



# **Preharvest and Postharvest Research Strategies for *Salmonella* Control in Poultry**

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# Programs at MSABD

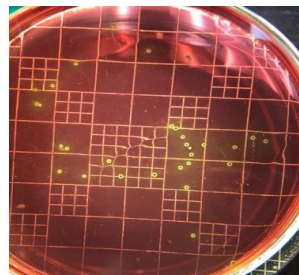


- Total: 67,000 sq. ft.
  - 25,000 sq. ft. in **Meat & Poultry Processing USDA Inspected plant**
  - 8,500 sq. ft. in **Food Safety pilot plant and laboratory**



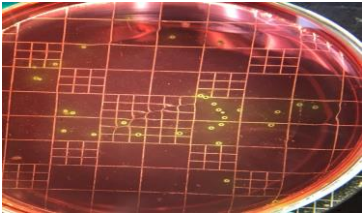
# MSABD Food Safety and Microbiology: Research

- Bio-safety level-2 containment
- **Meat** microbial ecology
- Microbiome sequence mapping
- Equipment sanitation evaluation
- Pathogen-**inoculated** animal studies: Feed additives
- **Processing** with pathogens added to carcasses
- **Longitudinal** pathogen studies: Preharvest to postharvest



# Screening Strategy for Preharvest *Salmonella* Control

## Pathogen Screen



*Salmonella*

*Salmonella* challenge studies *in vitro/in vivo*

Gut  
Microbiome

16S rDNA gene-targeted sequencing of  
microbial communities

## Gut Ecology



Taxa: Identification of representative gut microbes = core  
microbiome for a feed additive

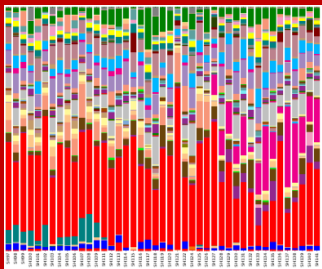
Diversity: Identification of differences in gut microbe populations  
between feed additives

## Bird performance

Host gut responses: Metabolomics, transcriptomics, proteomics

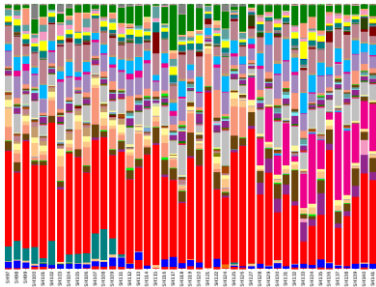
# *Salmonella* Preharvest Food Safety Research Results at UW-MASBD

- *Salmonella* and gut microbiota
  - *Salmonella* vaccines impact gut microbiota
  - Gut microbe variation closely related genetic vaccine variants
  - 3-way interaction gut microbiota, *Salmonella*, and host
- Prebiotic Mechanisms and Discovery
  - Complex prebiotic = complex gut microbe response
  - Gut microbiome to identify active grain bran components
- *Salmonella* Pathogenesis in Poultry
  - *Salmonella* barcoding and transmission routes
  - Aerosol versus oral infection
  - Heterogeneity within serovar population



# Strategy for *Salmonella* Control Measures and Microbial Ecology in Poultry Processing

## Sequencing



NGS

✓ Next Generation Sequencing

Microbiome

16S rRNA gene-targeted  
sequencing of entire microbial  
communities

## Applications

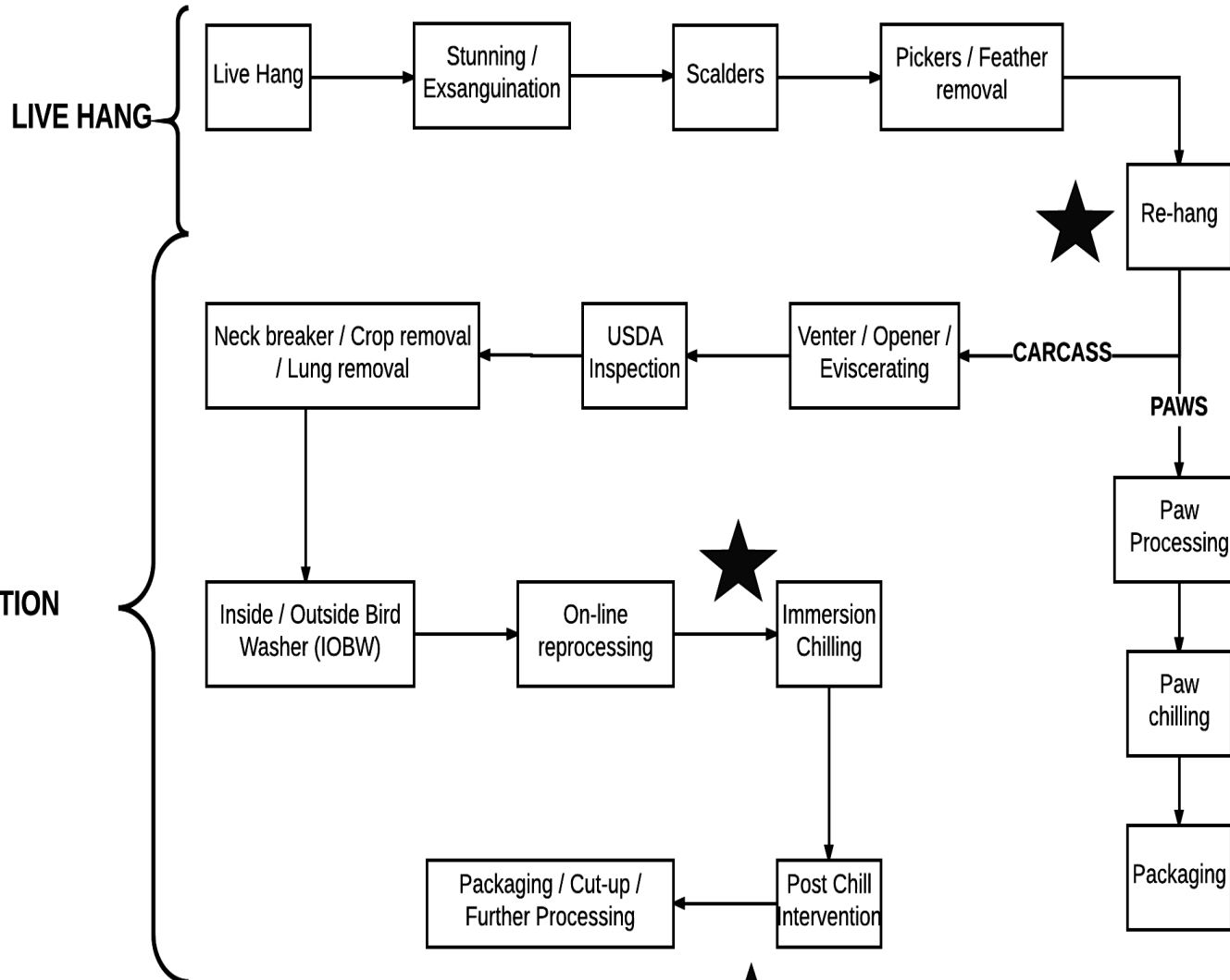


Conventional plating; Microbiome mapping of  
poultry processing steps and Pathogen Quantitation

Taxa identification of representative indicator microbes;  
Signature microbial populations for interventions

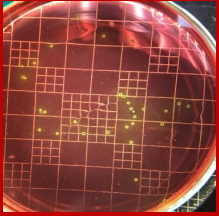
Screening of culture nonselective and selective plating methods;  
Validation of plating methods by NGS

# Processing *Salmonella* and Microbial Ecology Research Accomplishments



- *Salmonella* rapid quantitation: MPN-qPCR
- Shift: Fecal to Spoilage Microbiome
- Candidate indicator microbes
- Intervention signature microbial profiles
- Shelf-life modeling
- Selective plate ecology

## Salmonella



# Future Focus for *Salmonella* Research In Poultry

- **Barcoded *Salmonella*** for longitudinal studies
- **Identify *Salmonella*** virulence markers in broilers

## Preharvest



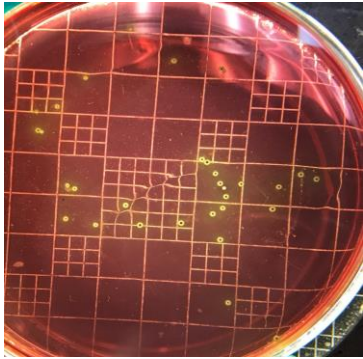
- **Preharvest strategy:** Additives/house management
- **Processing:** Microbiome mapping with *Salmonella*

## Postharvest



- ***Salmonella*** and processing plant ecology
- ***Salmonella*** serovar and strain differences





*Thank You*



Questions



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