



Department of Primary Industries

Fresh Produce Safety Surveillance, Monitoring and Support

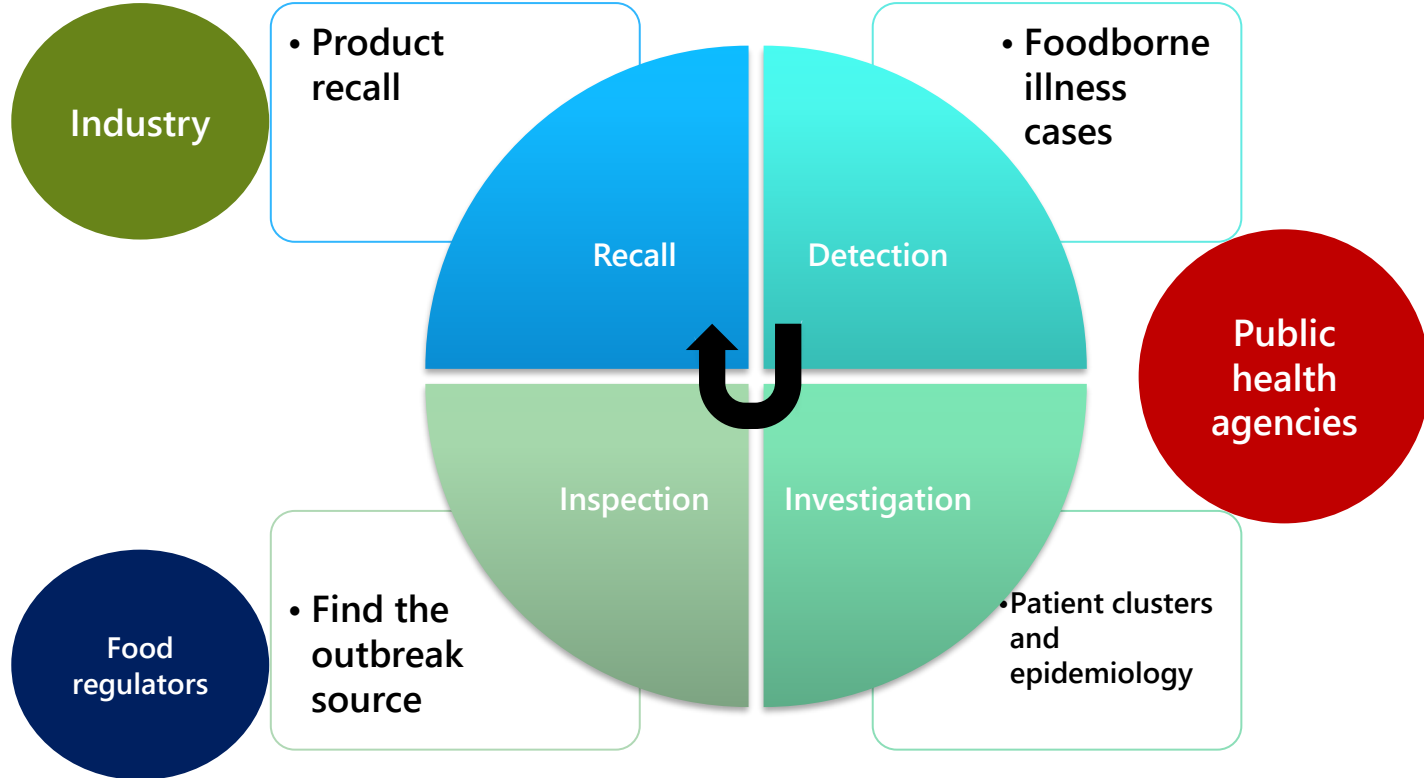
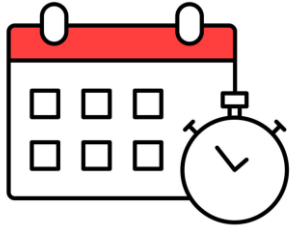
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FRESH PRODUCE
SAFETY CENTRE
AUSTRALIA & NEW ZEALAND

FOUNDING PARTNERS
THE UNIVERSITY OF SYDNEY
FRESH PRODUCE ASSOCIATION





Fresh produce
industry

Food and health
regulators

Improved food safety
standards

Increased global trade and
consumption

Perishability – inconclusive
investigations

Improved diagnostics

Enhanced surveillance

Whole genome sequencing

Better traceability and
regulations





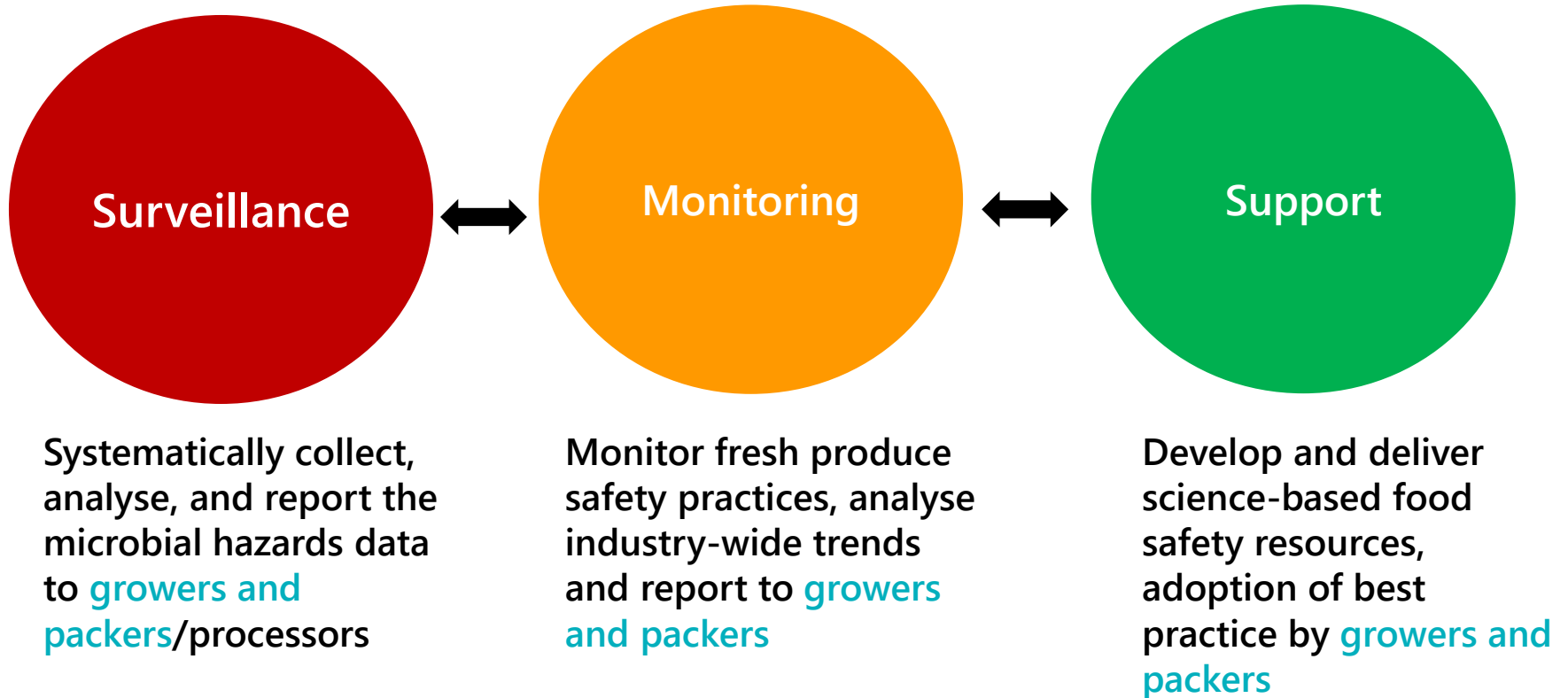
NSW DPI's Strategic priorities

Prepare for and reduce the occurrence of food safety risks

Respond to and contain foodborne illnesses and food incidents




Fresh Produce Microbial Safety





Surveillance

- To prevent and control microbial food safety hazards
 - To describe the nature and magnitude of microbial contamination
 - To identify the hotspots for microbial contamination and cross-contamination across the supply chain
 - To evaluate the performance of preventative food safety control measures
 - To promote risk-based decision making
- 

Surveillance

Melon industry

Identifying the hotspots for microbial contamination and cross-contamination
(2016-2019)

Microbial risk management performance
(2018 to present)

Triggering a response and early warning system
(2018 to present)

Minimise microbial risks to consumers

Citrus industry

Identifying the hotspots for microbial contamination and cross-contamination
(2021-2023)

Bridge the gaps in industry practice to minimise the risk of microbial hazard detection on the fruit surface

Minimise "TRADE" risks

Surveillance

Whole-of-the-chain

- Production fields
- Processing/packing facilities
- Wholesale
- Retail

Technology driven

- Molecular detection of target pathogens
- Whole-genome sequencing of isolates

Key features

Inclusive and targeted

- All growing regions
- All types of produce within target industry
- All scales

Extreme weather events, farm location and history

Time agnostic

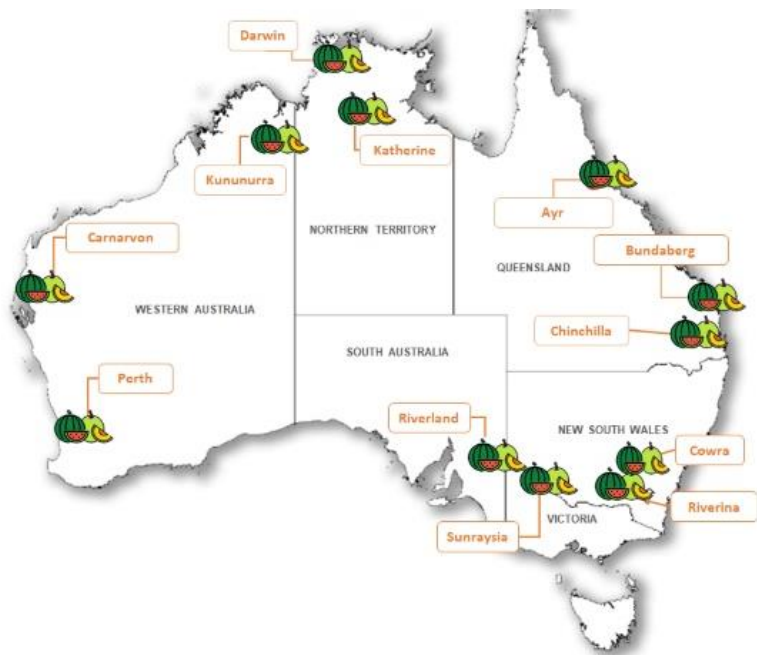
Incident investigation and long-term data

Cyclical, flexible and adaptable

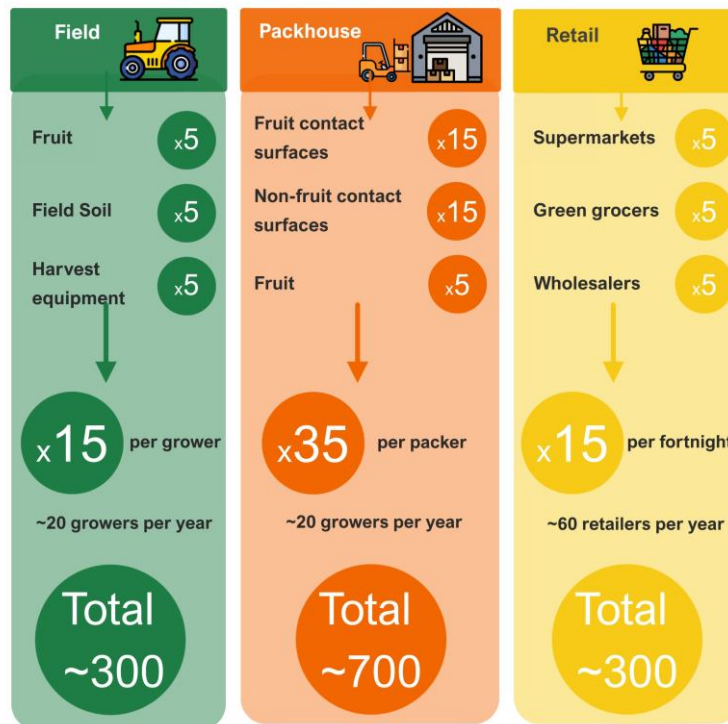
Continuous improvement with feedback loop



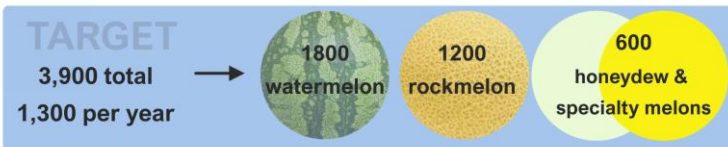
Surveillance



Microbiological Sampling Plan



1,300 samples / year



Melon Food Safety Surveillance

(August 2021 to July 2022)

Surveillance

Watermelon



Rockmelon & honeydew



Specialty



Fruit samples

414

281

316



Environmental samples

53

329

38

Total samples =

1,431

467

610

354

Surveillance

Melon food safety surveillance

(Aug 2021 to July 2022)

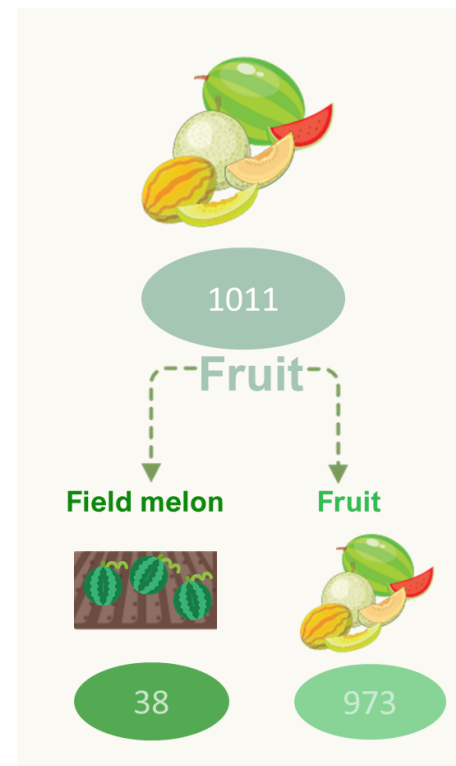
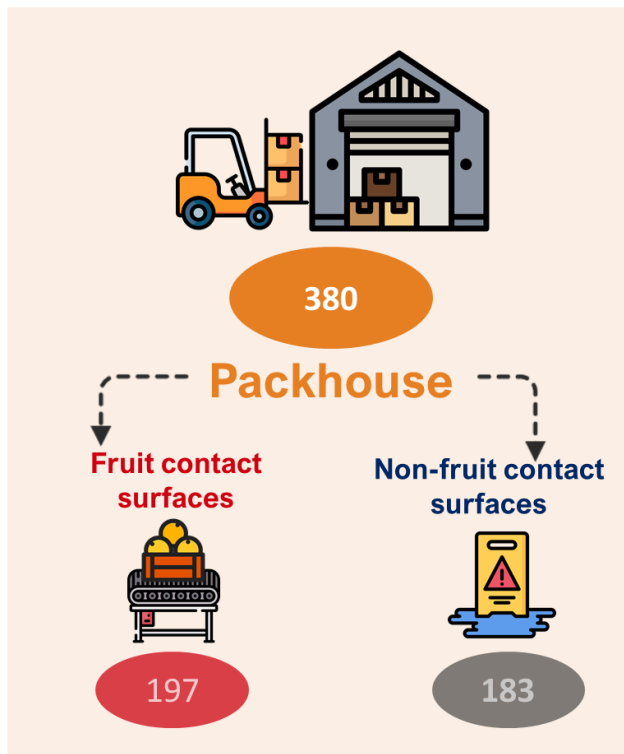
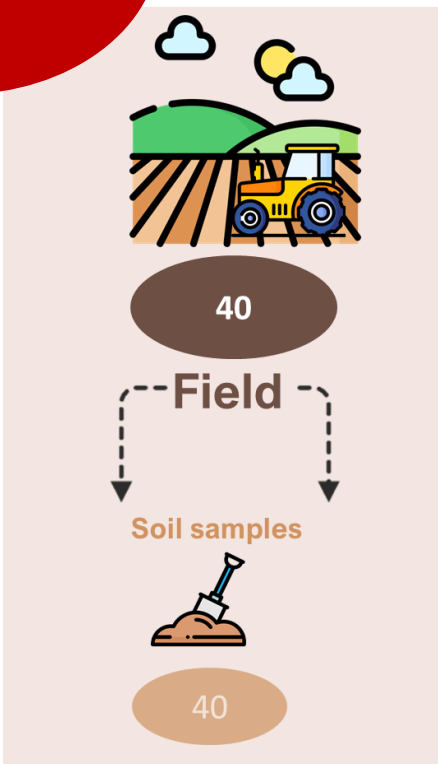
68 growers & packers

>95% of the industry

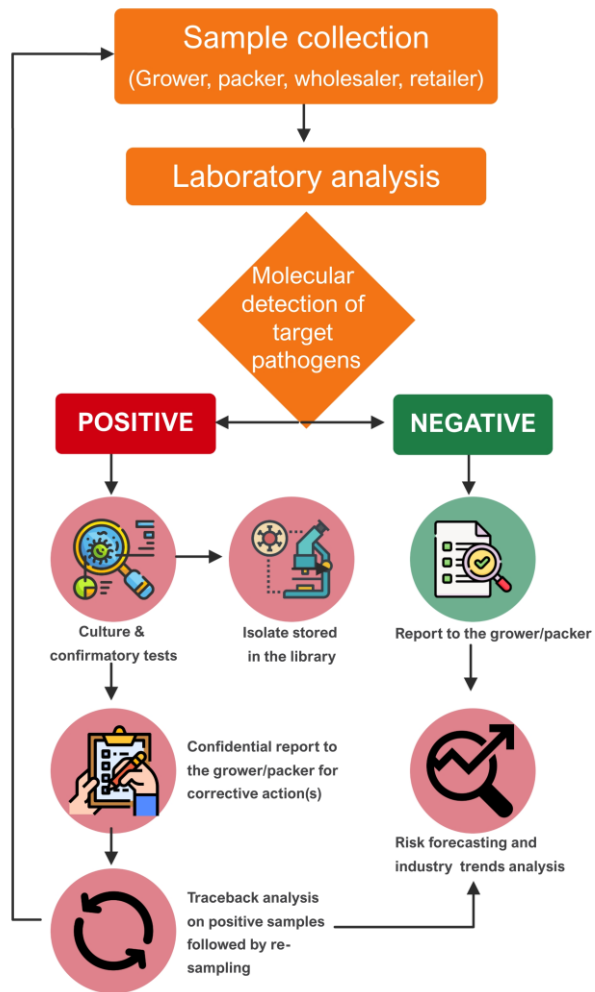


Surveillance

Melon food safety surveillance across the supply chain



Surveillance



Melon Food Safety Surveillance (Aug 2021- July 2022)

Surveillance

99.2 %

Listeria monocytogenes

99.9%

E. coli O157:H7

99.1%

Salmonella
species

Detections associated with heavy rainfall in production regions

Preventative measures ramped up

Pathogen monitoring frequency increased



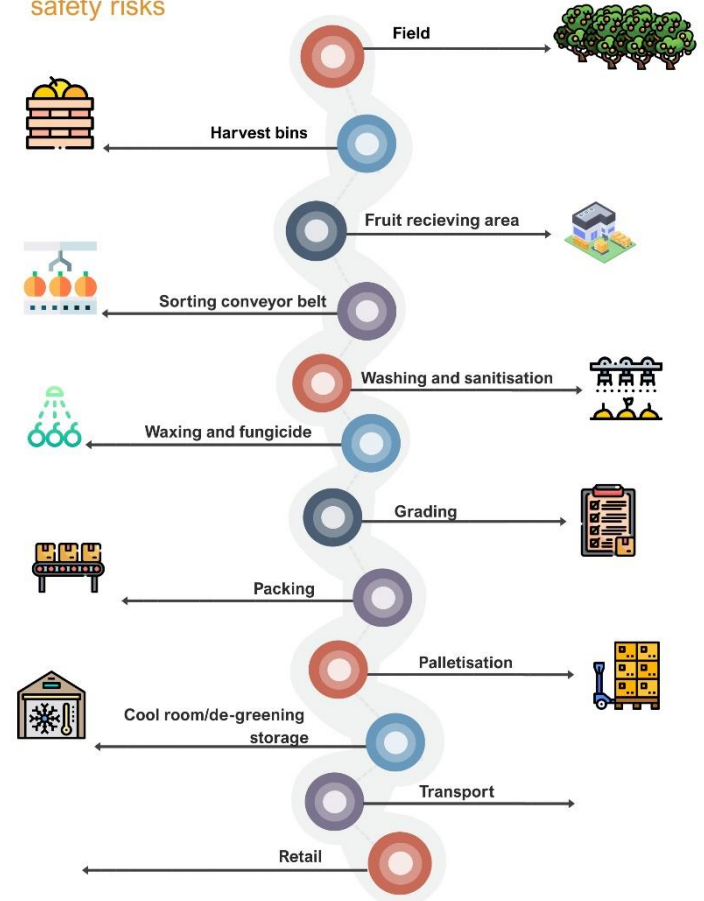
Compliance success meter

Surveillance

Citrus Microbial Food Safety Surveillance

- Due to the inedible peel, citrus fruit poses a relatively lower microbial risk to consumers.
- Detection of pathogens (e.g. *Listeria monocytogenes*) on the citrus fruit surface could be a serious 'TRADE RISK' in export markets.
- Oranges and mandarins export value ~\$0.5 billion in 2019-20.

Mapping supply chain for microbial food safety risks



Surveillance

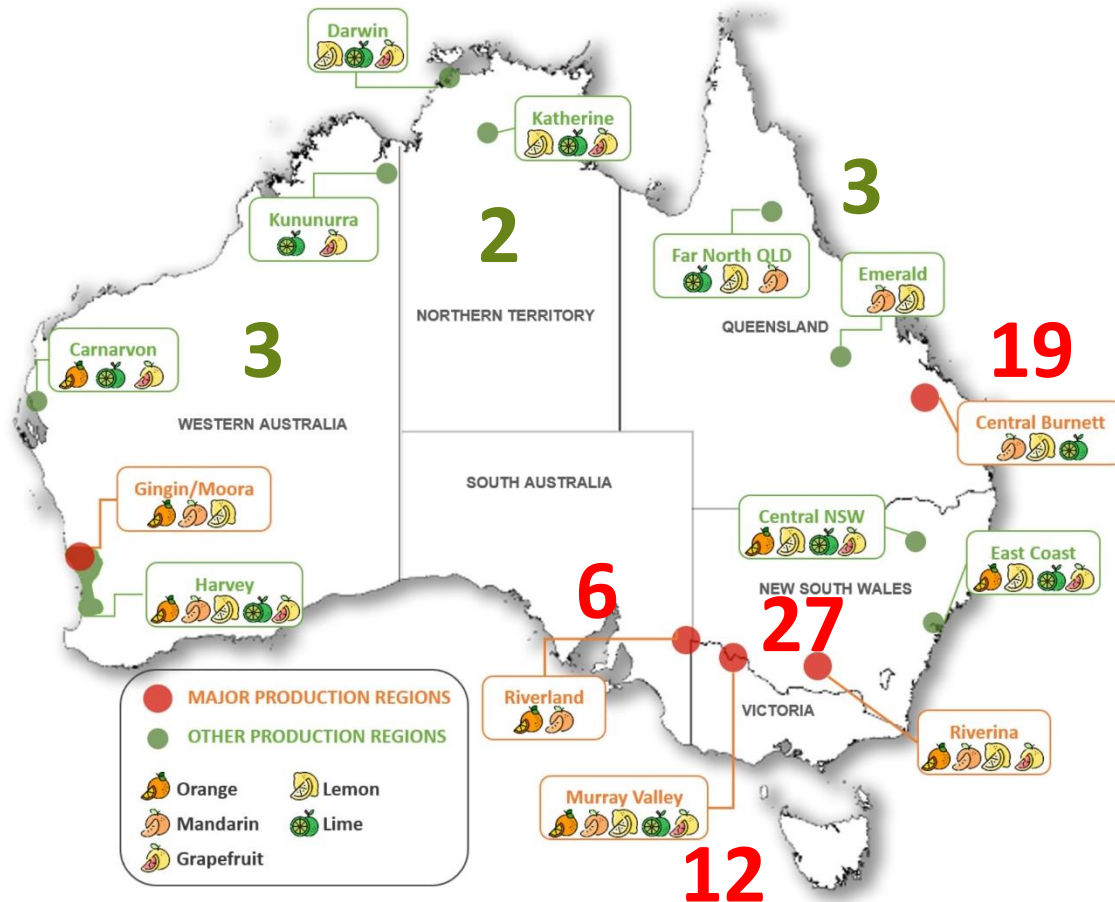
Citrus surveillance coverage

(Aug 2021 to July 2022)

64 packers

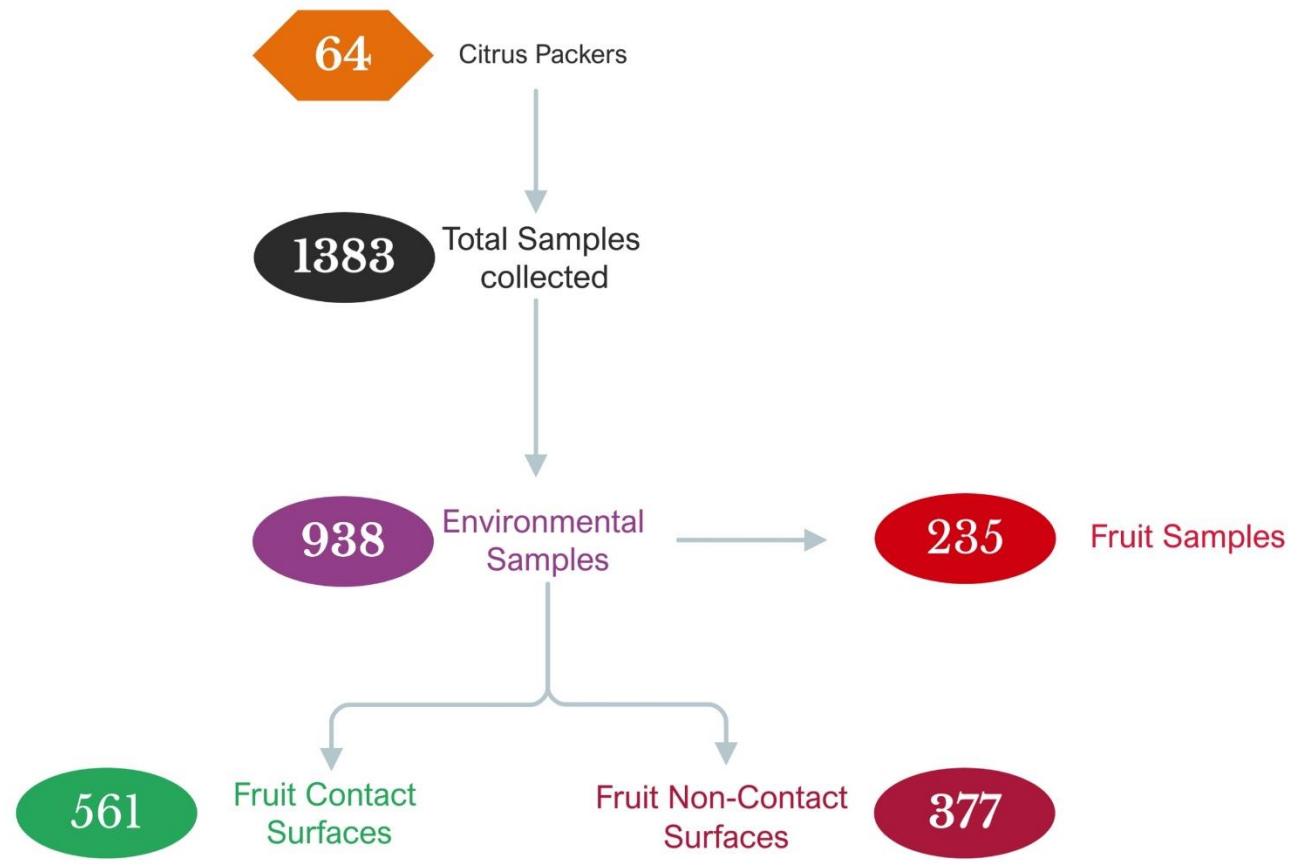
> 500 growers

~75% by citrus production volume



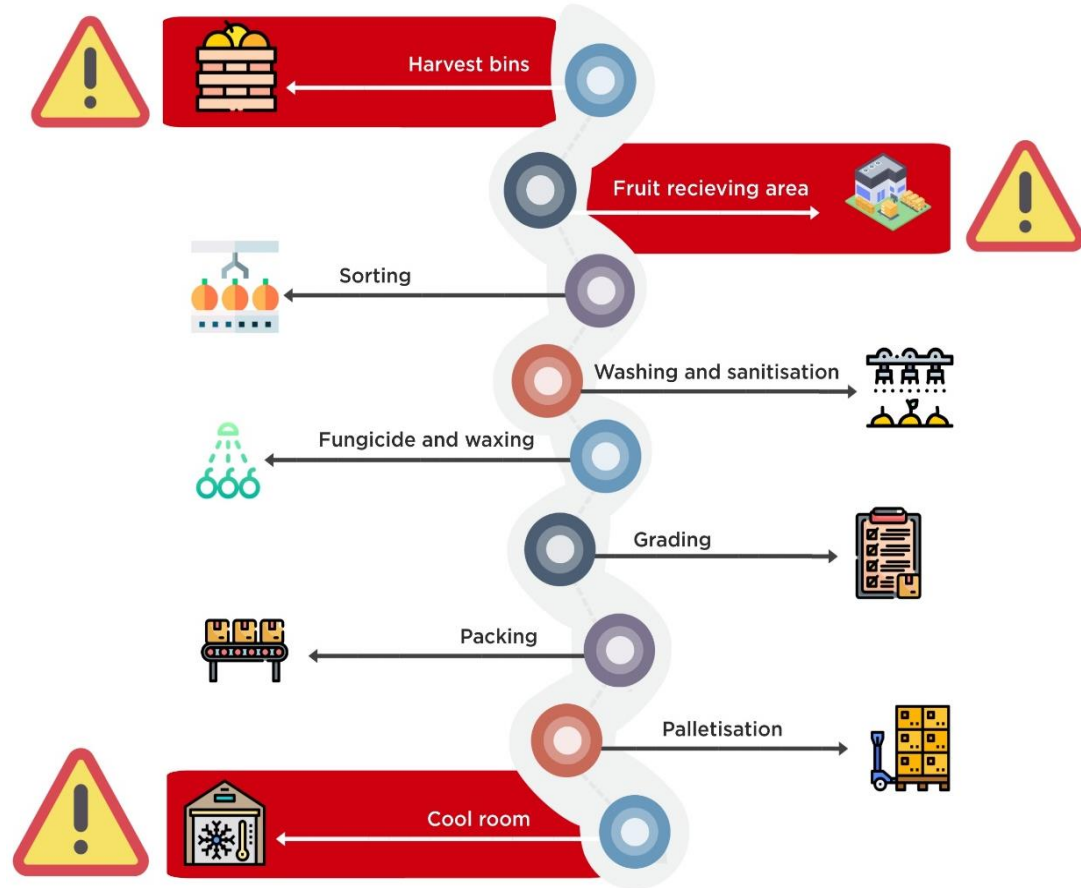
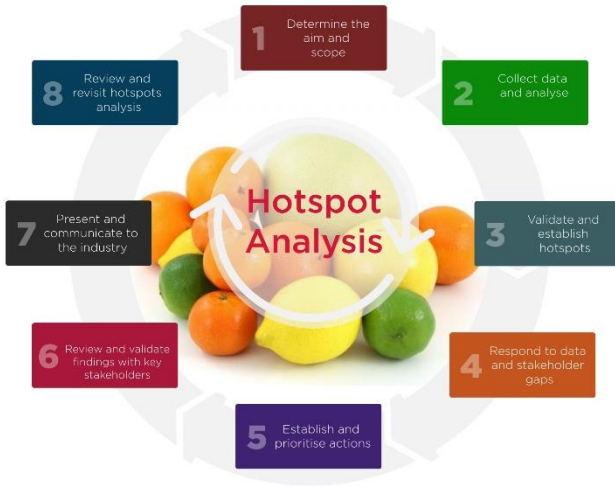
Surveillance

- Riverina 27
- Queensland 19
- Murray Valley 12
- Riverland 6



Surveillance

Listeria monocytogenes hotspots in the citrus industry



Surveillance

Whole-genome sequencing (WGS)

WGS of the *Listeria monocytogenes* isolates

- Persistence and transmission of pathogen
- Genetic diversity of isolates
- Virulence and antimicrobial resistance genes



Department of
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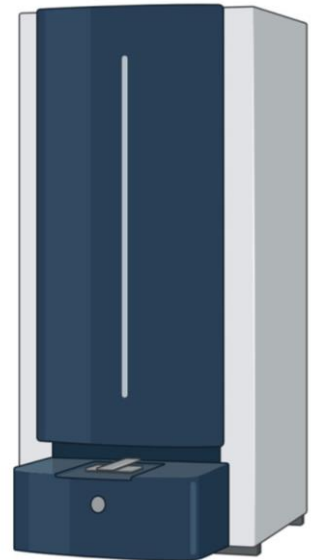
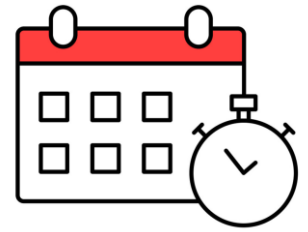
AGRICULTURE VICTORIA



Surveillance

New direction

- Expand the surveillance program
 - Leafy vegetables since March 2022
- Rapid, high throughput and cost-effective tools
 - Adopt MALDI-TOF application in microbial ID
 - Explore quasi-metagenomics in surveillance program
- Real-time collaboration across stakeholders



Monitoring

Preharvest (on-Farm)

- Soil amendments
- Preharvest water
- Farm location
- Weather events



Monitoring

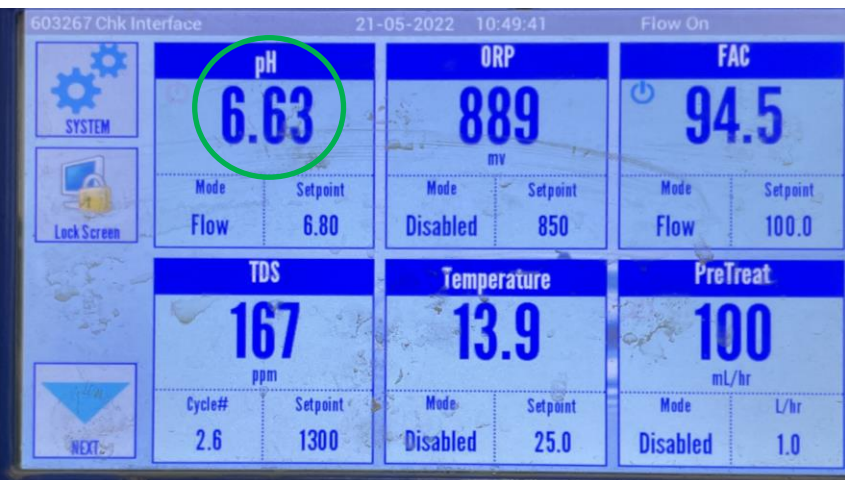
Postharvest (Packing sheds)

- Sanitation and hygiene
(harvest bins, equipment and cool rooms)
- Postharvest water
(source, quality and treatment)
- Sanitisers
(dosing, conc. and dwell time)
- Packhouse environmental monitoring

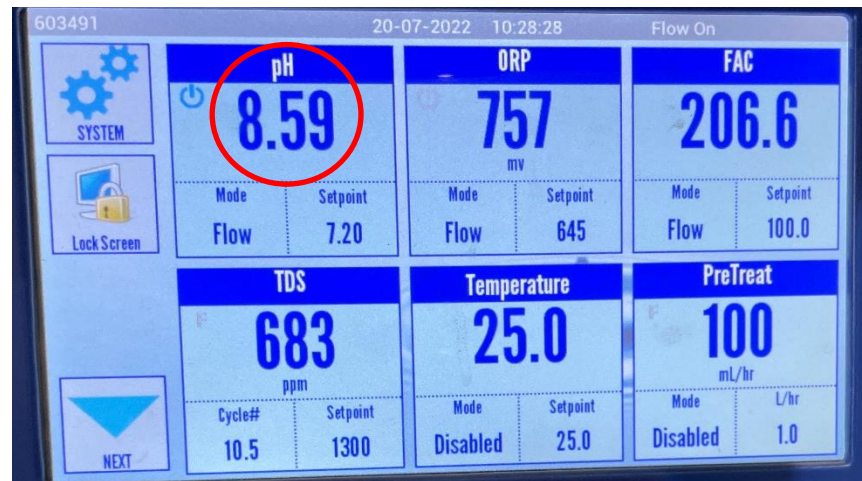


Monitoring

Critical operations (washing and sanitisation)



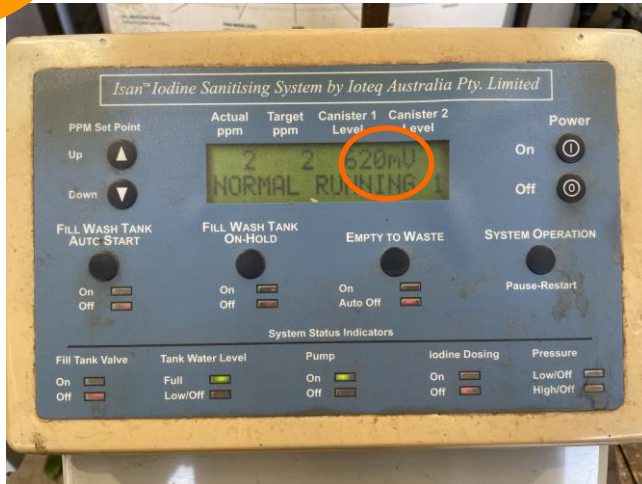
Packer A
Chlorine sanitiser
Optimal pH 6.63



Packer B
Chlorine sanitiser
Sub-optimal pH 8.59

Monitoring

Critical operations (washing and sanitisation)

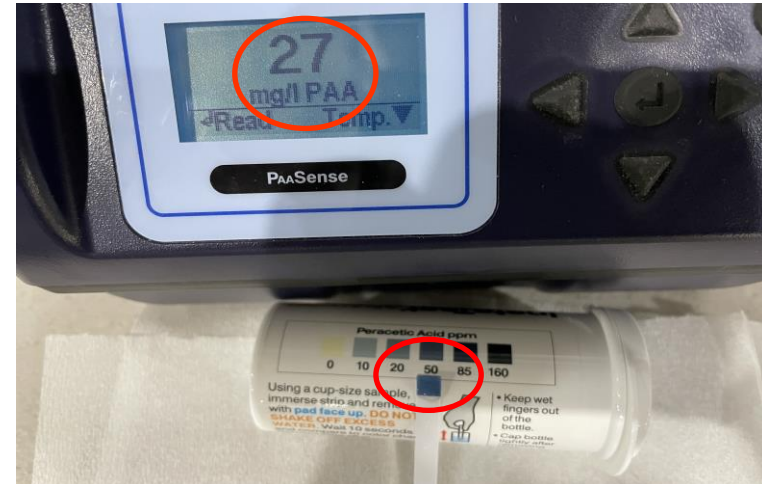


Iodine

Target conc.: 2 ppm

Actual conc: 2 ppm (test strip)

Sub-optimal oxidation reduction potential (ORP) = 620 mV



Peracetic acid (PAA)

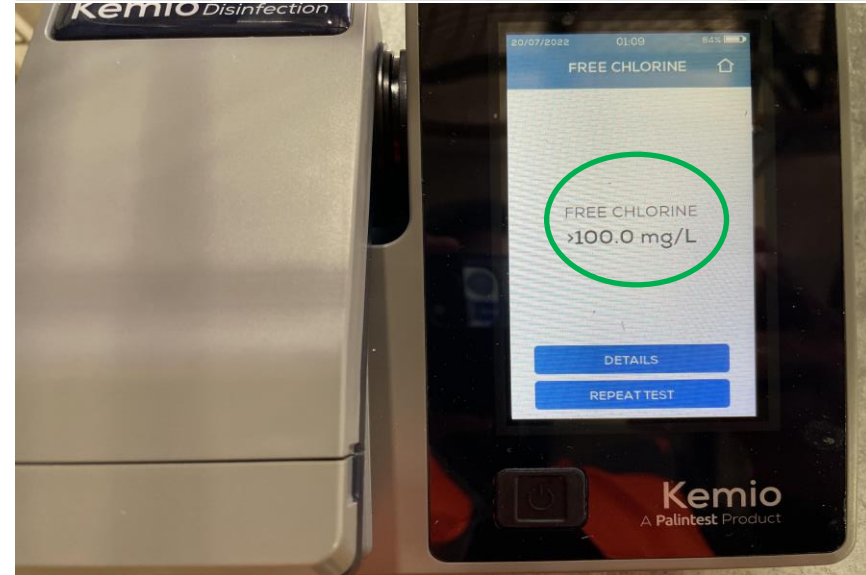
Target conc.: 80 ppm

Actual conc: 50 ppm (test strip)

Actual conc.: 27 ppm (digital meter)

Monitoring

- ✓ Automation of sanitiser injection
- ✓ Digital monitoring tools



Monitoring

- ✓ Packhouse hygiene and sanitation
- ✓ Packhouse environmental pathogen monitoring



Support

Business-specific reporting

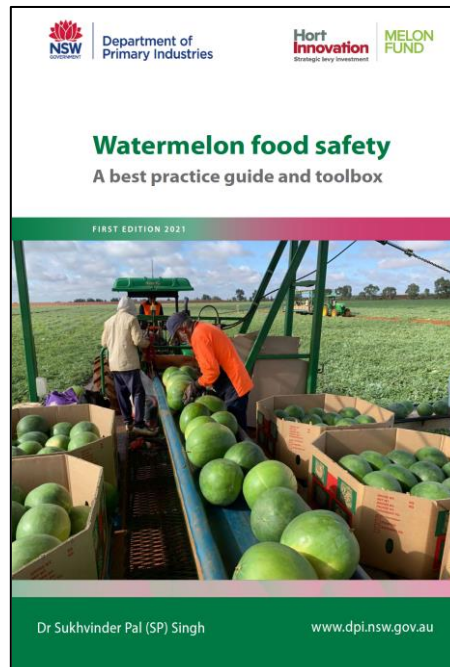
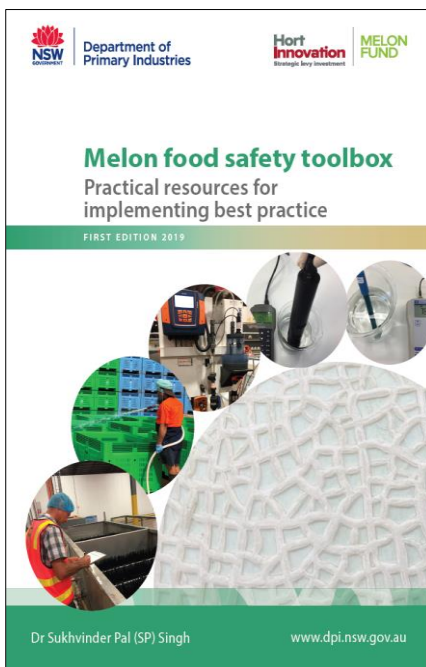
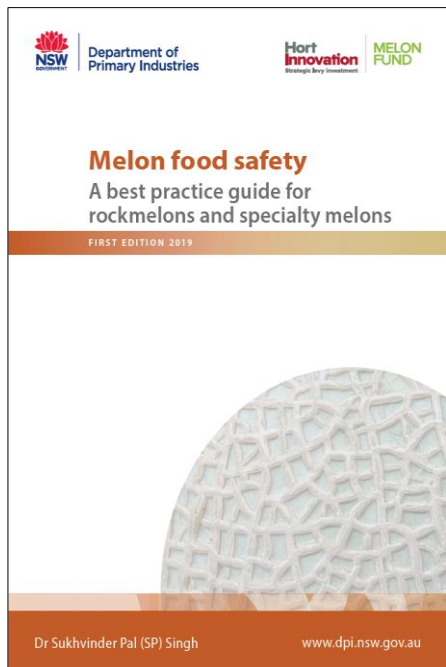
- Microbiological survey report
- Corrective actions
- Practice improvement recommendations
- Industry trends
- Follow-up action plan



Support

Best practice resources

Based on scientific evidence, surveillance and industry practice monitoring



Support



Support

On-site technical capacity building

- Microbiological sample collection
- Digital monitoring of sanitisers
- Optimisation of washing and sanitisation
- Packhouse environmental monitoring



Support

Technical enquiries regularly received from growers, packers, exporters, importers and regulators



Department of
Primary Industries

FOOD SAFETY HELPDESK

ASK THE FOOD SAFETY SPECIALISTS

Learn how to mitigate food safety risks and improve your food safety systems.

Contact Dr S.P. Singh
Phone. 02 4348 1935

Surveillance

Early detection of microbial hazards

Monitoring

Improved industry practice

Effective food safety risk management

Support

A strong food safety culture

Acknowledgements



Australian Government
Department of Agriculture,
Water and the Environment

Growers, packers, collaborators and supporters

Acknowledgements

Laboratory team



Frontline team



Lukas Creek
Field Assistant



Andrew Creek
Development Officer



Dr Amanda Warren-Smith
Development Officer