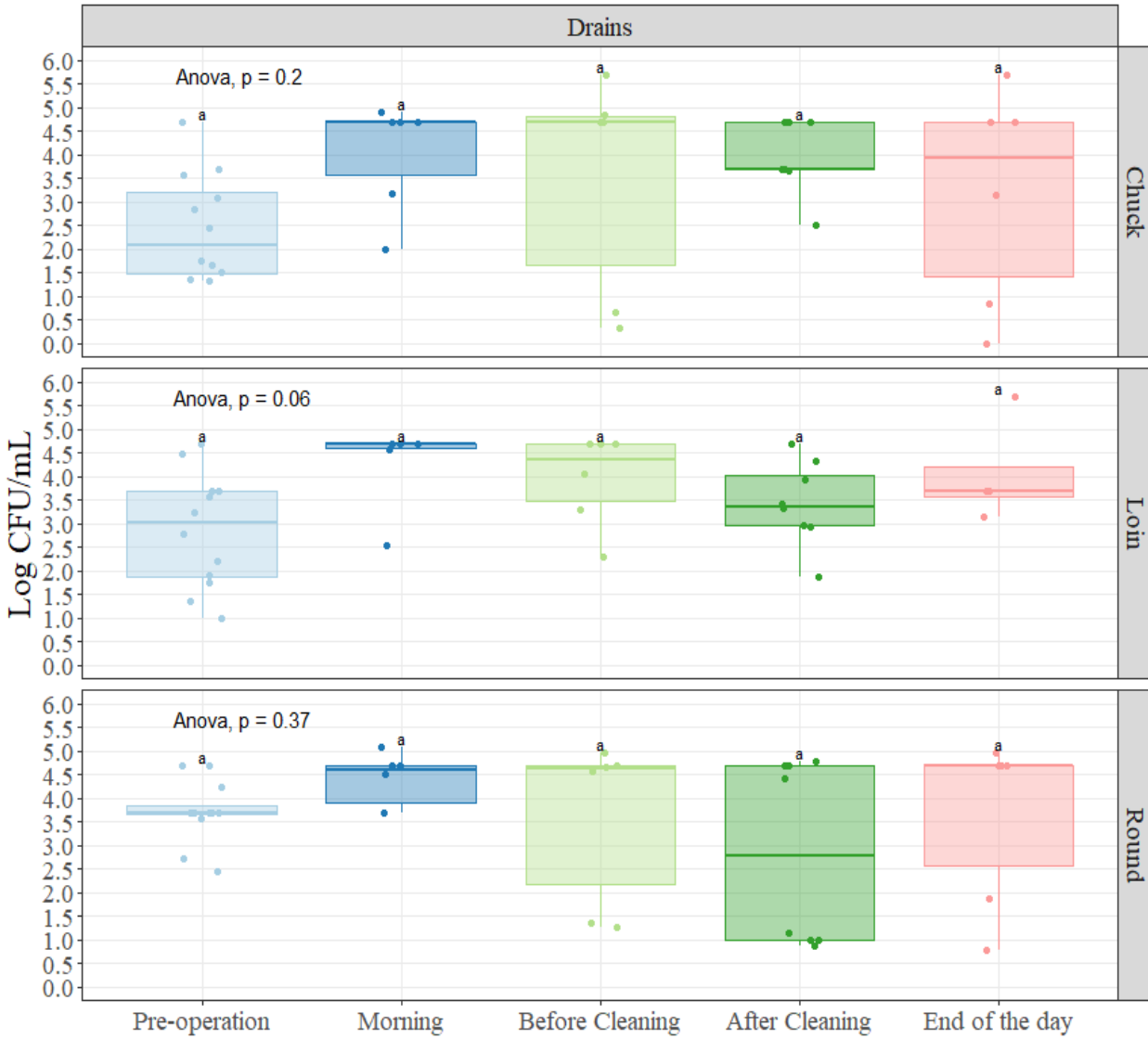


*N = 90

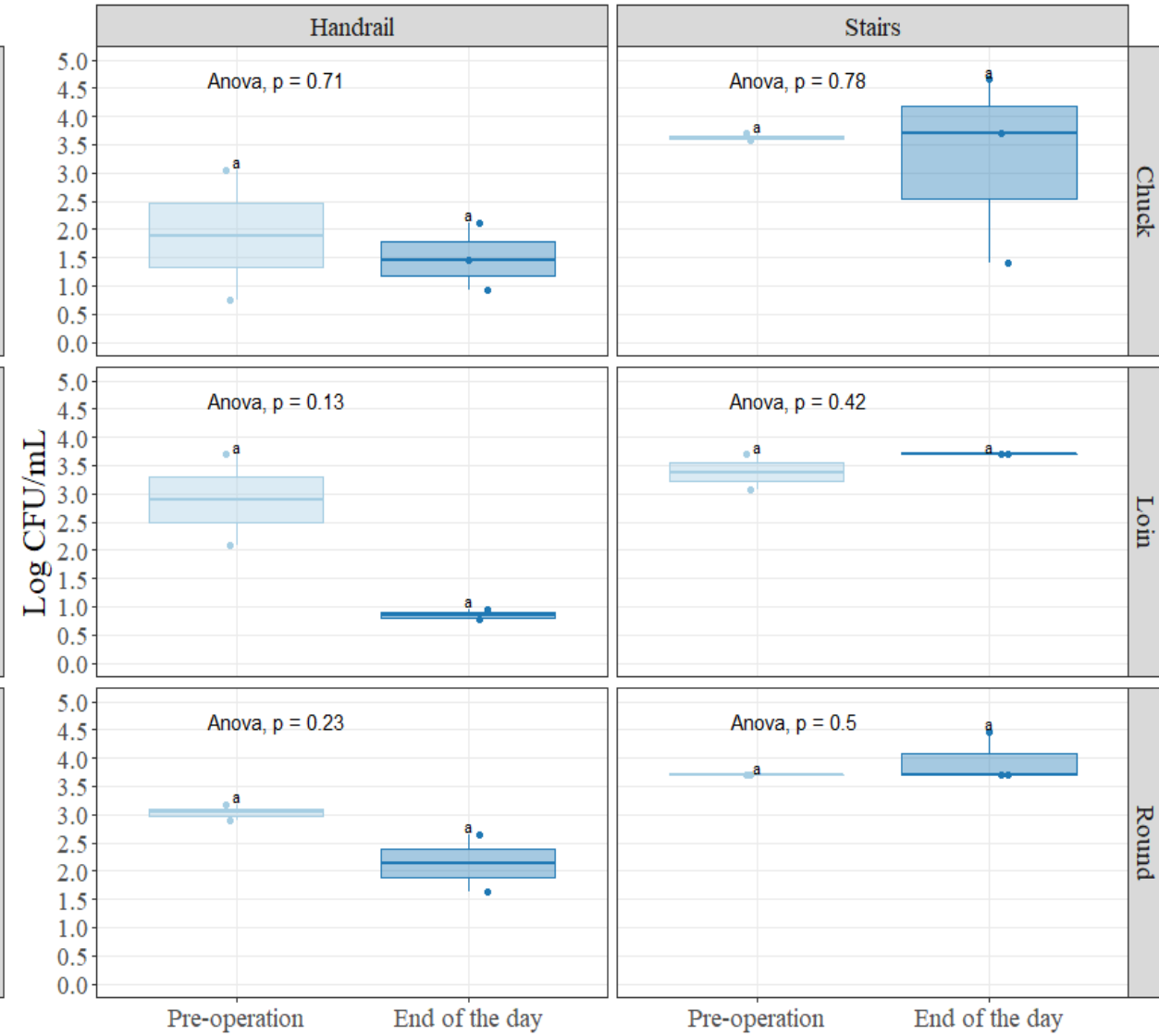


Results: Aerobic Counts

Study 1: Enviro-mapping



*N = 90



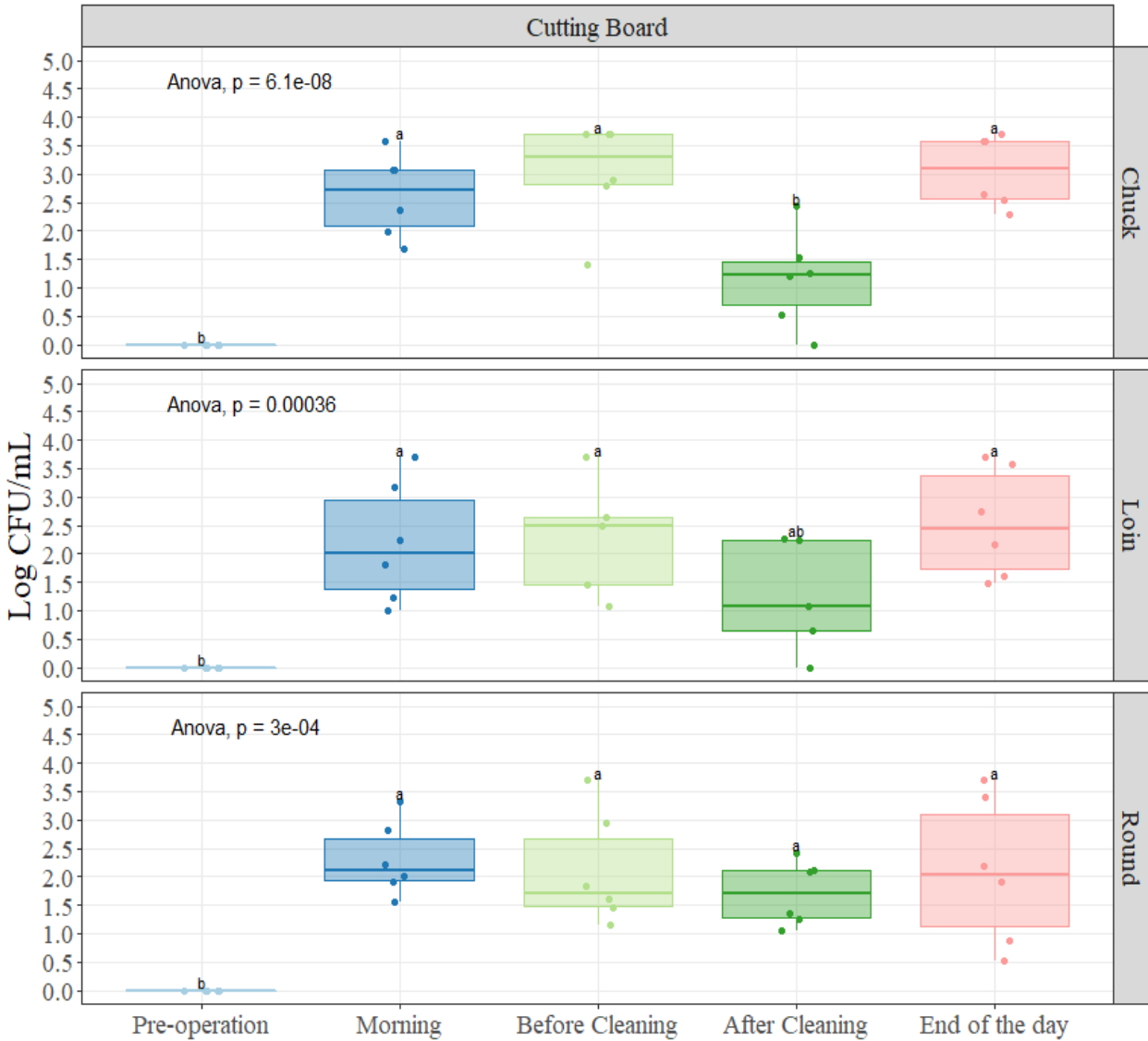
*N = 36



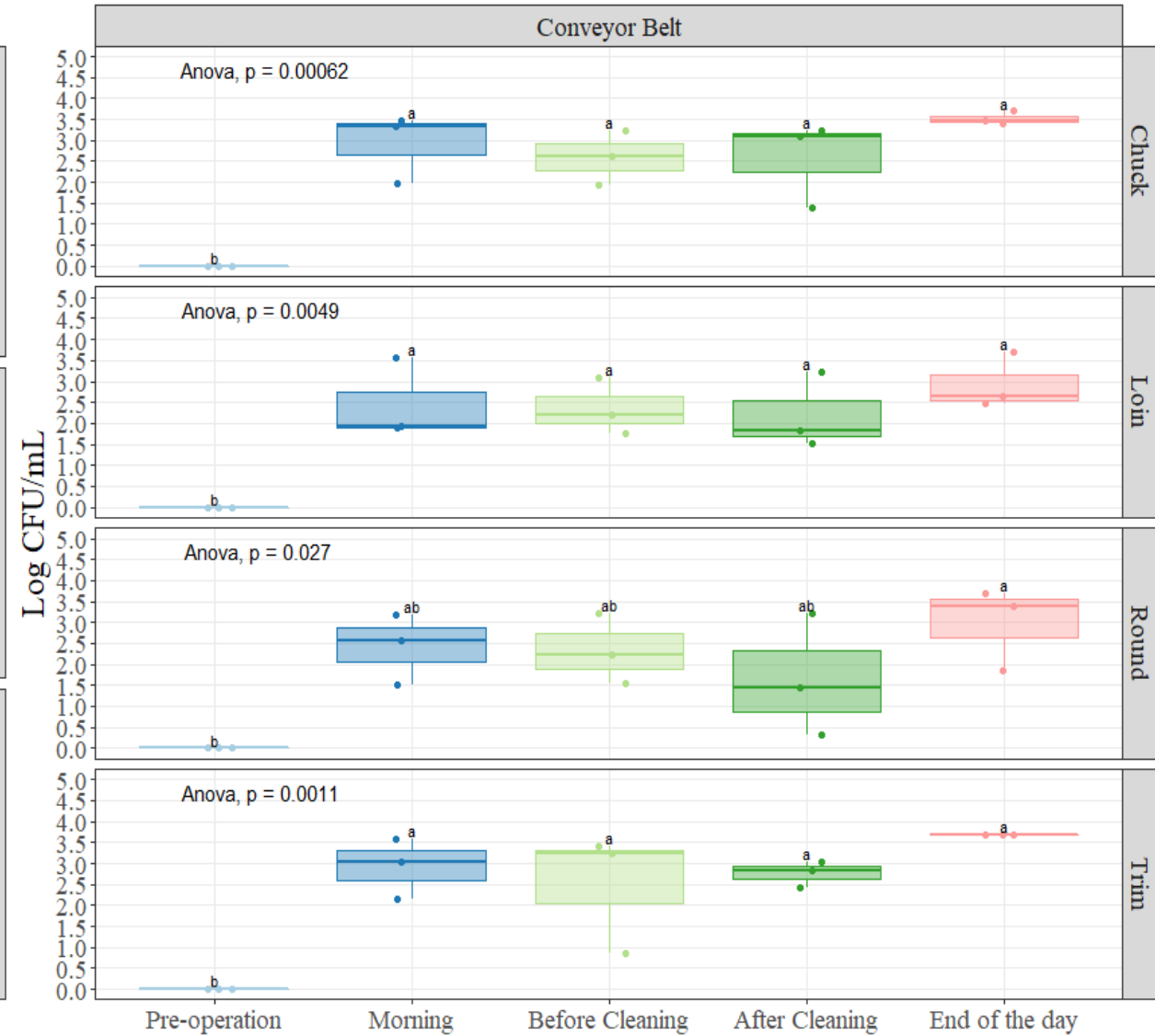
Results: Enterobacteriaceae

Study 1: Enviro-mapping

02



*N = 60

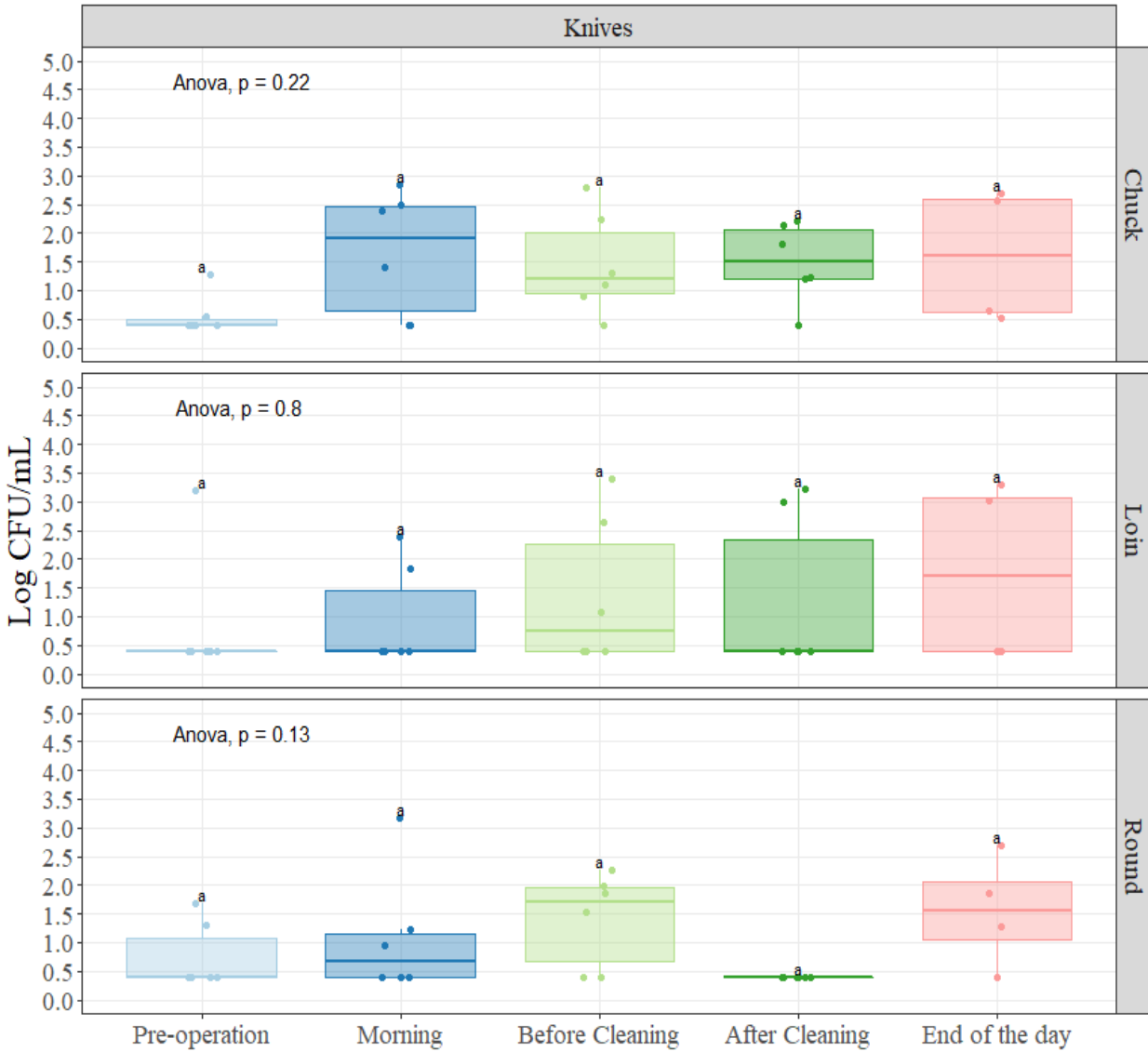


*N = 90

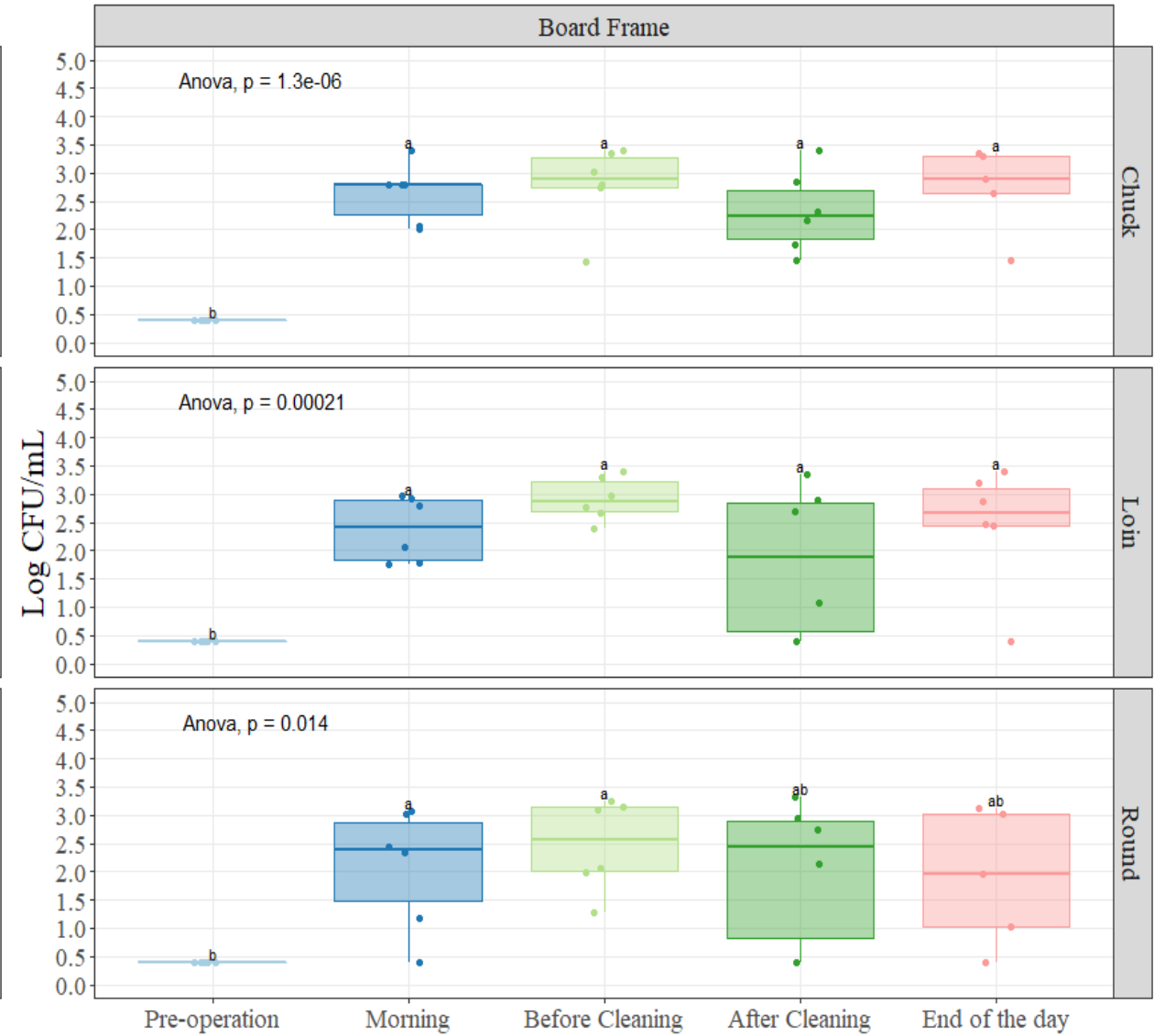


Results: Enterobacteriaceae

Study 1: Enviro-mapping



*N = 90

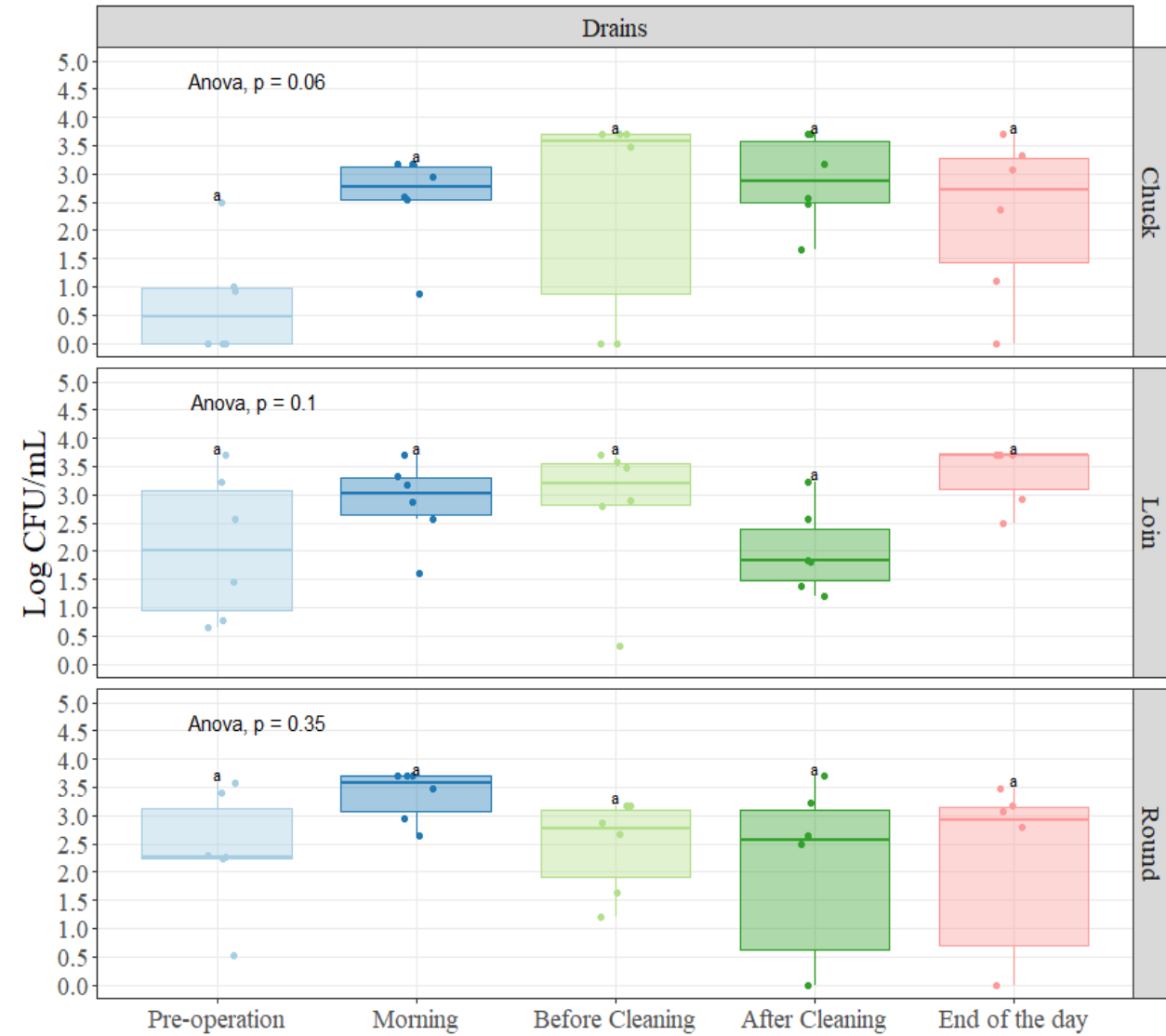


*N = 90

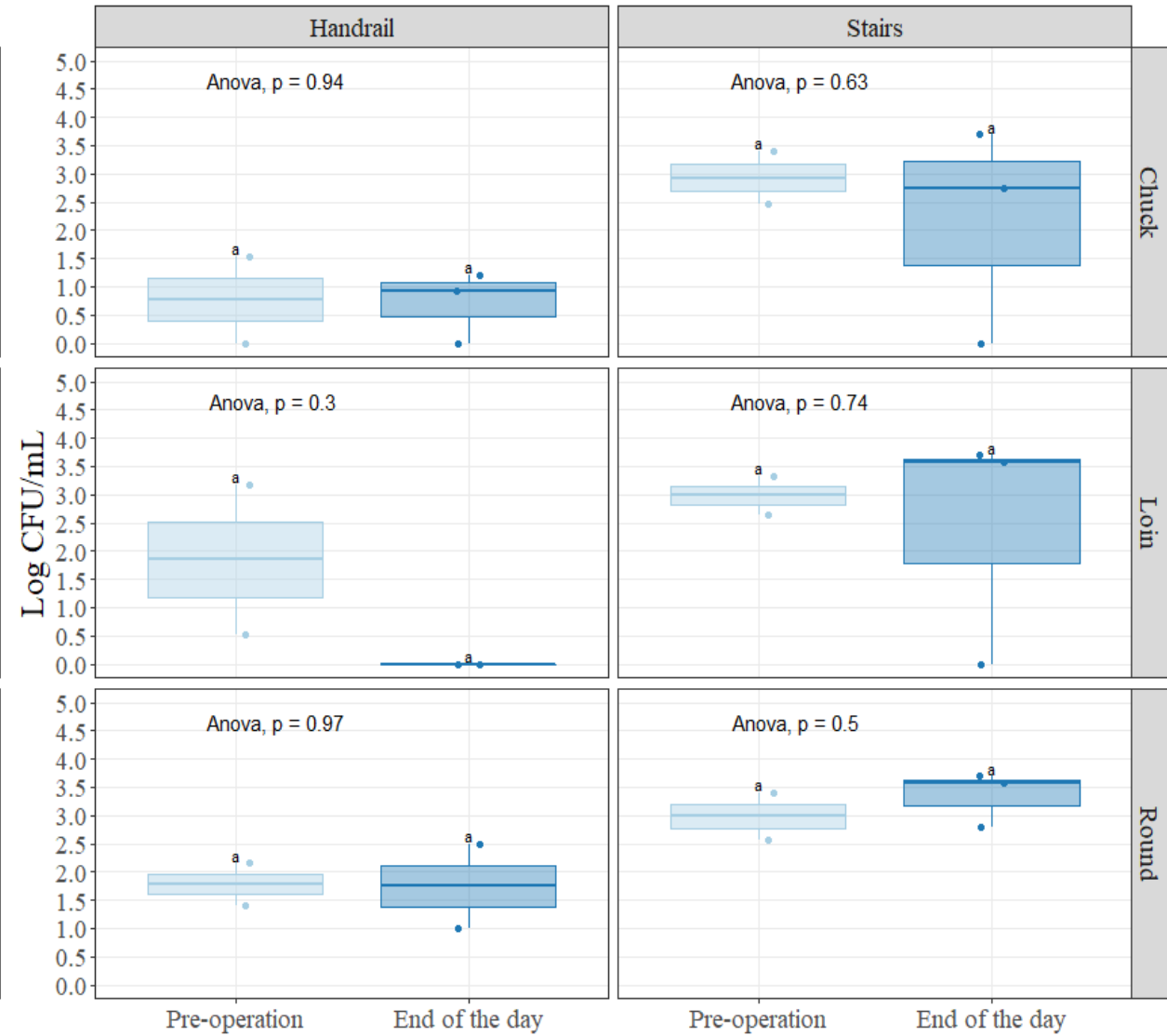


Results: Enterobacteriaceae

Study 1: Enviro-mapping



*N = 90

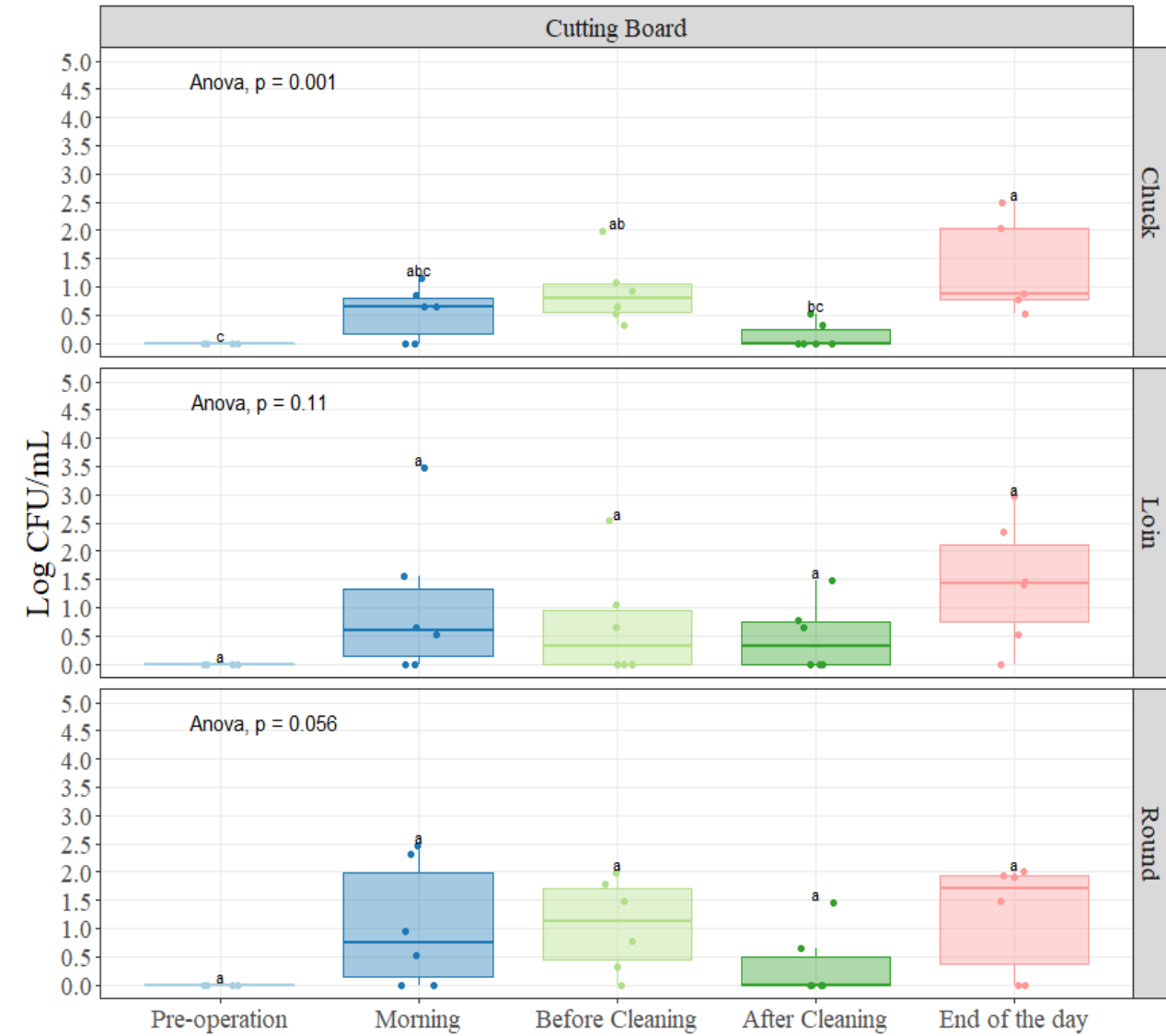


*N = 90

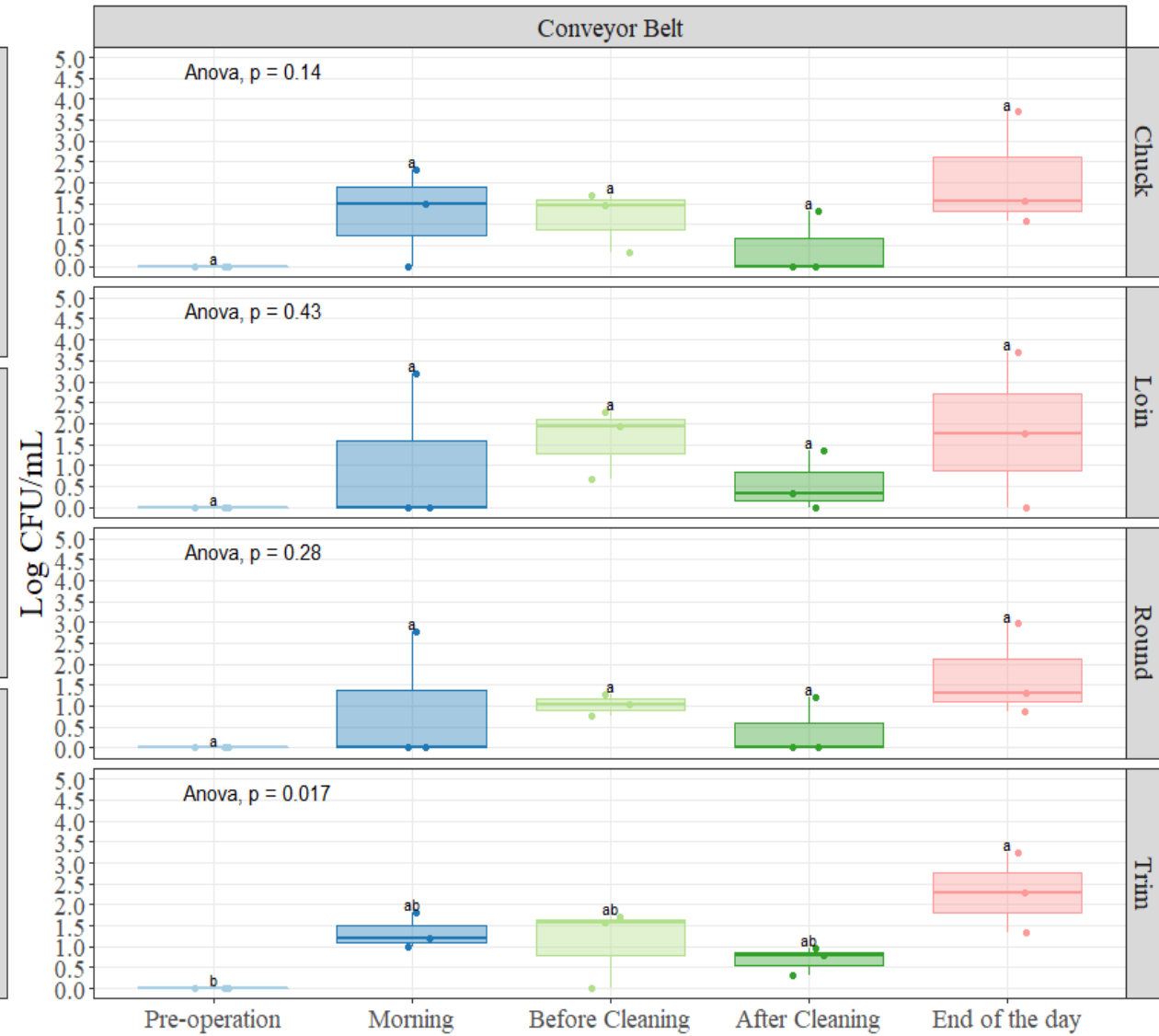


Results: Generic *E. coli*

Study 1: Enviro-mapping



*N = 90



*N = 90

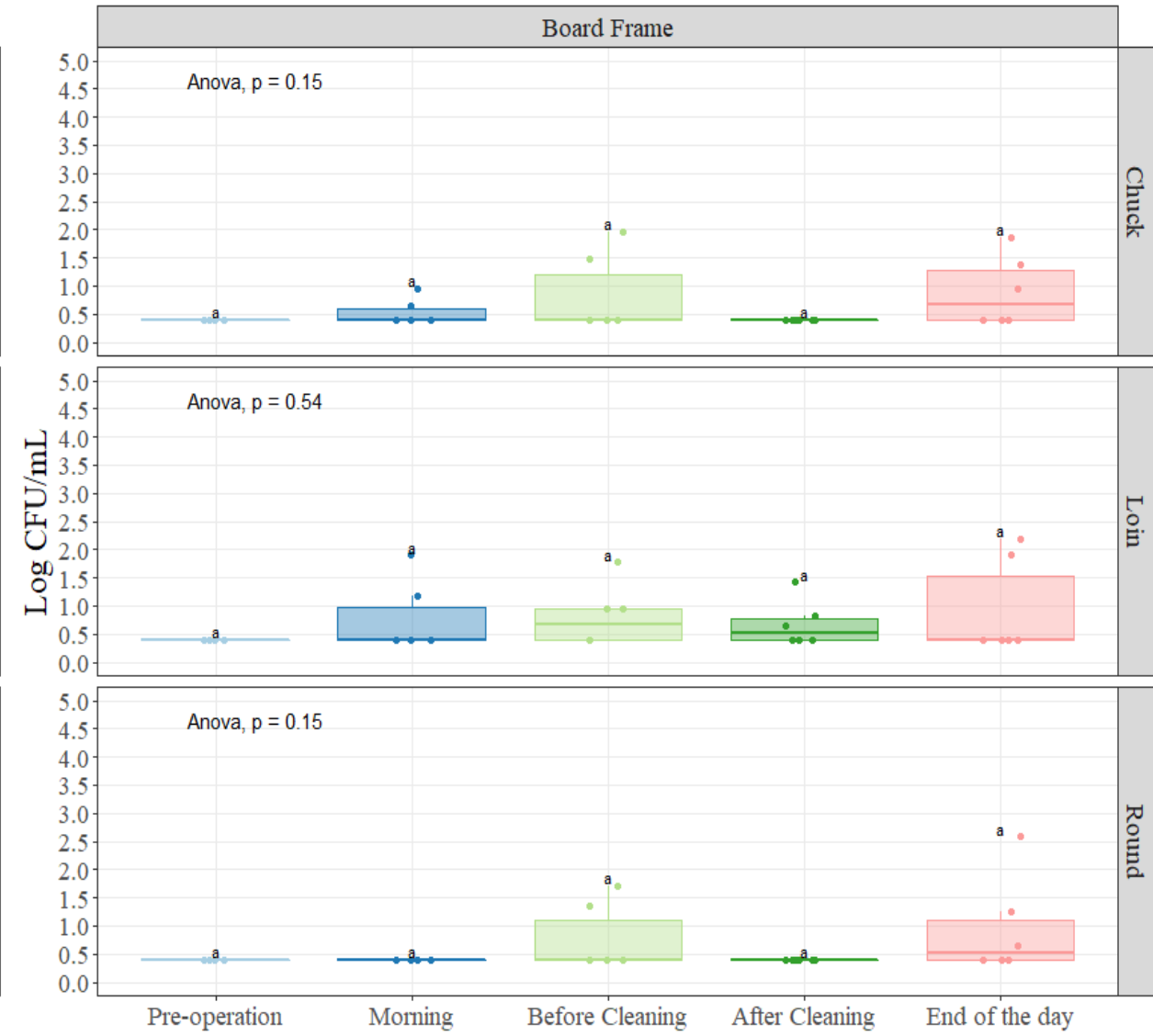


Results: Generic *E. coli*

Study 1: Enviro-mapping



*N = 90



*N = 90

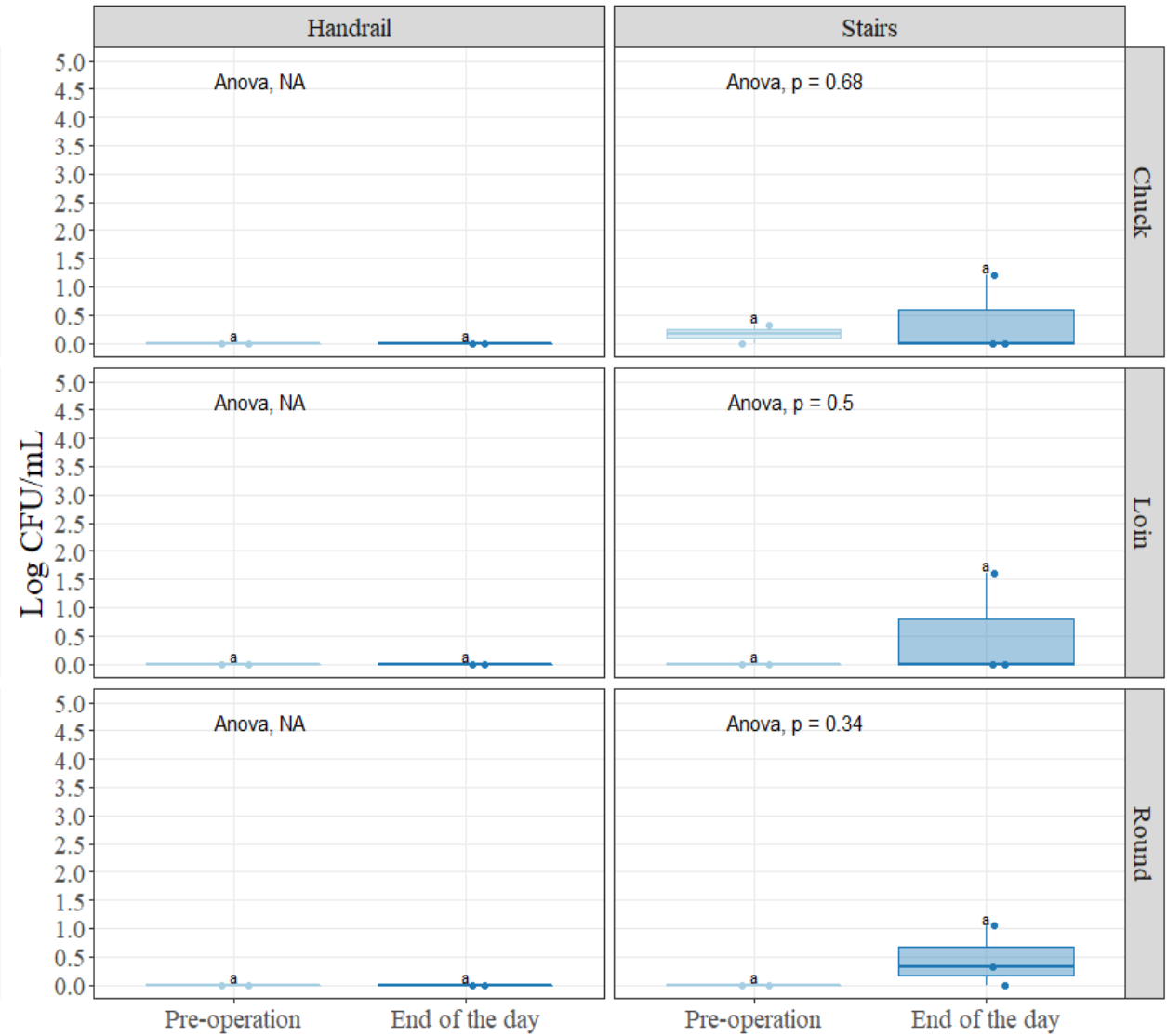


Results: Generic *E. coli*

Study 1: Enviro-mapping



*N = 90



*N = 90



Visualization platform

SureTrend® Cloud is a platform that provides a gateway to actionable insights.

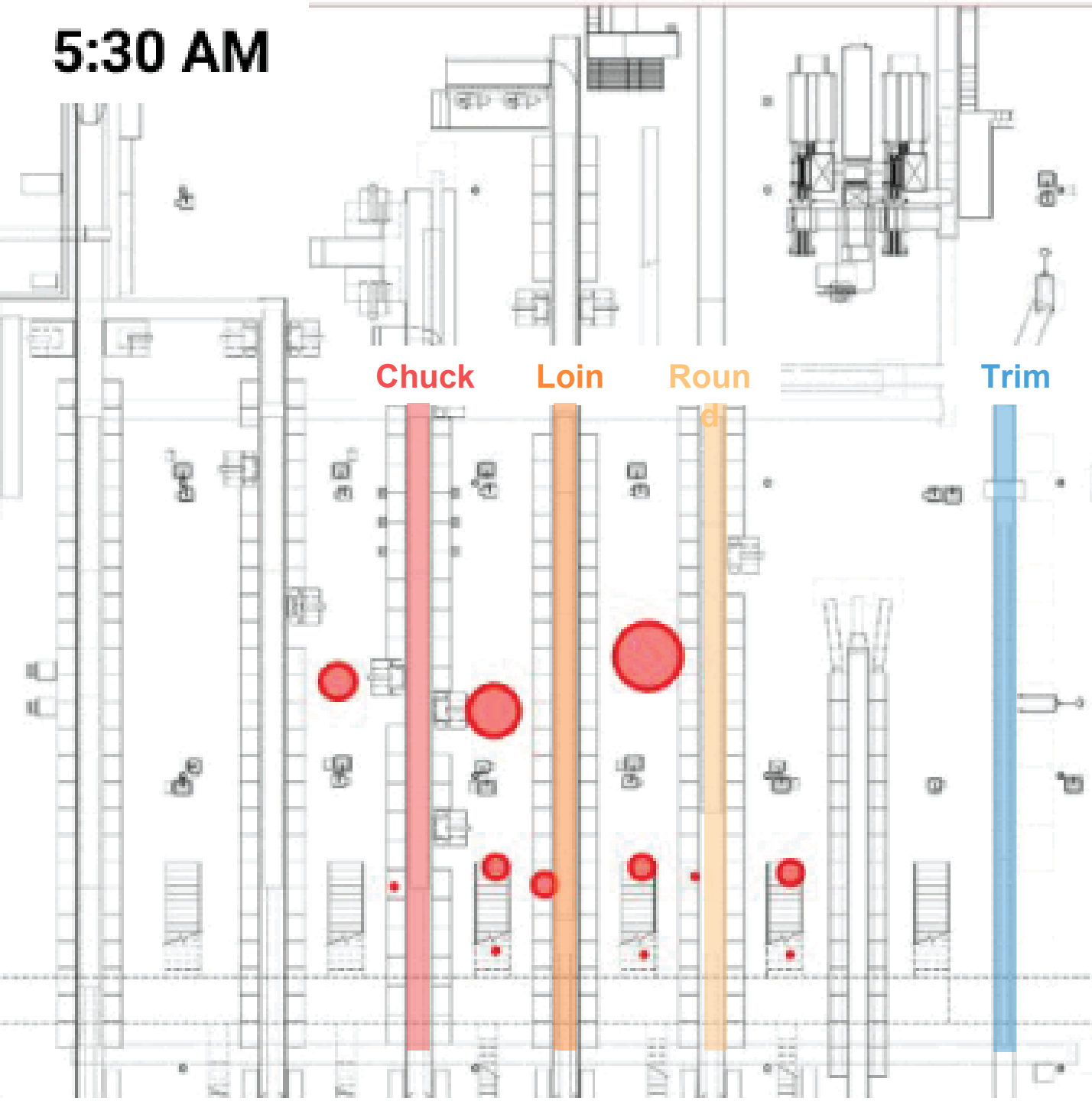
- Environmental maps help you identify critical areas to manage and mitigate risk.
- Track and trend cleaning efforts across multiple facilities.
- Quickly identify cleaning trends and problem areas to improve corrective actions.
- Identify training opportunities around cleaning protocol.
- Visualize and report environmental monitoring, food safety, and quality test results across multiple facilities.
- Alerts when something is not working to specification.



5:30 AM

Study 1: Enviro-mapping

02



Map: Aerobic Counts

Threshold limit of 1,000 CFU



TEXAS TECH UNIVERSITY SYSTEM™

5:30 AM

Study 1: Enviro-mapping

02

Chuck

Loin

Round

Trim

Map:

Enterobacteriaceae

Threshold limit of 100 CFU



TEXAS TECH UNIVERSITY SYSTEM

5:30 AM

Study 1: Enviro-mapping

02

Chuck

Loin

Round

Trim



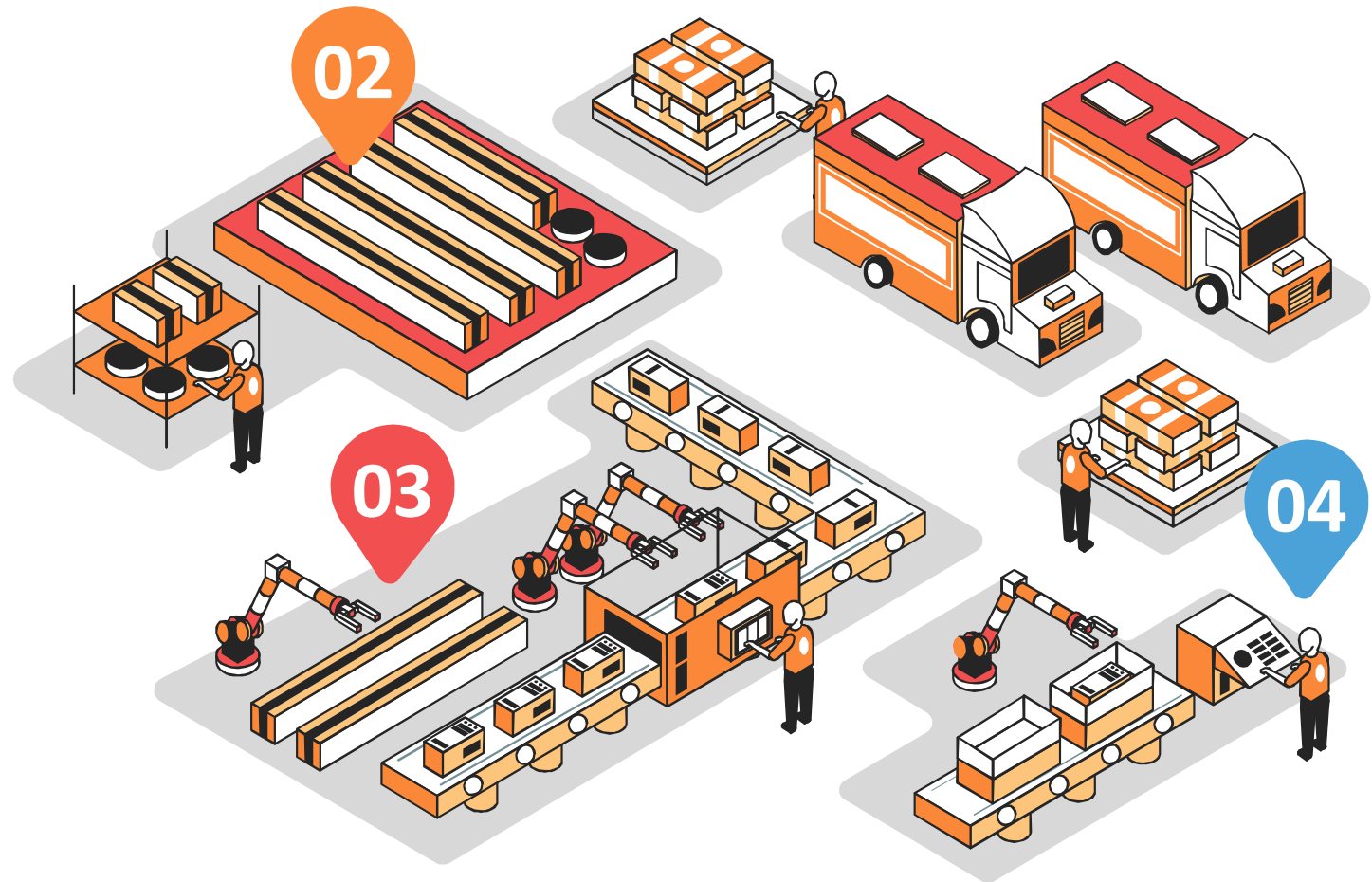
Map:
Generic *E. coli*
Threshold limit of 100 CFU



TEXAS TECH UNIVERSITY SYSTEM

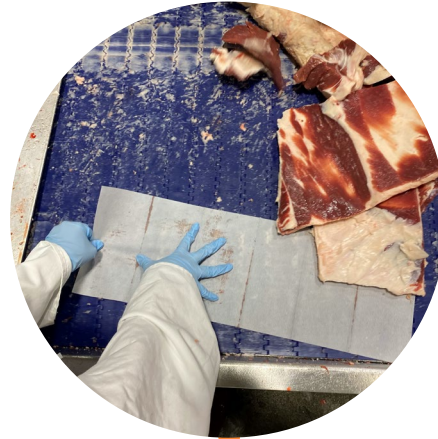


Pathogen Monitoring





Sample Collection





BAX System Q7 Real-Time PCR

- Rapid and accurate detection of microorganisms in food and environmental samples.
- Detection and quantification of specific DNA sequences in a sample.
- Primarily used for food safety testing in the food industry.
- It can detect various pathogens and microorganisms of concern, such as *Salmonella*, *Listeria*, *E. coli*, *Campylobacter*, and others.





Sample Processing

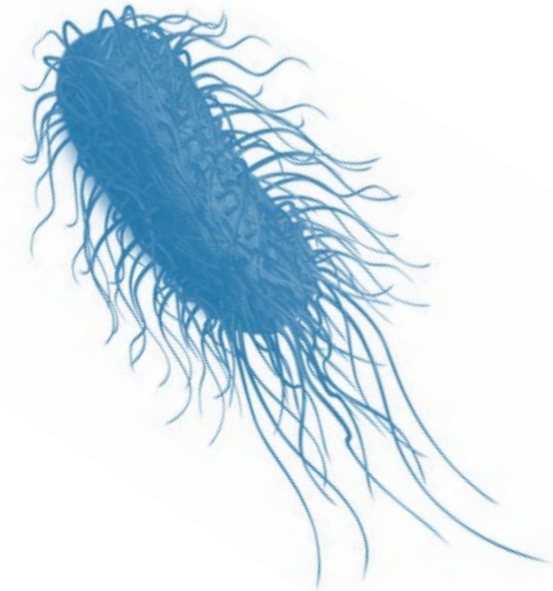




Results: *Salmonella*

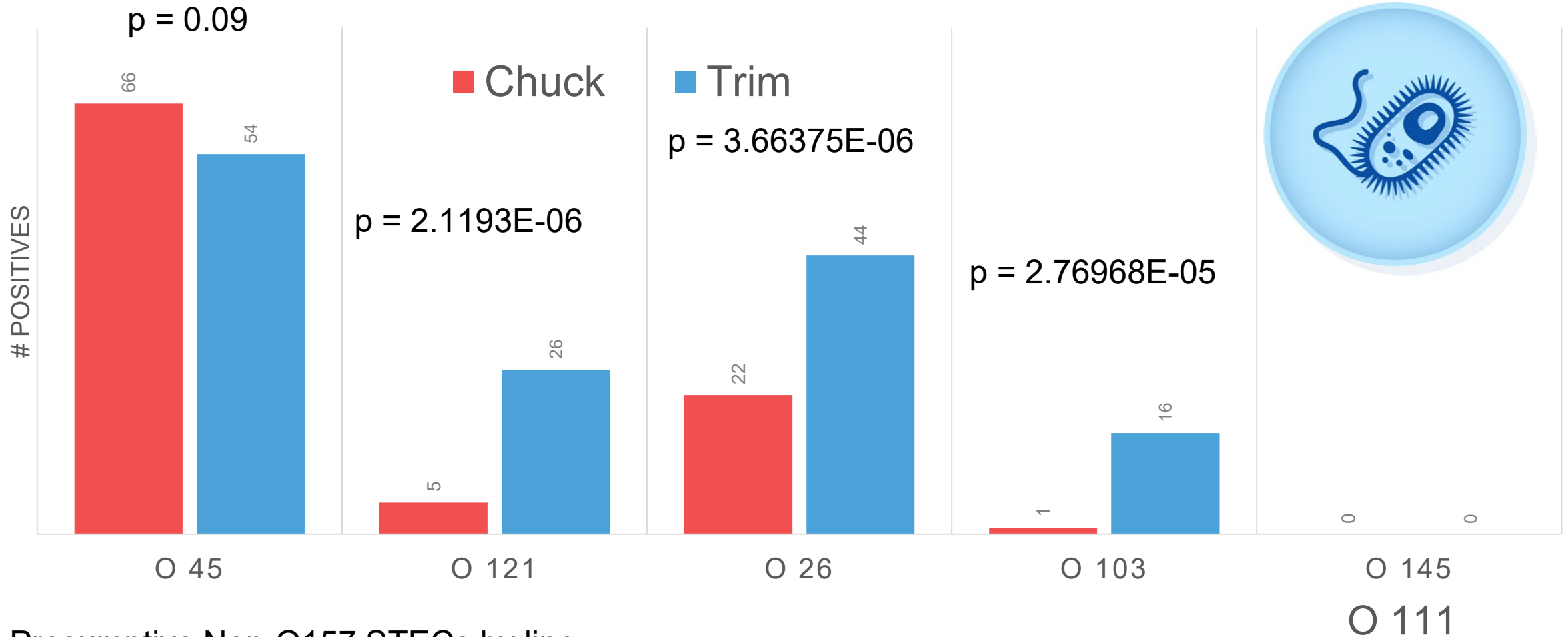
Line	# Positives	% Positives	Mean Log CFU/ Positive samples	P-value
Chuck	0/68	0.00%	<LOQ	0.015
Trim	5/60	8.33%	3.8	

Salmonella presence in conveyor belts treated (Chuck) and not treated (Trim) with ozonated water at 810 ORP. N = 128

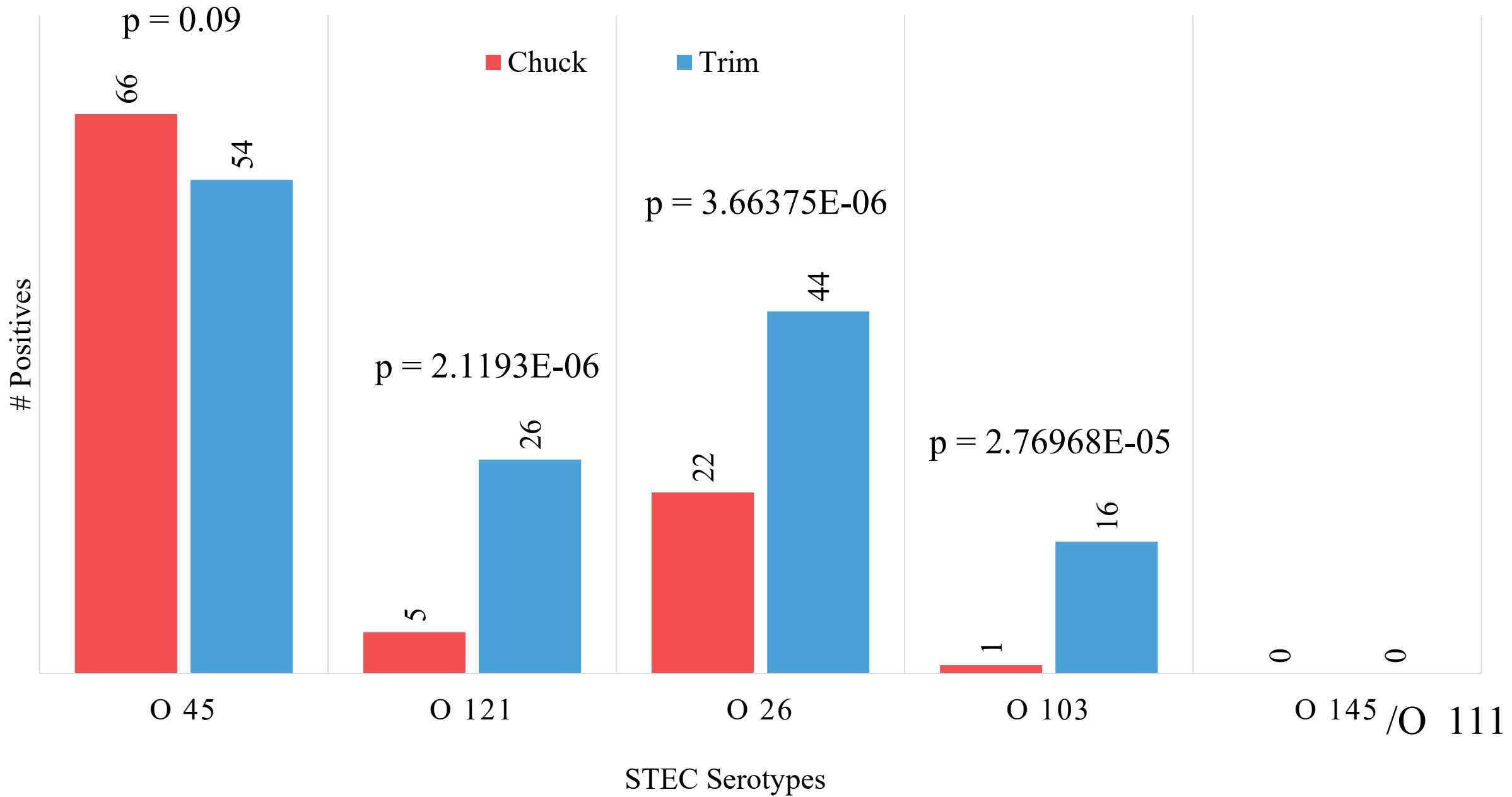




Results: Presumptive Non-O157 STECs Top 6



Presumptive Non-O157 STECs by line.





IMPLICATIONS

INDICATOR STUDY:

- Few Changes after 3 Hrs of Operation
- Visualization Platform Gives More Insight Into Changes in Patterns over Time

PATHOGEN STUDY:

- Pathogens are Present in the Fabrication Environment and can Give Insight into Mitigation Strategies
- *All Product is Subject to TWO Antimicrobial Treatments after Fabrication



BOTH APPROACHES HAVE VALUE!

**Thanks to Hygiena for Financial Support of
this Project**






Pilgrim's®

Presented by: Karen Beers

Diversifying Your Food Safety and Quality Data: Where Are My Results and What Are They Telling Me?



- **Data Driven Decisions**
- **Data accuracy and integrity**
- **Investment \$\$\$\$**
- **Where do we get the data and what do we do with it?**

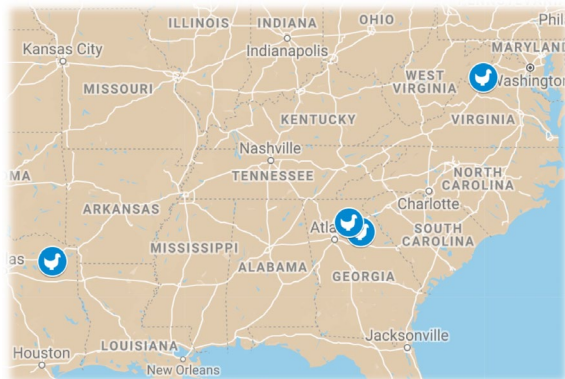


Pilgrim's Labs by the Numbers-Routine

- 4 internal labs
 - 1 Chem/Feed Analysis-supports 26 live complexes
 - 3 Microbiological/Food Safety-supports 26 slaughter, 4 further processing and 2 RTE facilities
 - All approved for USDA ALP Micro and/or Pesticide

- Microbiology Laboratories
 - 7 days week, 12 hours/day
 - 271,000 samples
 - 369,000 test analysis
 - 166,000 Carcass and Parts Rinses
 - Process control using EB
 - 109,000 Quantitative analysis (not EB or *Salmonella*)
 - 60,000 *Salmonella* prevalence tests
 - 14,000 *Campylobacter* prevalence tests
 - 20,000 *Listeria* tests

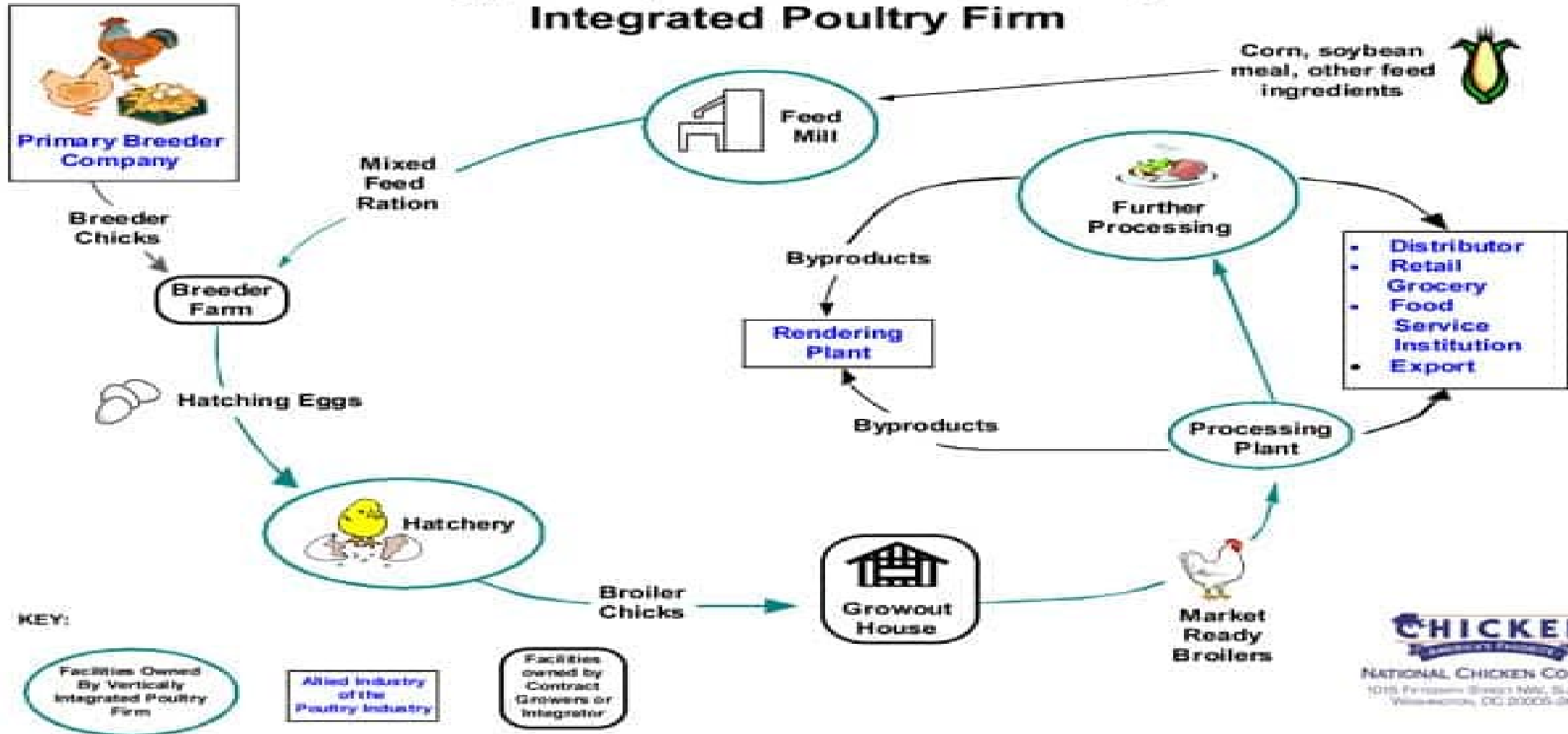
- Chemistry Laboratory
 - 5 days week, 12 hours/day
 - 135,000 samples
 - 306,000 test analysis
 - 21,000 pesticide
 - 49,000 NIR
 - 236,000 Wet Chemistry



Where do the samples come from?

Support team to collect and ship samples to the lab with correct sample information

Typical Operation of a Vertically Integrated Poultry Firm



- Pathogen testing
- Currently collect boot sock samples
- Twice in life cycle
- Test for certain *Salmonella* serotypes
- Exploring use of *Salmonella* quantification
- Challenges
 - High Background Growth
 - Validated Matrix
 - One boot sock sample per farm, per house
 - Cecal Tonsils-how many needed
 - LOQ/Serotypes per house
 - Wide Range
 - Species vs Serotype
 - Total *Salmonella* but also specific Serotype
 - Shipping
 - Prevalence Time/Temp are not as important as Quant. Have to be at Lab within Certain Time and at a Specific Temp

Data Driven Decisions

- One Farm-9 houses
- Very variable
- 14 days prior to slaughter
- Make changes based on data
 - All prevalence positive
 - Quant added next level of interpretation of data
- Know species, serotype, quantification to know if results change with any farm changes implemented
- **Data Driven Decisions**

Hs	Sal Log CFU/4 Bootsocks
1	2.65
2	0.88
3	2.65
4	3.78
5	2.17
6	4.66
7	2.17
8	9.26
9	1.76



Live Production-Breeder to Broiler

- **Breeder Egg**
 - Not currently tested
 - Not regulated (not table egg)
- **Hatchery**
 - Minimal testing but exploring what to test and where
 - Improve hatchability
 - Improve chick health
- **Feed Mills**
 - Nutritional testing
 - Rule #1 Do No Harm

Broiler Farm

- Same challenges as the Breeder Farm
- Data can be used for risk assessment
- Expand pathogen/quantification collection in Broiler farms to mitigate risk prior to reaching the processing plant
- Rule #1 Do No Harm

➤ Process Control

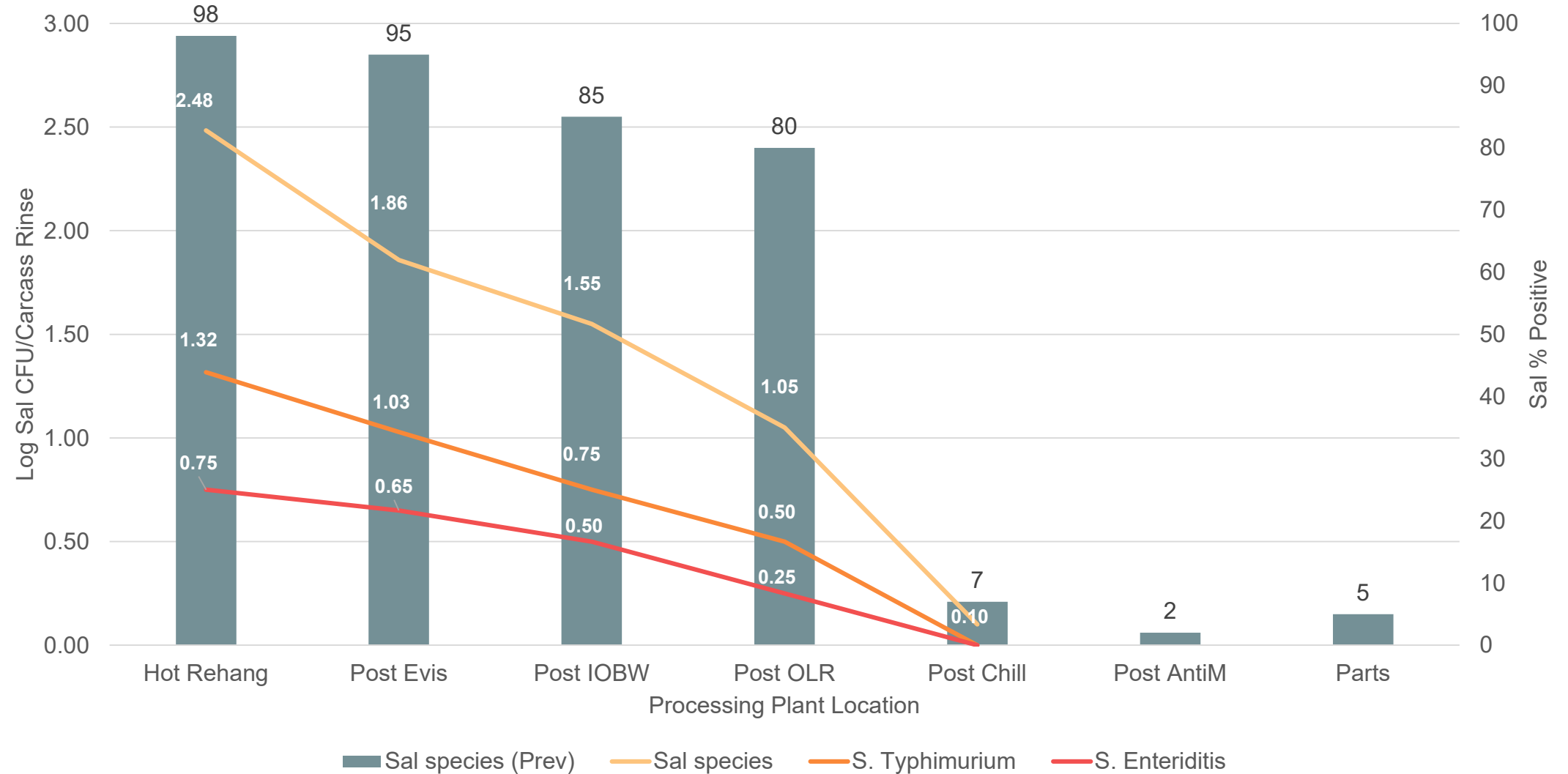
- Bio-mapping the process
- Every Day Every Plant
- EB or other indicator organism
- Actually use the pathogen of concern using *Salmonella* Quantification Data
- EB current process control-Data shows no correlation of EB load to *Salmonella* load

➤ Challenges

- High Background Growth beginning of process, clean end of process
- Validated Matrix – Carcass or Parts Rinses
- LOQ
 - Wide Range
 - Also very low post chill
- Throughput
 - Process control 1/22,000 pre and post chill
- Species vs Serotype
 - Total *Salmonella* but also specific Serotype
 - Tie into pre-harvest testing

Data Driven Decisions

Quantification Example



- Different verification or validations to be done
- Cross contamination, Interventions, Sanitation
- Actual Quantification of Sal instead of prevalence
- Challenges
 - Different matrix-Sanitation swabs
 - Same platform for all matrix
 - Can see a rebound in parts but what does that really mean

- Environmental Mapping
 - Follow Sentinel program +
 - RTE Products
 - 100% Test and Hold

Validation Example

Location	Prevelence (%)	Quantification Log ₁₀ CFU/Carcass		
	Sal species (Prev)	Sal species	S. Typhimurium	S. Enteriditis
Pre-Treatment	98	1.45	0.10	0.25
Post-Treatemnt	98	0.10	0.00	0.00



- **How do you interpret the data?**
 - **Central Location**
 - **Data mining Team**
 - **QlikSense program**
 - **Internally Supported**
 - **All Access**
 - **Review the data, what is it telling you?**
 - **Implement process improvements, interventions or other actions to support Rule #1**

- **Applied Research**
 - **Investigates what to look at**
 - **Can't test all new products**
 - **Need new technologies (like *Salmonella* Quantification, Serotyping, Virulence Gene Detection) to determine best practices**
 - **Support Rule #1**

Rule #1

Do No Harm



Thank you to Hygiena and IAFP for this Webinar!

Karen Beers

Karen.Beers@pilgrims.com





International Association for
Food Protection®

Q&A



International Association for
Food Protection®

Thank You

Karen Beers Karen.beers@pilgrims.com

Mindy Brashears Mindy.Brashears@ttu.edu

Mark Carter mcarter@hygiena.com

Matt Hahs mhahs@hygiene.com

Upcoming Webinars



November 17, 2023 1:00 PM Matrix Additions Part 2: Alternative Approaches for Rapid Pathogen Detection Methods

December 13, 2023 11:00 AM Building a Culture – The Tools and Tips You Need to Succeed

December 14, 2023 9:00 AM Impact of Water Use and Reuse in Food Production and Processing on Food Safety at the Consumer Phase: Focus on the Fresh Fruit and Vegetable Products Sector

<https://www.foodprotection.org/events-meetings/webinars/>



Be sure to follow us on social media



InternationalAssociationforFoodProtection



@IAFPFOOD



international-association-for-food-protection



IAFPFood

This webinar is being recorded and will be available for access by **IAFP members** at www.foodprotection.org within one week.

Not a Member? We encourage you to join today.

For more information go to: www.FoodProtection.org/membership/

All **IAFP webinars** are supported by the IAFP Foundation with no charge to participants.

Please consider making a donation to the [IAFP Foundation](#) so we can continue to provide quality information to food safety professionals.