Taylor FARMS

Produce Safety: Changes Underway

Solutions for TODAY
Planning for TOMORROW
Produced By FoodSafety magazine

…But none of this means anything without Food Safety

TEST & LEARN- Internal programs have benefited from internal and external research

PARTNERING WITH RESEARCHERS- Developing researchers and the next generation

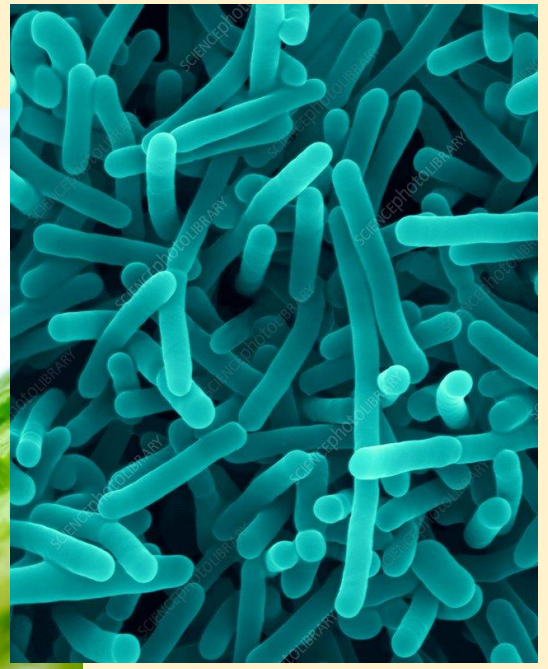
EVOLUTION- What does Food Safety success look like? *→Are we changing what we do based on what we've learned?*

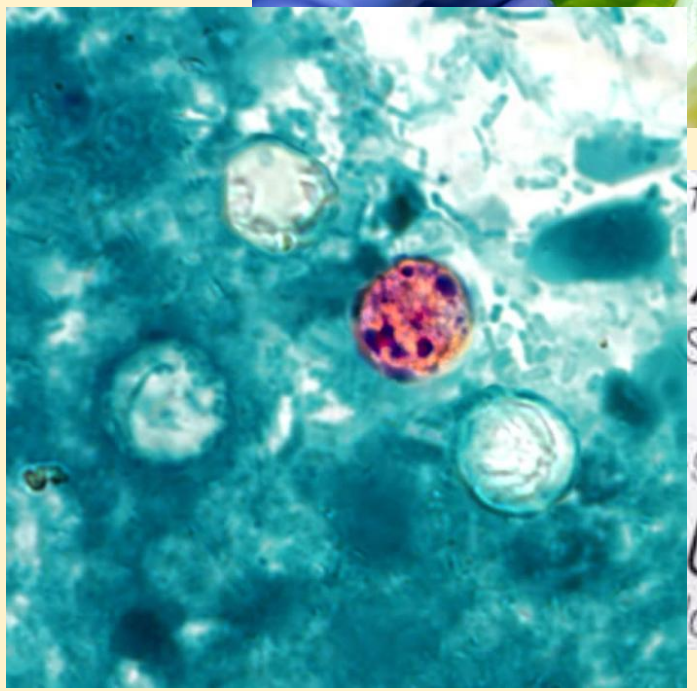
KEY CHANGES IN THE LAST TWO YEARS

- More Robust and Deeper Risk Assessments
  - ✓Water
  - ✓Dust
  - ✓Animal Activity
  - ✓Soil Inputs
- Harvest Sanitation
- CEA (Controlled Environment Agriculture)
- Outbreaks w/ very little 1:1 causation

Contaminants of Concern

- Pathogenic E. coli
- Salmonella
- Listeria
- Cyclospora
- Heavy Metals





Understanding and predicting food safety risks posed by wild birds.

Group 1

- Commonly found around agricultural structures (i.e., barns, fences)
  - Physical barriers (i.e., spikes, nets)

Higher Risk

Group 2

- Commonly found in fields
  - Scaring deterrents (i.e., decoys, air cannons, reflective surfaces)

Higher Risk

Group 3

- Commonly found in surrounding areas (i.e., forests, wetlands)
  - No management needed

Lower Risk

Digital farm-to-facility food safety testing optimization.

Microbial risks during indoor leafy green production: Current knowledge and future research needs.

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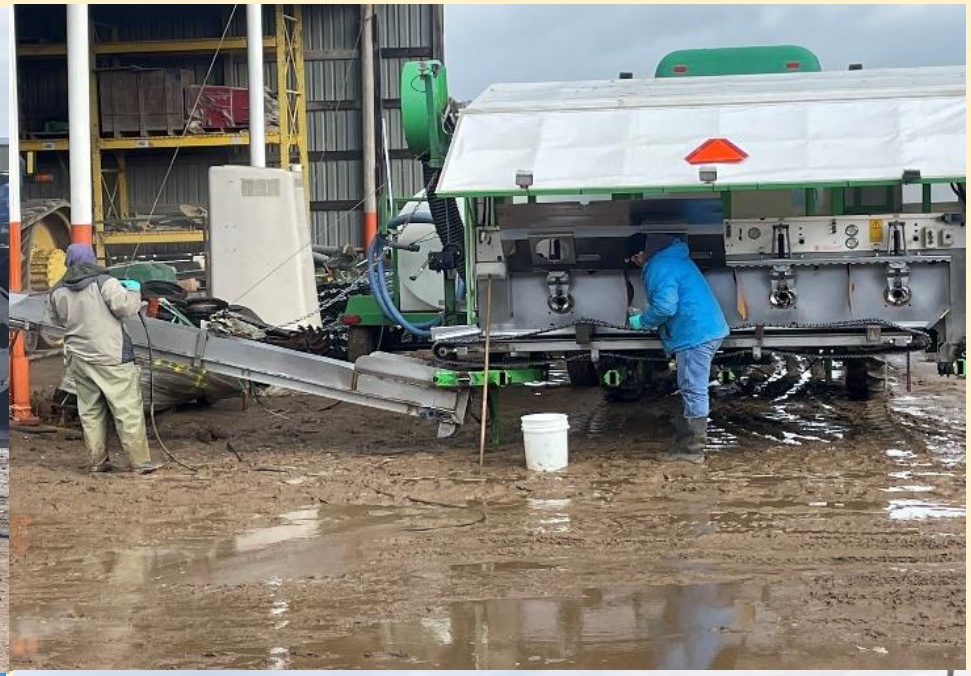
Salinas Valley Flood Rapid Response

Harvest Machine Sanitation



Root Cause Investigations and Analysis

- Water- deeper dive into irrigation infrastructure and treatment efficacy
- Adjacent land and activities- more detailed research-driven risk assessments
- Harvester and equipment Sanitation
- Other soil and crop inputs

In all **4** areas, it is what happens in the last 7 days or so of harvest that appear to be important- last water, side dressing, weeding, other equipment moving through a field, harvester sanitation timing etc.

Moving away from opinions- focus on FACTS on the ground

Fresh Cut Vegetables Processing and Wash System Evolution

04/25/2024

Fresh Vegetable Processing and Wash system Evolution

Evolution of The Fresh Cut Vegetable Food Safety Programs and Wash System Controls.

- Raw product Food Safety Risks Control and Management
- Advances in Harvesting and Harvest Equipment
- Improved Processing capabilities and Processing Equipment advancement
- Improved Wash System set up and evolution in Wash System Sanitizer Controls and Management.

Fresh Cut Produce Processing and Wash System Evolution

Background

Whole head at Grocery

↓

Cellophane wrap

↓ (Demand for Value added produce lead to)

Chop Produce pack in sealed bag

↓

Whole baby leaf pack in sealed bag

↓

Fresh cuts & sizing, blending and packaging in Sealed bags and addition of condiments

Changing Phases in Value Added Produce

- **Chop Produce in Sealed bags**
- Harvest
- Transfer in reusable Containers Wood, Fiber or bags
- Cool in Hydro-Vac or Forced Air
- Trim, de-cored or peel
- Chop or cut into sizes
- Soak in water to rinse (plus disinfectant)
- Spin
- Dry
- Pack in Cello bags

- **Whole Baby Produce in Sealed Bags**
- Harvest
- Transfer in reusable Containers Wood, Fiber or bags
- Cool in Hydro-Vac or Forced Air
- Sort into sizes
- Blend or mix
- Soak in water to rinse (plus disinfectant)
- Spin
- Dry
- Pack cello bags
-

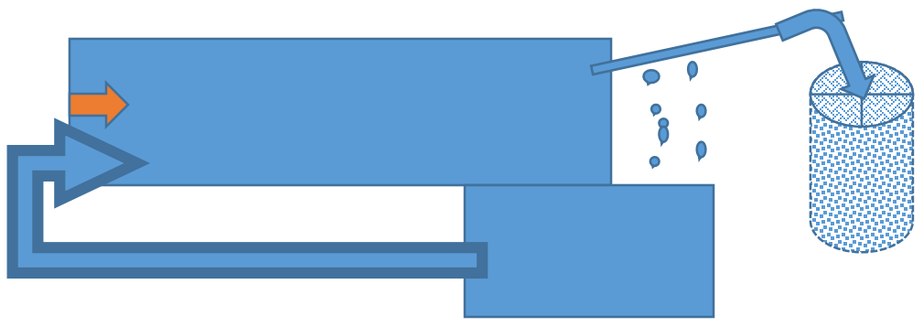
Processing Evolution and Challenges

- Advancement in Raw product harvest Pre-trimming and de-cored process transfer from facility to harvest operation in the field.
- Processing of de-cored and pretrimmed raw material (RAC)
- Equipment design
- Wash system design
- Washing process and sanitizer selection
- Chill water control and management
- Sanitizer injection and saturation challenges
- Injection system control
- Chemistry monitoring
- Data collection and analysis
- Process data storage and
- Trace back

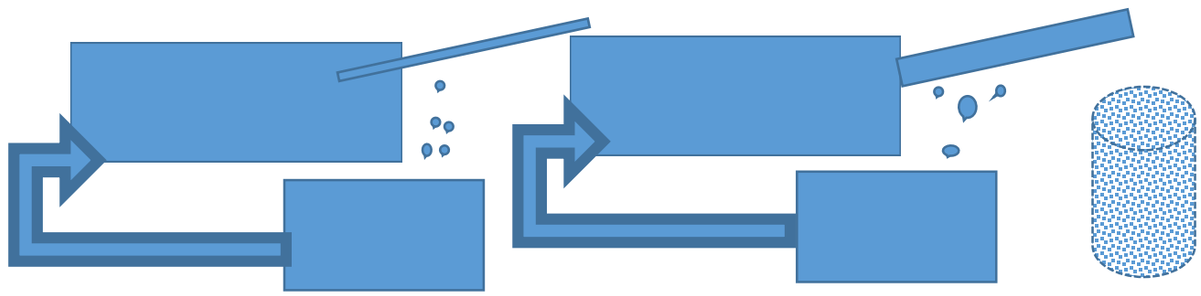
Wash System Evolution

Old Style Wash Flume Design

- Single flume wash system



Upgrade Wash Flume Tank Design



Advanced Bubble Floatation Wash Tanks

How Did We Chose Our Wash System?

The Science Behind Our Wash System

- Chlorine and Food Specific Chemistry
- Fully Patented & Tested by USDA ARS (T-128)
- Food Compatible Acid
  - Lower pH operation (higher active free chlorine)
- Food Friendly Diols
  - Resistance to organic materials (slows free chlorine depletion)
- Organic and Conventional Formulas

Smart Wash ASAP System Control

Designed specifically for produce

Durable in high care, wet environments

Improved sensitivity

- low reading error

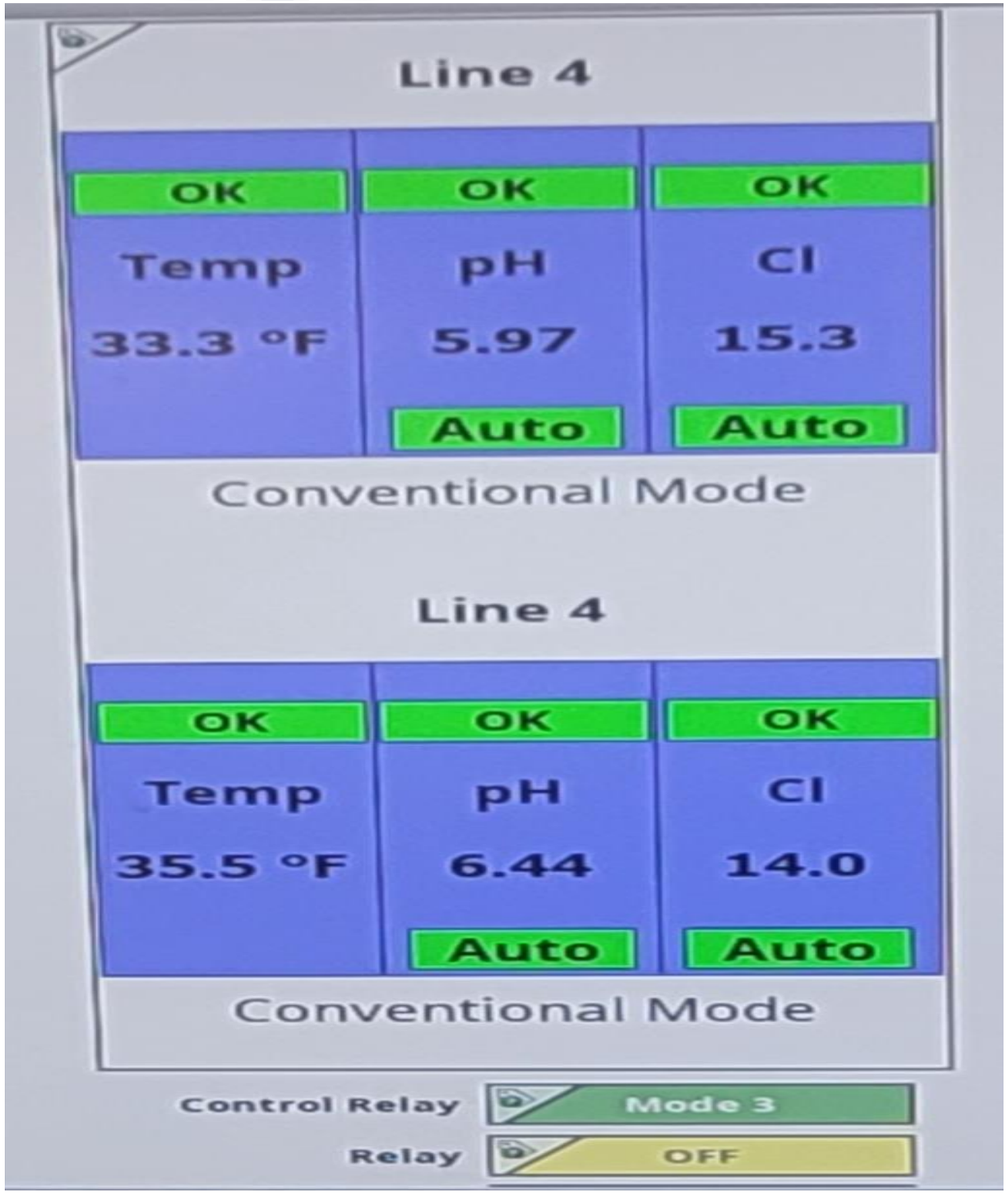
Uncompromised specificity

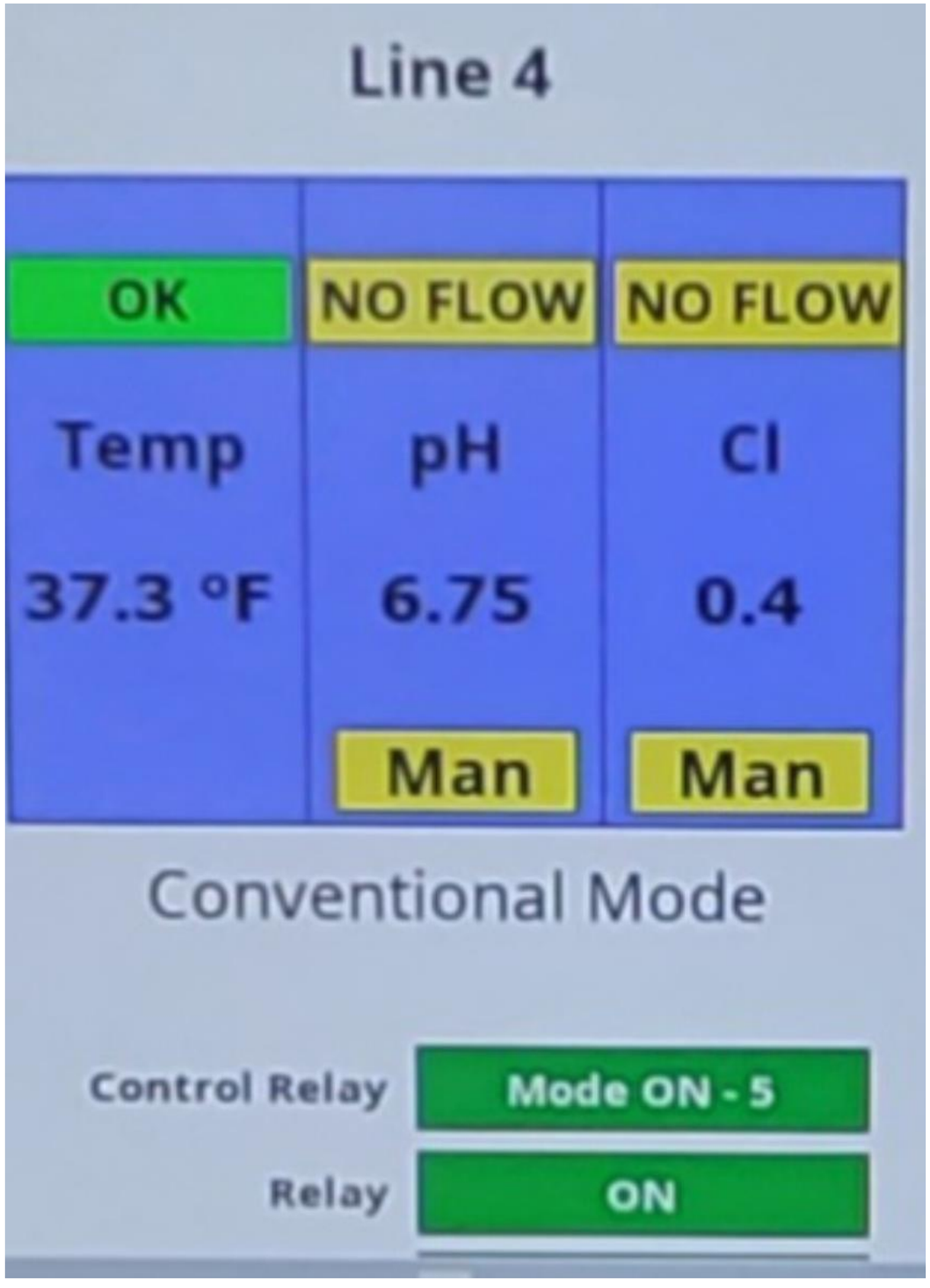
- HOCl specific

Extended calibration periods (weeks)

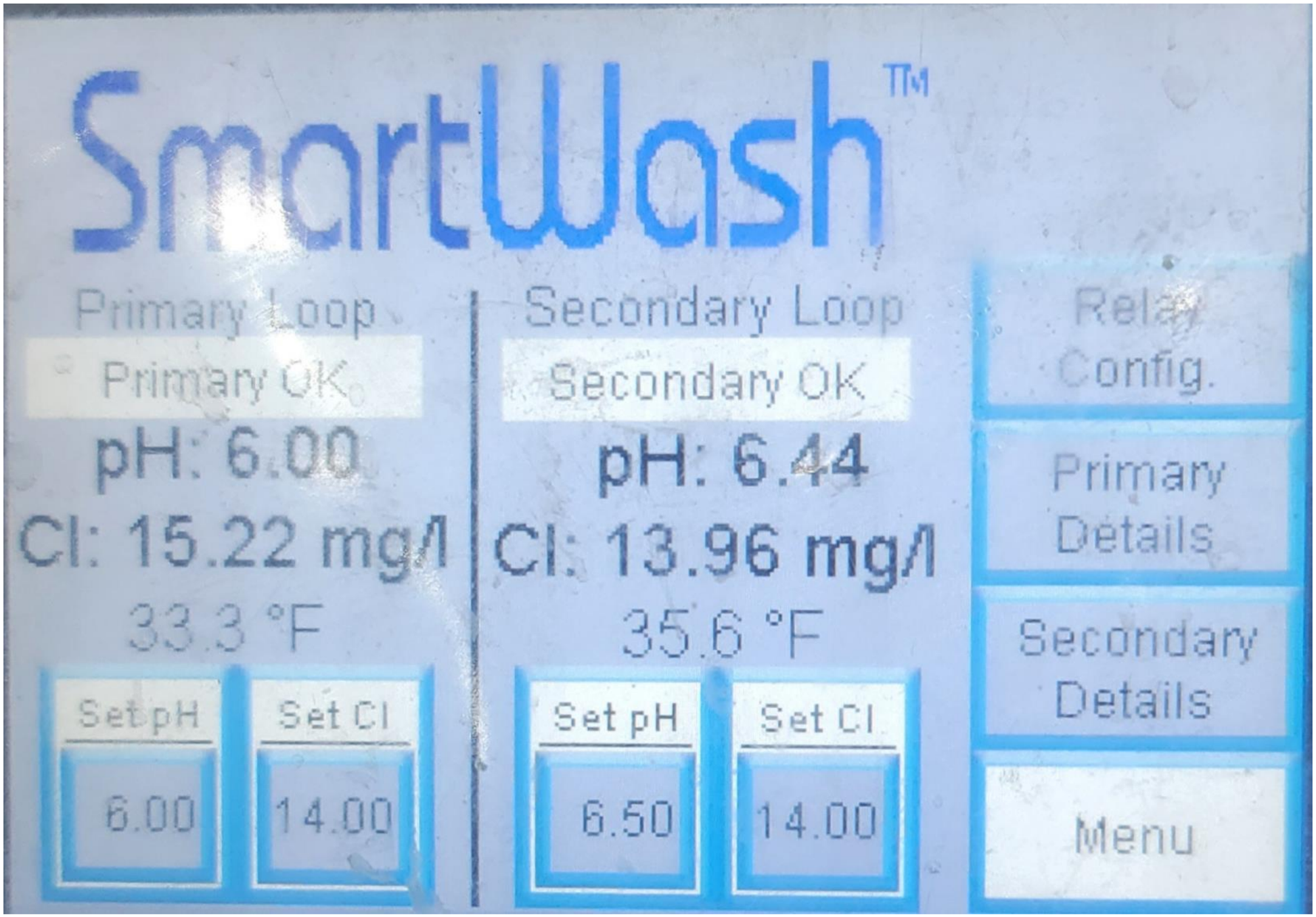
Self cleaning probes

Line performance Monitoring screen





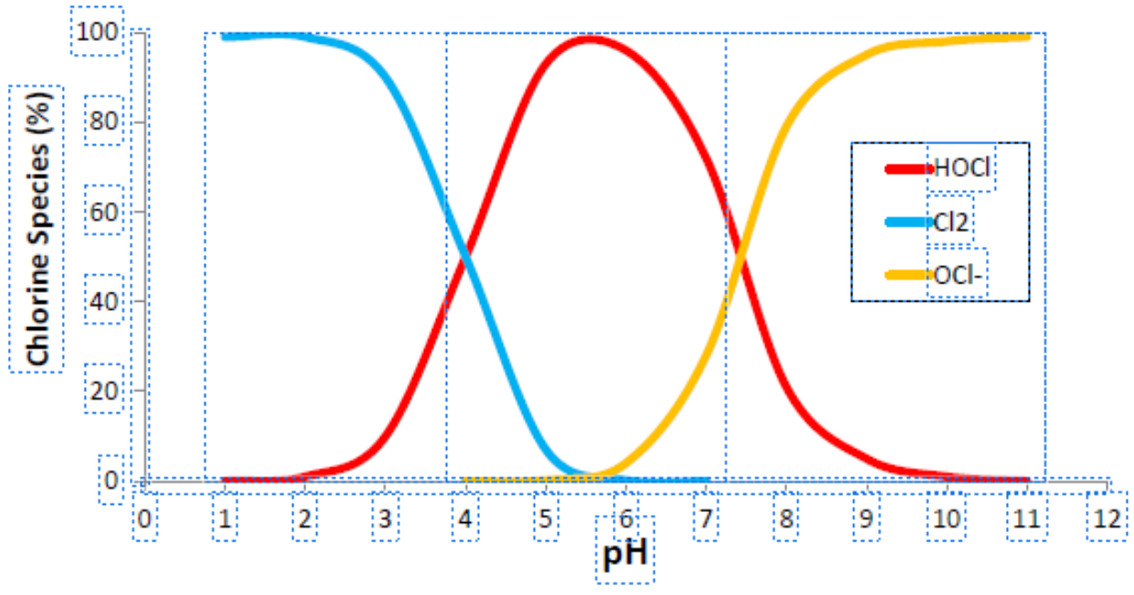
Processing Line Controller Screen Shot



Real Time Wash System performance Chart
Data Analysis and System Control

Chlorine Chemistry in Water

Maintaining appropriate pH is critical to ensure effective (free, available) free chlorine strength



Cl_2 + H2O

HOCl

OCl^- + Na^+

System Performance and Efficacy

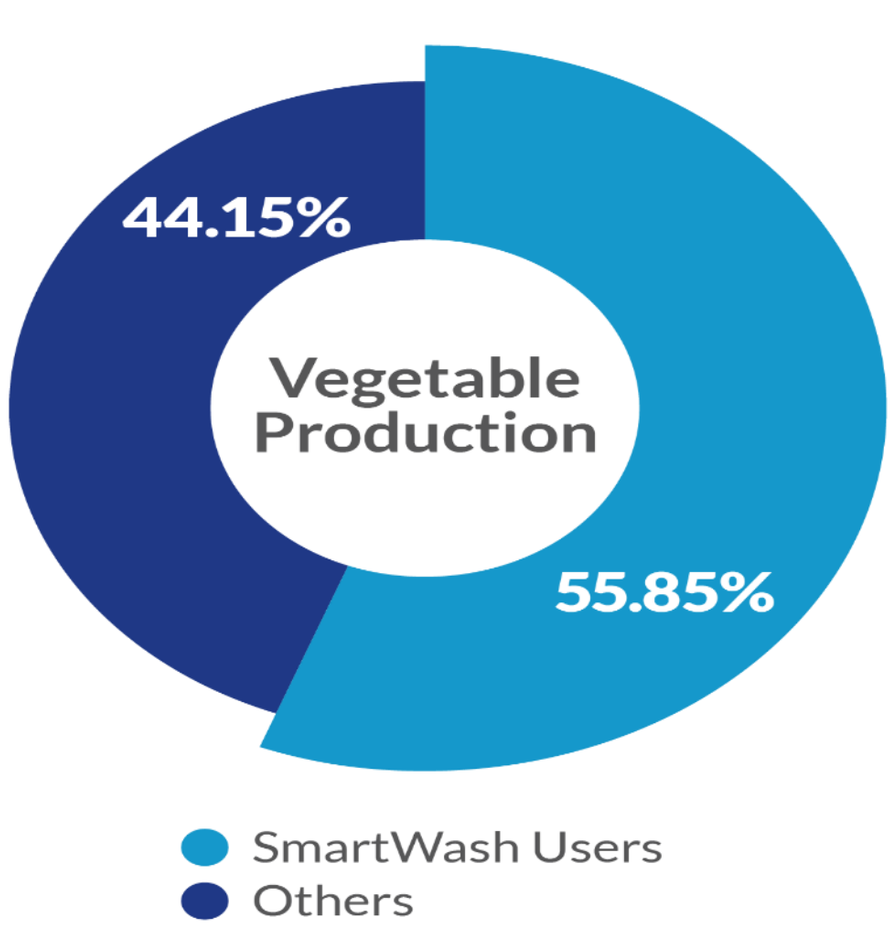
Benefits from Advancement and changes

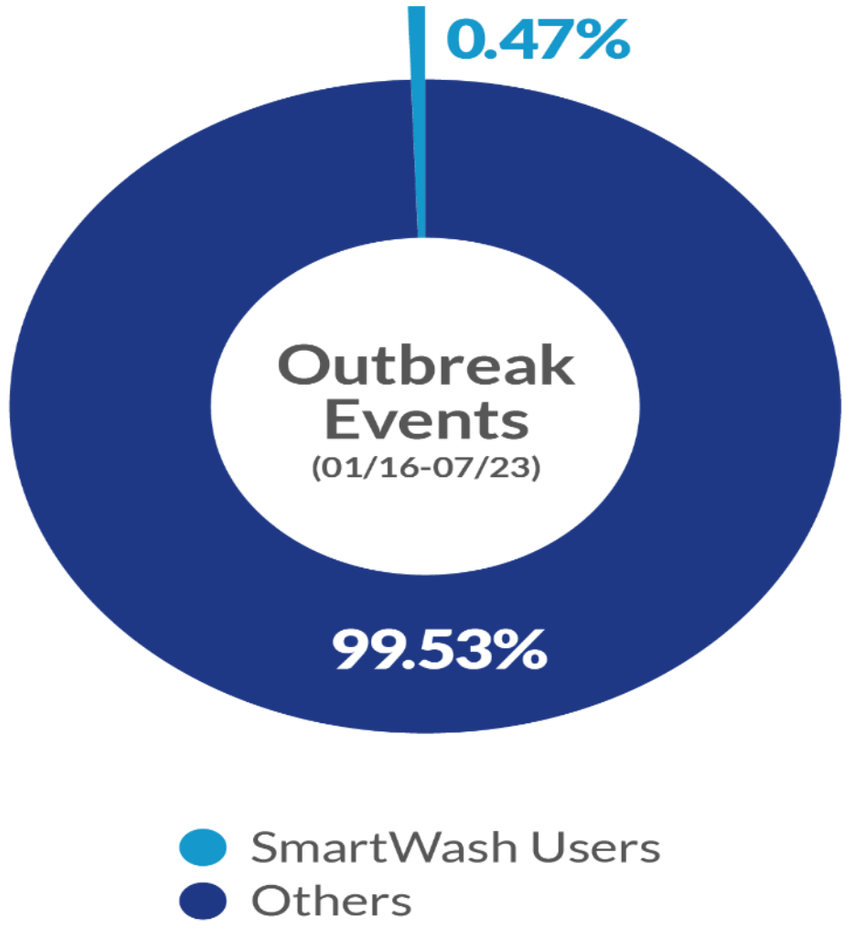
- Water Replenishment and Control efficiency – reduced spills and waste
- Product Flow Control with Interlock Relay – with <1% deviation rate/month
- Chemical usage – Managed with control system within target range
- Product wash contact time and CCP control – managed with automation controls
- Deviation easy to track with data and to take action steps to prevent product in finish bags
- Employee safety through exposure to off gas - well controlled
- Improved log reduction results from Micro test in samples collected and tested by 3rd party labs.

Key to success

- Increased awareness and advanced knowledge at the field level Good Agricultural Practice
- Raw product supply - through the application of latest advance scientific knowledge, technology and metric systems at the farm level
- Improved Equipment Hygienic Sanitary design.
- Advance processing and wash system technology
- Improve rapid microbiology testing and detection that helps identify and remove potential source of cross contamination from the supply chain.

When Market Penetration and Enforcement Events Collide…





Total Pound of Produce Washed in SmartWash products = 32,000,000,000 (estimated)

Produce Safety –Changes Underway

Interventions-Training

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A Changing World

Global Standards

AI and IoT

Climate Change

Pathogen distribution and persistence

Sustainability

Feeding the 10 billion

Food Loss/Waste

Food Safety and Security

The rise of parasites

Diagnostics

Food Safety Management

Food Fraud

International Trade

Food Safety – Taking Lessons from History

Milk

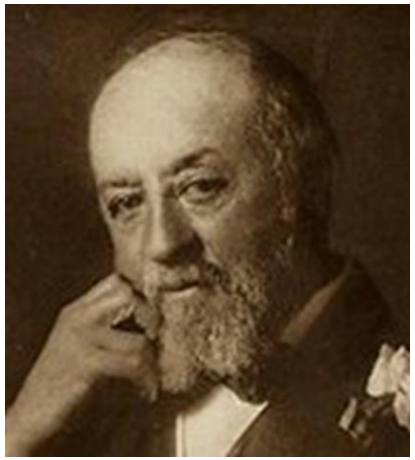
Henry Colt

Certified Production
- Sanitation
- Herd health
- Transportation

Expensive

Nathan Straus

Milk pasteurization
Extended shelf-life
Cheap milk for the population



Beef Sector

Jack in the Box chain linked to 'severe' outbreak

OLYMPIA, Wash. (AP) — An outbreak of severe diarrhea and abdominal pain among more than 90 children and adults in western Washington has been traced to a fast-food restaurant chain, state authorities said yesterday.

About 75% of the people stricken ate at Jack in the Box restaurants, said Dean Owen, spokesman for the state Health Department. He couldn't say how many restaurants were involved.

"Kids were writhing in pain, seriously. Their stomach cramps were very bad ..." Owen said Sunday. "This is not your typical diarrhea that comes with the flu. This is very severe."

The majority of the cases were in King County, where Seattle is located, but about 15 children were reported ill in Snohomish and Pierce counties, the department said.

About half the cases were reported in the past week.

Twelve children became seriously ill and were hospitalized after being infected with a strain of bacteria commonly found in undercooked beef. Seven children were receiving kidney dialysis treatment at Children's Hospital and Medical Center in Seattle, the state Health Department said.

None of those placed on dialysis had life-threatening illnesses, hospital spokesman Dean Forbes said.

Three of the seven receiving kidney dialysis were in intensive care, said hospital spokesman Dean Forbes. Two of the three were listed in serious condition and the other was in critical condition, he said.

"Kids were writhing in pain, seriously. Their stomach cramps were very bad ..."
DEAN OWEN
Health department spokesman

Jack in the Box's owner, Foodmaker Inc. of San Diego, said the source of the illness wasn't clear.

But Paul Schultz, Jack in the Box vice president, said that "as an extreme precaution," the restaurant chain was suspending sales of all its ground beef products at its 60 restaurants in western Washington until the arrival of a new shipment, expected today.

"We are very concerned by the incidents of this illness in the state of Washington and are cooperating fully with state health authorities," he said.

Symptoms of infection by the strain, bacterium E coli 0157:H7, usually appear three to four days after contaminated food is eaten.

The last major outbreak of E coli contamination in Washington was in the mid-1980s and was traced to a Walla Walla fast-food chain. Owen said several people died in that outbreak. ■

- Prescriptive regulations
- Interventions
- HACCP

Interventions on the Fresh Produce Chain

Pre-harvest

Irrigation water
- UV
- Sanitizers

Crops
- UV-B
- UV-C
- Hydroxyl-radical Process

Post-harvest

- Wash systems
- Hydroxyl radical process
- Low dose irradiation
- UV
- Blue light
- Bacteriophages
- Antimicrobial coatings

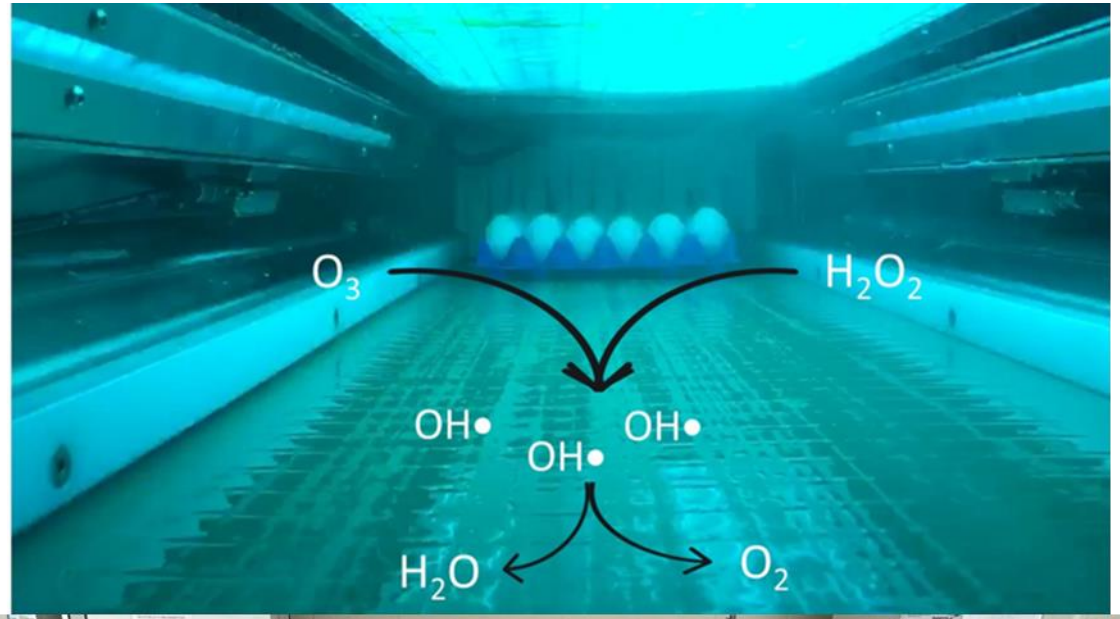
Intervention Requirements

- Effective in pathogen reduction
- No detrimental effect on quality
- Integrate into existing process
- No objection from regulatory bodies

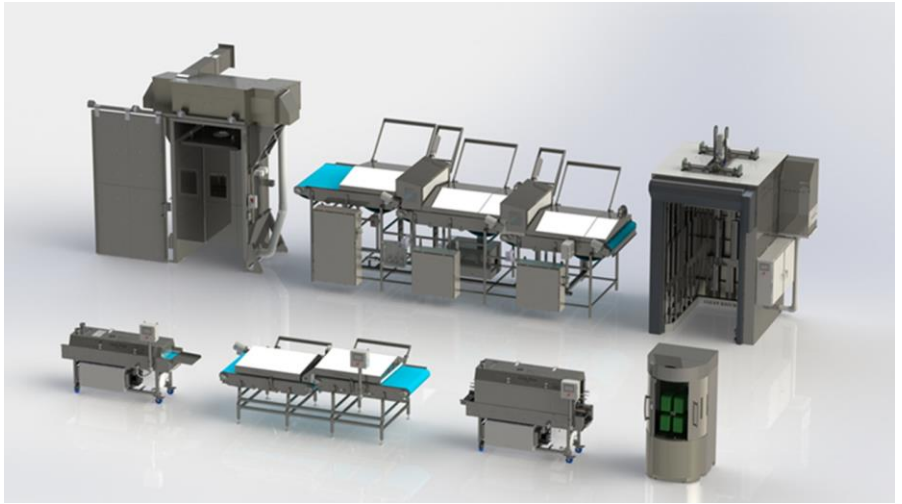
Tangible benefits

- Shelf-life extension
- Reduce water/energy use
- Open markets with added food safety assurance

Hydroxyl-Radical Process

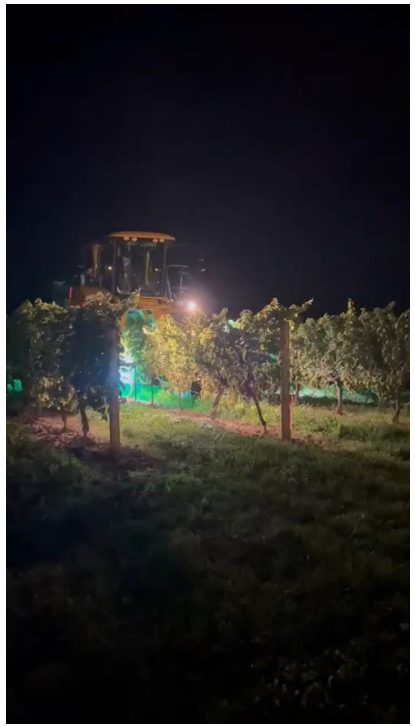


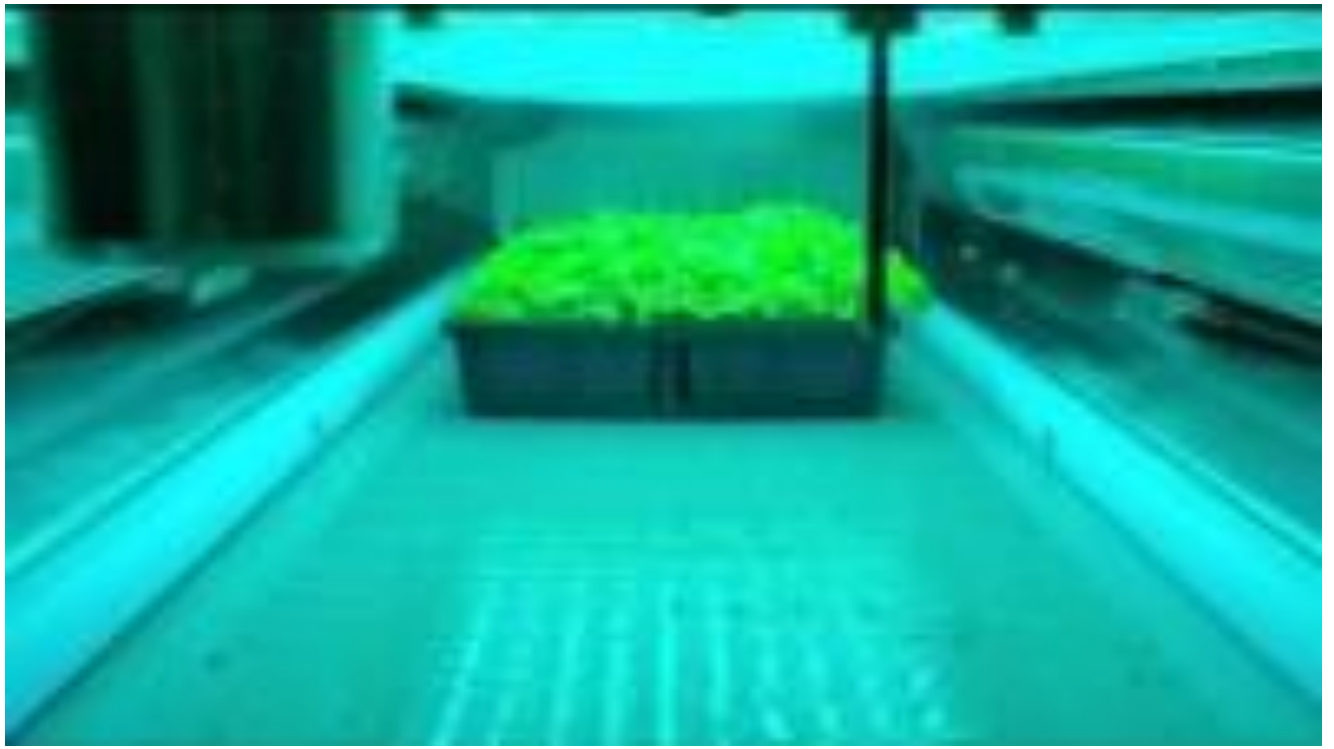
clean works™



On-Going Research

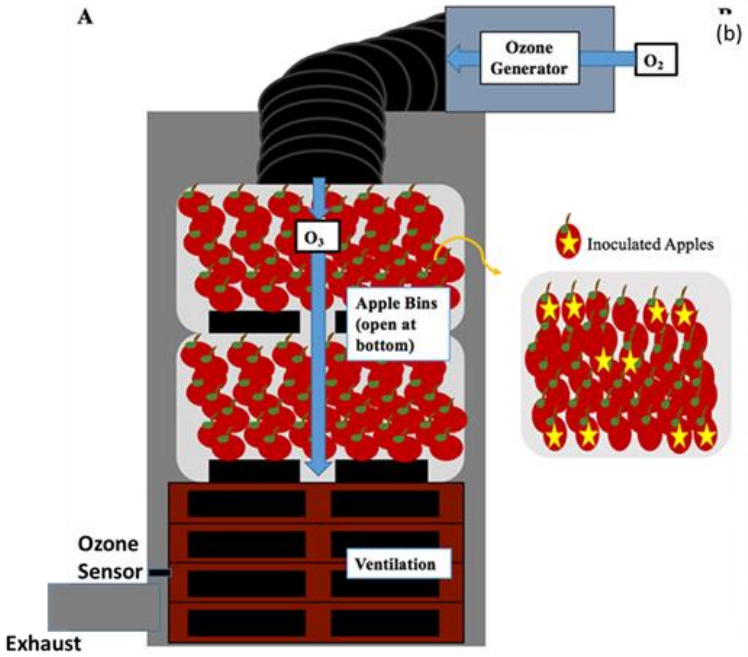
Pre-Harvest





Hydroxyl-Radical Process

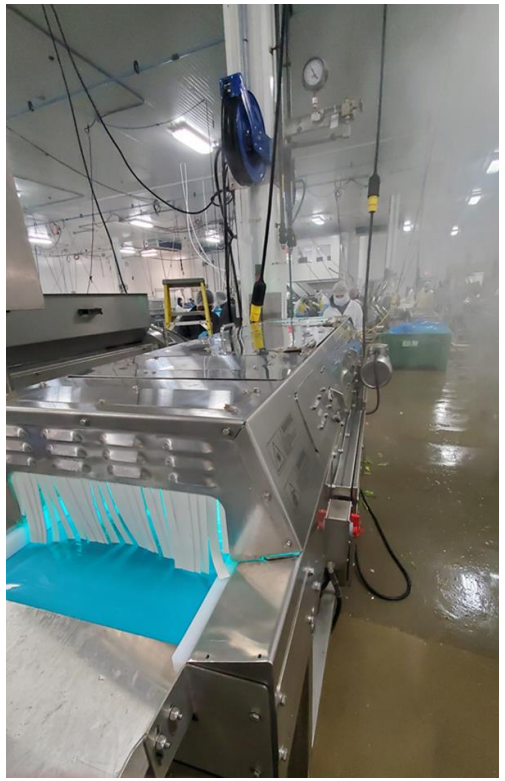
Receiving

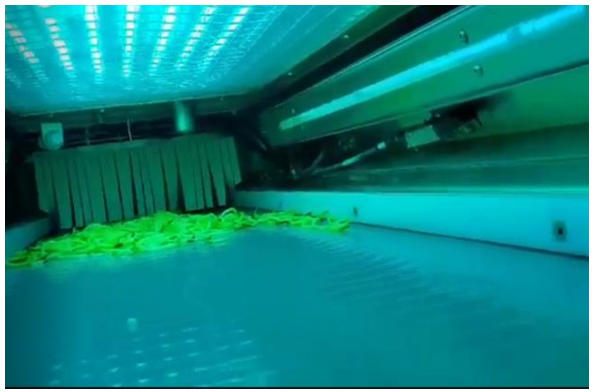


Forced Ozone Reactor

Peroxone

Processing





Hydroxyl-Radical Process

Food Safety Training

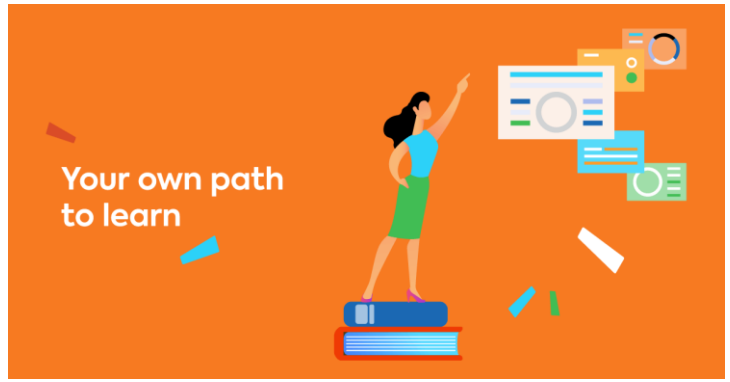
- Regulations increasing complexity

Guidelines

- Simplify
- Prescriptive
- Generic

- Limited effectiveness
- Subjective interpretation end-users and inspectors

Food Safety Toolbox



- Based on Codex General Principles of Hygienic Practice
- Foundation for all regulations
- Empower user by showing the path to learning

- Food Safety Toolbox
  - Science based
  - Mapping – route to learning
  - Grouping (Chunking)
  - Learn-By-Asking

Link: Home (fao.org)

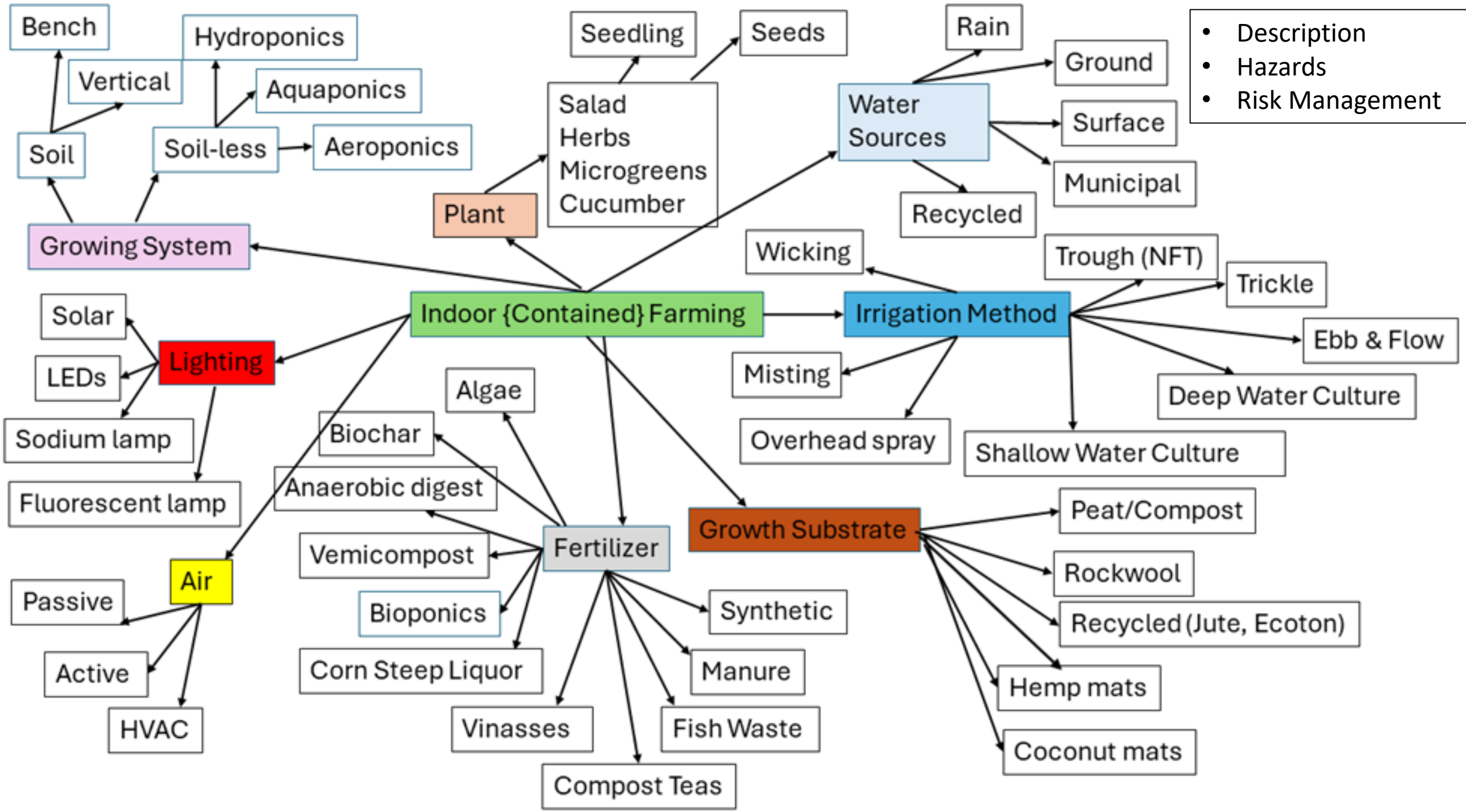
Good Hygiene Practices (GHP) and HACCP Toolbox for Food Safety

Background How to use GHP HACCP Glossary FAQ

GHP and HACCP

Good Hygiene Practices, or GHPs, form the basis of all food hygiene systems that support the production of safe and suitable food. The HACCP approach focuses on control measures for significant hazards rather than relying only on end-product inspection and testing.

Home (fao.org)

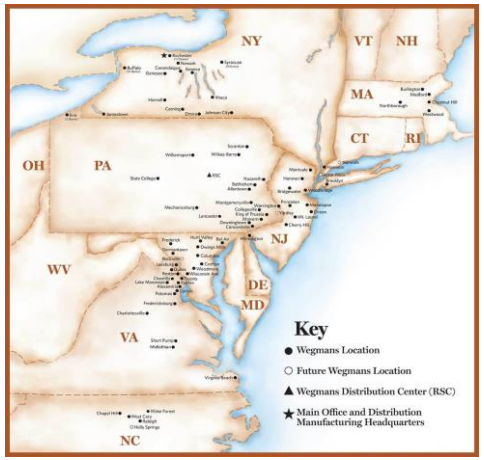

Bench
Hydroponics
Vertical
Aquaponics
Soil
Soil-less
Aeroponics
Growing System
Seedling
Seeds
Salad
Herbs
Microgreens
Cucumber
Plant
Rain
Ground
Water
Sources
Surface
Municipal
Recycled
Wicking
Trough (NFT)
Trickle
Indoor {Contained} Farming
Irrigation Method
Ebb & Flow
Misting
Deep Water Culture
Overhead spray
Shallow Water Culture
Solar
Lighting
LEDs
Sodium lamp
Fluorescent lamp
Algae
Biochar
Anaerobic digest
Fertilizer
Vemicompost
Bioponics
Corn Steep Liquor
Vinasses
Compost Teas
Manure
Fish Waste
Synthetic
Growth Substrate
Peat/Compost
Rockwool
Recycled (Jute, Ecoton)
Hemp mats
Coconut mats
Air
Passive
Active
HVAC
• Description
• Hazards
• Risk Management

Summary

- Need to recognize the problem
- Testing, guidelines, and standards only go so far
- Need for interventions to act as a firewall from field to consumer
- Options available
- Effectiveness and tangible benefits
- Food safety training – empowering the user

"Helping Customers Live Healthier Better Lives through Exceptional Food."

53,000 Employees
111 Stores
8 States and DC



Celebration
OF FOOD & PEOPLE

CARE • HIGH STANDARDS • MAKE A DIFFERENCE • RESPECT • EMPOWER

Wegmans Food Safety Specifications for Leafy Greens

	Wegmans Food Safety Specification for Leafy Greens
Document #: WCS-001	Date of Issue: 09-08-2022
Formerly # WCWI-007	Version #: 7
Issued By: **Corporate Quality Assurance**	Page: 1 of 8

The following applies to any leafy greens supplied to Wegmans. Includes:

- Wegmans Brand (WB) leafy greens and non-WB leafy greens for both conventionally grown and organic
  - o Includes: Arugula, Baby Leaf Lettuce (i.e., immature lettuce or leafy greens), Butter Lettuce, Cabbage (green, red and savoy), Chard, Endive, Escarole, Green Leaf Lettuce, Iceberg Lettuce, Kale, Red Leaf Lettuce, Romaine Lettuce, Spinach, Spring Mix
  - o Bulk leafy greens and bagged leafy greens (including blends)
- Refer to Wegmans Quality Specifications for the quality attributes required for these products.

* LGMA Commodity Specific Food Safety Guidelines “Leafy Greens”

Risk Assessment

For all growing locations, a robust and active grower risk assessment of the location and surroundings must be conducted before seeding or transplanting, growing and harvest of any leafy greens for Wegmans Food Markets.

*Not Best Practices, but Wegmans Requirements.

Product Requirements	
Grower Certification	The product can only be sourced from growers who supply a handler or shipper (in CA and AZ) that has been certified to Leafy Green Marketing Agreement (LGMA) standards. A copy of the LGMA certificate for the handler or shipper of this product should be provided and will be held on file by Wegmans QA. Growers of leafy greens outside of CA & AZ growing regions must follow LGMA guidelines. Wegmans requires **all** growers to maintain a current GFSI certification.
Risk Assessments	For **all** growing locations, a robust and active grower risk assessment of the location and surroundings must be conducted before seeding or transplanting, growing and harvest of any leafy greens for Wegmans Food Markets. Risk assessments should be active and ongoing. Vigorous, thorough Pre-Season and Pre-Harvest risk assessments must be completed and available for review by Wegmans. Pre-Season Risk Assessment: • Grower GAP Verification • Recent Field History (>5 years) • Irrigation Water Sources • Adjacent Land Use • Field Sanitation • Soil Amendment Verification Growing and Pre-Harvest Risk Assessment should include: • Field sanitation • Adjacent Land Use • Soil Amendment Verification • Evidence of Flooding • Evidence of Animal Intrusion • Worker Health & Hygiene • Grower/Harvester GAP/GHP Training Verification • Harvesting Practices and Harvest Equipment Sanitation

Verification:

Wegmans reserves the right to conduct ranch and farm inspections with 24 hours notice to the supplier and as little as 2 hours notice to the individual ranch/farm. We *LGMA auditor upon oral or written request, except that you have 24 hours to obtain records you keep offsite and make them available and accessible to the auditors for inspection and copying

Compost Operations

- Fields growing leafy greens for Wegmans must be a minimum of **2-miles from any Compost operation/processor**

*400ft for all Amendment operations

	• Weather Events (Wind >30 MPH, Precipitation, Flooding, Temperatures <32° F, etc) Risk assessments should be ongoing during the growing season and include: • Field and surroundings (complete perimeter inspection) • Recent Field History • Adjacent Land Use • Evidence of Animal Activity • Irrigation Water Sources • Weather Events (Wind >30 MPH, Precipitation, Flooding, Temperatures <32° F, etc)
Verification	Wegmans reserves the right to conduct ranch and farm inspections with 24 hours notice to the supplier and as little as 2 hours notice to the individual ranch/farm. We require the ability for remote data access for verification. Risk assessments should be available at any time. Records of annual GFSI audits (including certificate, full audit report and corrective actions), GHP audits, Ranch Risk Assessments, Pre-Harvest Inspections and Auditor and Harvest Crew training and other relevant documents are to be available at the request of Wegmans (or designated representative) for review. GPS coordinates (provided in decimal degrees) for all growing locations of product for Wegmans are to be provided.
Pesticides	Ensure that agricultural pesticides and chemical usage adhere strictly to all local, county, state, provincial and federal regulatory guidelines
Compost Operations	• Fields growing leafy greens for Wegmans must be a minimum of 2-miles from any Compost operation/processor (including green compost) that produces >5,000 cubic yards per year or 1-mile from any Compost operation/processor that produces <5,000 cubic yards per year. • Compost storage and staging areas must be located in a manner that prevents any likely contamination.
Soil Amendments/ Crop Inputs (including compost)	All soil amendments should follow the current LGMA guidelines for soil amendments. In addition: • No raw manure, manure teas, biosolids, incompletely composted, non-certified compost or dry manures shall be used on any growing area where fresh produce is grown for Wegmans. • Compost staging areas must be located to control, reduce and eliminate likely contamination of lettuce or leafy greens from the stacking and application of compost and must be: o addressed in all related risk assessments o a minimum of 800 feet or 0.15 miles must be maintained between the potential source of contamination (soil amendment (s)) and the leafy green crop (if it falls outside the 2 mile or 1 mile requirements noted above in the Compost Operations section)

Growing Location

The grower location must be **2 miles** minimum from: • any Concentrated Animal Feed Operation (CAFO, greater than the equivalent of 1000 head of cattle, or the equivalent for other animal species).

- 5 or fewer USDA animal equivalent units per acre in pens or open grazing - **800 feet** (250 m) between the crop of interest and animal operation is required. • 6 to 24 USDA animal equivalent units per acre in pens or open grazing - **.25 mile** (.4 km) between the crop of interest and animal operations is required

LGMA CAFO Animal Recommendations: Pre-Harvest

- 80,000+: 1 mile or 2-mile opportunity for water runoff to water source
- 1,000+: 1200ft or 1-mile opportunity for water runoff to water source
- <1000: 400ft with composting, non-composting 30ft
- Grazing/Domestic: 30ft

Animal Intrusion	• Harvesting will be prohibited if there is evidence of animal (dog, cat, coyote, deer, etc.) tracks throughout the field, multiple fecal events throughout the field or animals seen defecating in the field • Buffers will be required when a single incidence of fecal waste is found (>10' buffer), a single incidence of animal tracks (>5' buffer beyond tracks) or when evidence is found of birds feeding and/or leaving droppings (>10' buffer)
Growing Location	The grower location must be 2 miles minimum from: • any Concentrated Animal Feed Operation (CAFO, greater than the equivalent of 1000 head of cattle, or the equivalent for other animal species). • Commercial dairy of any size • Commercial feed lots (of any size). For non-commercial operations such as a hobby farm or where smaller numbers of either domesticated or non-domesticated animals are housed or permitted to openly graze, the following distances apply: • 5 or fewer USDA animal equivalent units per acre in pens or open grazing - 800 feet (250 m) between the crop of interest and animal operation is required. • 6 to 24 USDA animal equivalent units per acre in pens or open grazing - .25 mile (.4 km) between the crop of interest and animal operations is required
	***Any animal operation**, regardless of size, must be assessed and closely managed.* NOTE: Risk Assessments may dictate distances GREATER Than 2 miles from a CAFO, commercial dairy or feed lot. Wegmans Food Markets must be notified of any change in growers or growing areas.

Irrigation Water:

Furrow Irrigation: Contact of irrigation water with the edible portion of the plant is prohibited including the surface of the growing bed after planting and before plant breaks the surface of the soil. Wegmans requires a plan to assure that irrigation water has not come in contact with the edible portion of the plant at least 60 days prior to first harvest of any growing region

Irrigation Water	All growers of leafy greens must comply with the current LGMA Agricultural Water Metrics and demonstrate continuous improvement as the science evolves. Additionally, product grown for Wegmans must adhere to the following: • **Overhead:** Untreated surface water is prohibited for overhead irrigation; this water must be treated from plant emergence or transplant to harvest. • **Furrow Irrigation**: Contact of irrigation water with the edible portion of the plant is prohibited including the surface of the growing bed after planting and before plant breaks the surface of the soil. *Wegmans requires a plan to assure that irrigation water has not come in contact with the edible portion of the plant* at least 60 days prior to first harvest of any growing region; this must be shared and agreed upon with Wegmans prior to allowing furrow irrigation. The plan must include best practices, such as bed configuration, bed height, irrigation water release, tail water collection, field soil contamination of the plant, treatment and testing of water, harvest equipment, harvest tools and harvest crew. The plan must include limits, monitoring, frequency and who is responsible for each portion of the plan. Additionally, a buffer from the headland and tail ditch will be required; the ongoing risk assessment and the monitoring of irrigation events will dictate the buffer required. This information must be shared with Wegmans. Irrigation water must be tested for each furrow irrigation event within 21 days of harvest. • **Surface Drip Irrigation**: Untreated surface water is prohibited for surface drip irrigation; this water must be treated from plant emergence or transplant to harvest. • **Buried Drip Irrigation**: Must ensure that untreated surface water does not contact the edible portion of the plant. • **Seepage Irrigation:** Seepage irrigation is acceptable as long as there is no water contact with the edible portion of the harvestable crop. • **Water Treatment**: Water treatment must be validated. Water treatment must be verified throughout the use on product for Wegmans.

The Wegmans approach to Food Safety and our Local Growers

Wegmans has a long history of supporting our Local, “Near our Stores” growers

Celebration
OF FOOD & PEOPLE

CARE • HIGH STANDARDS • MAKE A DIFFERENCE • RESPECT • EMPOWER

Gingerich Farms

Ben Schwartz

Honeysuckle Hill Farm

VerWulst Tomatoes

Wegmans commitment to Organic growing has led to development of Wegmans Partner Farm program ……..making Organic growing a viable East Coast option for many of our growers…

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Wegmans Produce Food Safety commitment to our over 150 Local Growers…..

MAKE IT SAFE

KEEP IT SIMPLE

HELP REMOVE THE FINANCIAL BURDEN

PROVIDE TRAINING AND SUPPORT

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THANK YOU!

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