

A large, modern, curved building with a prominent, illuminated, conical roof structure, likely a library or academic building, is shown at night. The building is lit up, and its reflection is visible in a pool of water in the foreground. The background is dark, with some other buildings and trees visible in the distance.

University of Pretoria **MAKE TODAY MATTER**



Professor Lise Korsten

Co-Director DST/NRF Centre of Excellence Food Security
10 April 2018, SABO meeting at ARC



Microbial contaminants - dynamics in SA

5 Challenges

PLAN FOR ACADEMIC EXCELLENCE IN 2018

Challenge 1: Invest in Human capital - NOW

#Winds of change

AN INTEGRATED ACADEMIC PLAN

Academic excellence at the heart of a student-centred approach

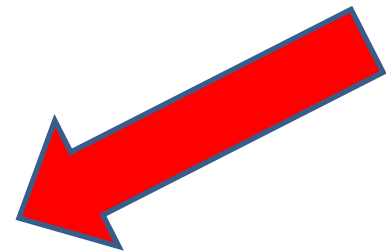
2018 plan for undergraduate and postgraduate students:

- 1. An enabling environment**
- 2. Effective student support environment**
- 3. Staff who demonstrate a student-centred attitude**
- 4. Students taking responsibility for own learning objectives.**
- 5. Transforming the curriculum**

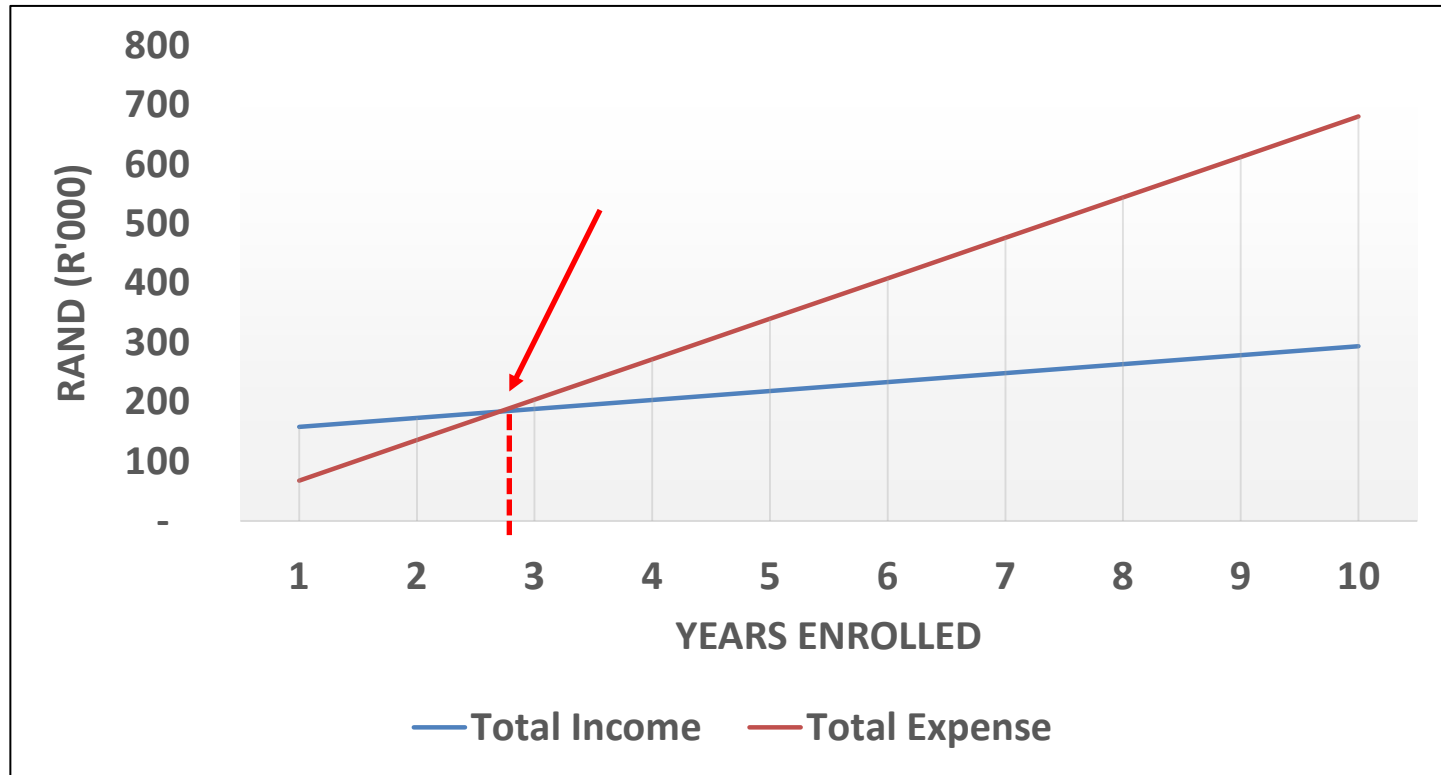
THE STUDENT LIFE CYCLE IN THE INTEGRATED ACADEMIC PLAN

Integration and coordination of functions to support and enhance the student life cycle

1. Student recruitment and enrolment, financial aid, student accommodation, student life
2. Safety and security enabled by smart technologies
3. On-boarding of students - an institutional priority that requires the active involvement of both faculties and support departments
4. Teaching, learning and mentoring support
5. Assessment and graduation support
6. Culture, sport, social and leadership development
7. **Graduate employability and entrepreneurship.**



100% research Masters programme



- Students enrolled for less than 3 years in this programme are 'profitable', thereafter students are enrolled at a 'loss'
- The 'surplus' per student who graduates in two years is **R 37 205**.
- For a student graduating after 3 years, the 'loss' is **R 15 715**
- The average completion time is currently 4 years; the resulting 'loss' per student is **R 68 635**



PLAN FOR RESEARCH EXCELLENCE IN 2018

Challenge 2: Invest in Research for Innovation

#Opportunities

RESEARCH STRATEGY



Working in areas of research
strength,
and

With **strategic partnerships** to
maximise capacity and impact



Aligned with

- UN Sustainable Development Goals
- African Union Agenda 2063
- SA National Development Plan 2030

RESEARCH THAT MATTERS



THEMES THAT MATTER

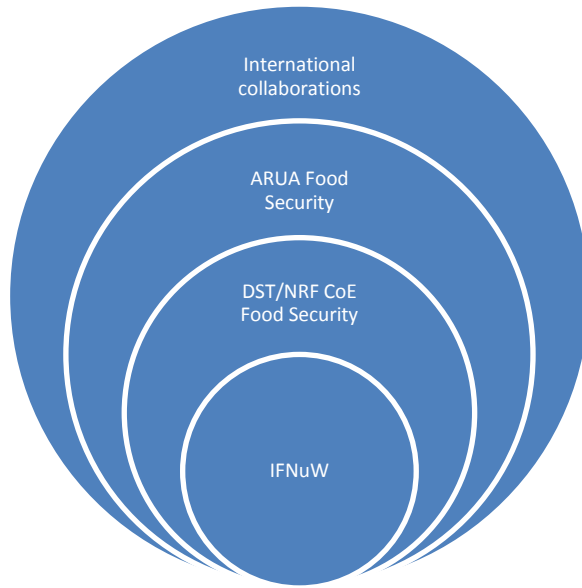
- Plant production and food security
- Human rights
- Heritage and society
- Natural environments
- Health

UP Research Review 2016

<http://archivedpublicwebsite.up.ac.za/ResearchReview2016/mobile/index.html>

RESEARCH PRIORITIES

- **Food security and poverty**
- Health / Genomics
- Data science
- Energy and water
- Governance and sustainable development





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The Future Africa Initiative

*Transdisciplinary Science
Leadership for Innovation*

A novel platform that learns from the most successful programs at UP and leading international institutions to develop large, transdisciplinary and internationally connected research projects, focused on African objectives



Engaged, responsive and making a difference



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PLAN FOR NATIONAL STANDARDS - 2018



Challenge 3: Get involved in national standards writing

#SAFENATIONALASSETS

SABS

SABS Workshop February 2018

GAP	STD	HOW	WHO
Additives in food	No Currently not currently addressed by legislation	FOODSTUFFS, COSMETICS AND DISINFECTANTS ACT, 1972 (ACT 54 OF 1972) Revised in 2015	DOH
Livestock – intake (could be endocrine disruptors Microflora – Growth stimulants	Only test methods. EU Regulation 1831/2003 controls the use of additives in animal nutrition within the European Union. What about South Africa	Act 36 of 1947) and provides for a label of uniform format and composition All compound, supplementary and complementary feeds, concentrates and feed ingredients sold or imported into South Africa must contain a label that conforms to the requirements as set out in regulation 20 to 22 of the legislation	DOH
Endocrine disruptors - to define - influence on medical / population	No Std	DAFF	DOH



	GAP	STD	HOW	WHO
	Biocontrol products, growth stimulants	New standards	Update regulations	DAFF
	Pest resistant chemicals			DAFF
	Nanotechnology in pesticide formulations		Should it be regulated	DAFF
	Nutritional drinks Supplements and drinks Energy Bars	No Product standard but various test methods in place	Std should be developed	SABS / DOH
	Honey	Draft Std was abandoned without interest	Revive get Retailers and Academia on board	SABS
	Banned substances			DOH DAFF NRCS

GAP	STD	HOW	WHO
Crosscutting issues can be addressed in generic stds ie. Sugar, SO2 content, Salt, Fatty acids Who are the regulators ? Stakeholders do not know who to speak to!		Test methods exist for determination – controlled by verification under labelling requirements (ethically labelled)) Section 15 of the Act 54 of 1972	DoH
Food packaging Impregnated films	SANS 933:2007 Corrugated board containers for the export of citrus fruit SANS 1887-9:2008 Tissue paper Part 9: Wrappers for citrus and deciduous fruit	Stakeholders should inform SABS of GAPS, proposals to change the current legislation to include new products should be presented to DAFF / DOH	Stakeholders SABS
Wax coatings for fruit	SANS 1448:2014 Wax emulsion for coating citrus fruit	Stakeholders should inform SABS of GAPS, proposals to change the current legislation to include new products should be presented to DAFF / DOH	Stakeholders SABS

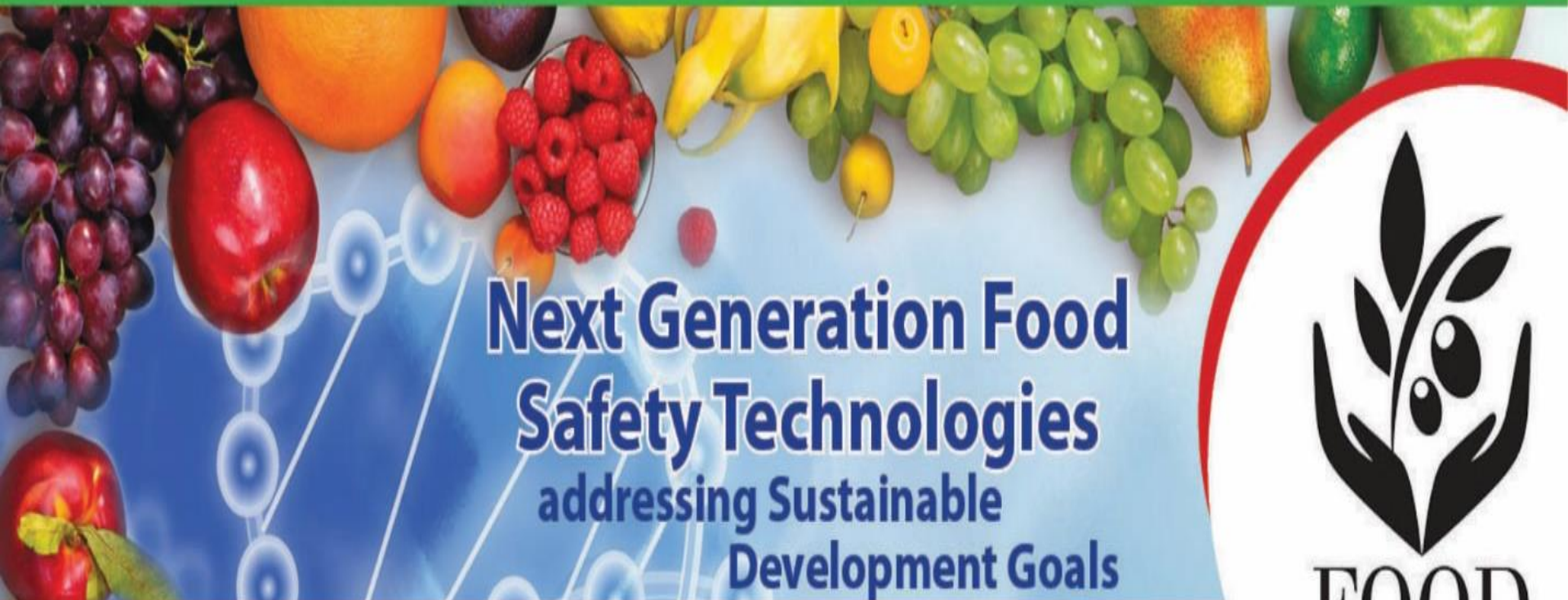
PLAN FOR COMMUNICATION IN 2018



Challenge 4: Attend the International Food Safety for Food Security Conference in Pretoria and present a paper.

#opportunitiestoengage

2nd International Conference for FOOD SAFETY and SECURITY



Next Generation Food Safety Technologies

addressing Sustainable
Development Goals



FOOD
SAFETY&SECURITY

15 - 17 October 2018 - VENUE: St George's Hotel, Pretoria, South Africa

THE FUTURE WE WANT



- Majority of the world's hungry living in developing countries
- Local sustainable solutions to address poverty and inequality in urbanizing spaces
- Food security and food safety are critical issues internationally



I. FOOD AND HEALTH RISK ASSESSMENT

Dr Palesa Sekhejane

CORE ASPECTS

Policy and Governance – Gauteng MEC of Health

Stats and data – STATS SA

One-health, clinical implications and burden of food illnesses - Ampath

Socio-economics of GMOs – Jasper Rees

Industrial implication and mitigation for contamination - Bayer

Systems modeling for food associated risk assessment

Scientific Committee:

Palesa,

Keynote speaker

Gauteng MEC of Health

Guest speakers

Ampath Chair (Lise to confirm name)

Bayer/Novodisc on clinical aspects (Palesa)

Jasper Rees (Lerato)

Palesa

STATS SA (Palesa/Lerato)

2. PESTICIDES AND CHEMICAL FOOD SAFETY

Dr Patrick Njobeh

CORE ASPECTS

Food and health risk assessment

Clinical implications of food contamination – Sarah?

Impact of endocrine disruptors on the food chain -Tian

Mycotoxins in food and feed – Sarah and Patrick

Indigenous knowledge in food safety - Bongi

Food grown in metal-heavy lands – Dr Oberholzer

Scientific Committee:

Patrick, Lizyben, Peter, Ian Du Plooy (Lerato)

Keynote speaker

Prof Sarah De Saeger – Ghent University, Belgium ?

Peter Spongille (Lise) – Developed vs developing countries – Ghent University, Belgium

Guest speakers

Professor Tian de Jager – Endocrine Disruptors

Thilvahle or boss – Pesticide registration

Dr Patrick Njobeh - Mycotoxins

Dr Bongi Mcatha (Lerato) – Indigenous knowledge in food safety

Dr Oberholzer – Heavy metals



3. ANTIMICROBIAL RESISTANCE IN THE AGROECOSYSTEM



Professor Anthony Okoh

CORE ASPECTS

Antimicrobial resistance in water – food nexus -
Anthony

Effect of antibiotics use on agroecosystem, Water, soil
and food resistome – Shirley ?

Effect of antibiotic use on environment resistance –
Andrew (Animal) and Mark (Human)

Next generation and molecular resistance – Adrian

Keynote speaker

Dr Shirley Micallef - Microbial Ecology and Food Safety
University of Maryland, U.S.

Guest speakers

Professor Anthony Okoh – Animal and Water

Andrew (Lerato)

Dr Adrian Brink – Clinical

Dr Mark Nicol – Human Health

Scientific Committee:

German, Anthony, Erika, Andrew (Lerato), Mark

4. BIOSECURITY AND ZOOONOSES

Prof Voster Muchenje

CORE ASPECTS

Meat Safety - Voster

Transboundary zoonoses - Chetty

Pathogen Discovery - UPVets

Epidemiology

Keynote speaker

TBD

Guest speakers

Professor Voster Muchenje – Meat safety

UPVets Zoonoses and ARC Onderstepoort

Dr Chetty – Transboundary Onderstepoort (Lerato)

Onderstepoort (Biltong) - Evelyn

Scientific Committee:
Voster,



5. CURRENT AND EMERGING MICROBIAL FOODBORNE PATHOGENS AND INDICATOR SYSTEMS

Prof Lise Korsten

CORE ASPECTS

Food safety in the agroecosystem, Foodborne pathogen source tracking; virulence profiles - Lise

Public policy on food safety, nutrition and security, application and coherence - Wandile

Risk assessment - Elna

Next generation foodborne pathogen diagnostics - Marc

Bacterial and viral food safety and security policies – Maureen and Gunnar

Keynote speaker

Dr Marc Allard – Next Gen Seq in Food Safety

Guest speakers

Professor Lise Korsten – Bacteriology

Professor Maureen Taylor – Virology

Professor Gunnar Sigge – Food Science

Professor Elna Buys -

Wandile–Policy / McLean (Innovation Hub) – Lerato (Info)

Scientific Committee:

Gunnar, German, Maureen, Marc, Gape, Lizyben, Lerato (Wandile [Policy] Genevieve and Dirk)



PLAN FOR MICROBIAL INTEGRITY IN 2018

Challenge 5: Invest in better understanding of
Microbial dynamics –

#driversofchange

PLAN FOR ACADEMIC EXCELLENCE IN 2018

Big Drivers of Change:

1. Listeria impact
2. Antibiotic resistance
3. Microbial dynamics- microbiomes

#newopportunities



WHO: South Africa's listeriosis outbreak 'largest ever'

2018-01-13 10:00

Derrick Spies, Correspondent



news24

Johannesburg - The World Health Organisation has said South Africa's *Listeria* outbreak, with nearly 750 confirmed cases, is believed to be the largest-ever outbreak of the bacterial disease



Listeria in SA

- 1956 First case
- 1978 14 cases in Joburg over 9 months period
- *Listeria* brain stem encephalitis in Western Cape.
- Between 2013-2016 had average of 16-18 cases per year

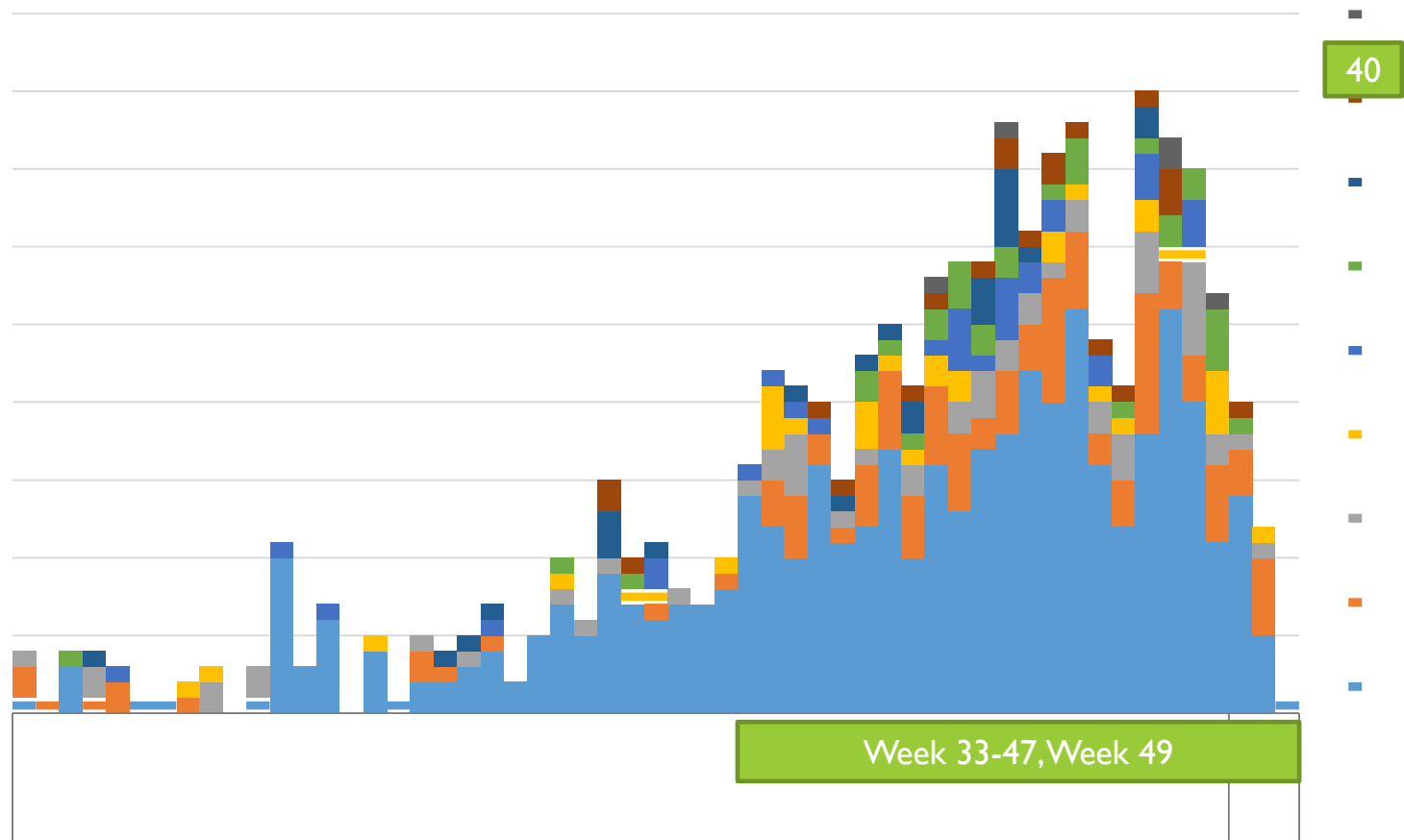


Figure 1: Epidemic curve of laboratory-confirmed listeriosis cases by epidemiological week and date of sample collection and province, South Africa, 01 January 2017 to 16 January 2018 (n=767)

- **34% -50% death rate – Tembisa 63%**
- **Neonatal, mothers and 15-49 yrs**

Timeline of Events: Multistate Outbreak of Listeriosis Linked to Whole Cantaloupes from Jensen Farms in Colorado—United States, 2011

229004-A

Outbreak Identification and Source Implication

September 2
The Colorado Department of Public Health and Environment (CDPHE) notifies the Centers for Disease Control and Prevention (CDC) of seven ill persons with listeriosis (*Listeria* infection) reported since 8/29/11.

September 6
PulseNet defines outbreak strains in CO patients and identifies an ill person in NE and another in TX, each infected with an outbreak strain of *Listeria*. Initial interviews of 7 ill persons in CO with standard CDC questionnaire find all ate cantaloupe. Three ill persons report eating cantaloupe from one region in Southeastern CO ("Rocky Ford").

September 7
CDC begins coordinating the multistate investigation.

September 8
CDC asks states to use the supplemental questionnaire created by CDPHE to learn more about cantaloupe eaten by ill persons. Food and Drug Administration (FDA) begins investigation with initial information collected by CDPHE to identify sources of cantaloupe eaten by ill persons.

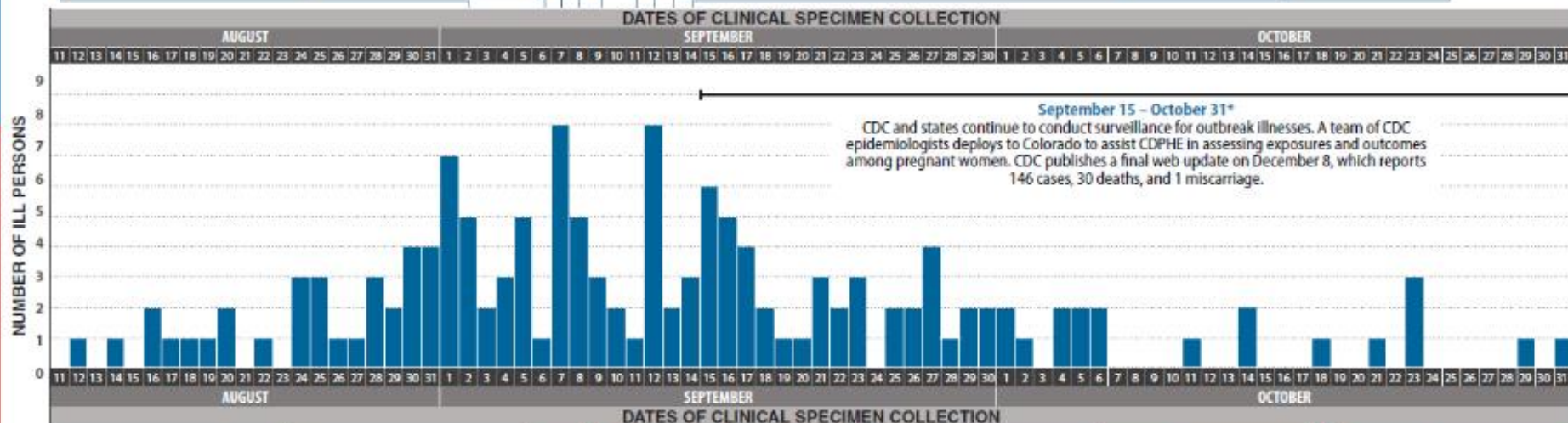
September 9
CDPHE announces that cantaloupes are the likely cause of illness and warns high-risk CO residents not to eat them.

September 11
Preliminary traceback investigation suggests that cantaloupe produced at Jensen Farms was sold at several retail locations where ill persons reported buying cantaloupe marketed as coming from one region in Southeastern CO.

September 12
CDC posts initial web announcement about the investigation, saying that the multistate outbreak of listeriosis is linked to cantaloupes marketed as coming from one region in Southeastern CO, and warning persons at high risk nationwide not to eat them.

September 13
FDA issues a statement that public health officials have discovered that most ill persons consumed cantaloupe purchased whole, most likely marketed as coming from one region in Southeastern CO.

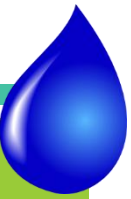
September 14
CDC posts another web update about the investigation, including a warning that the multistate outbreak of listeriosis has been linked to cantaloupes from Jensen Farms.





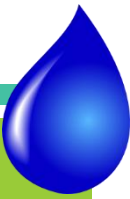
A close-up photograph of several red apples, each with a wooden stick inserted into its top. The apples are arranged on a light-colored wooden surface. The central apple is in sharp focus, showing its glossy red skin and the stick. Other apples are visible in the background, slightly out of focus.

Inserting the stick releases
juice and 'creates a
microenvironment that
facilitates growth of any *L.
monocytogenes* cells already
present on the apple surface.'
(Glass et al., 2015)



AGRICULTURAL WATER

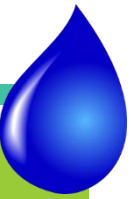




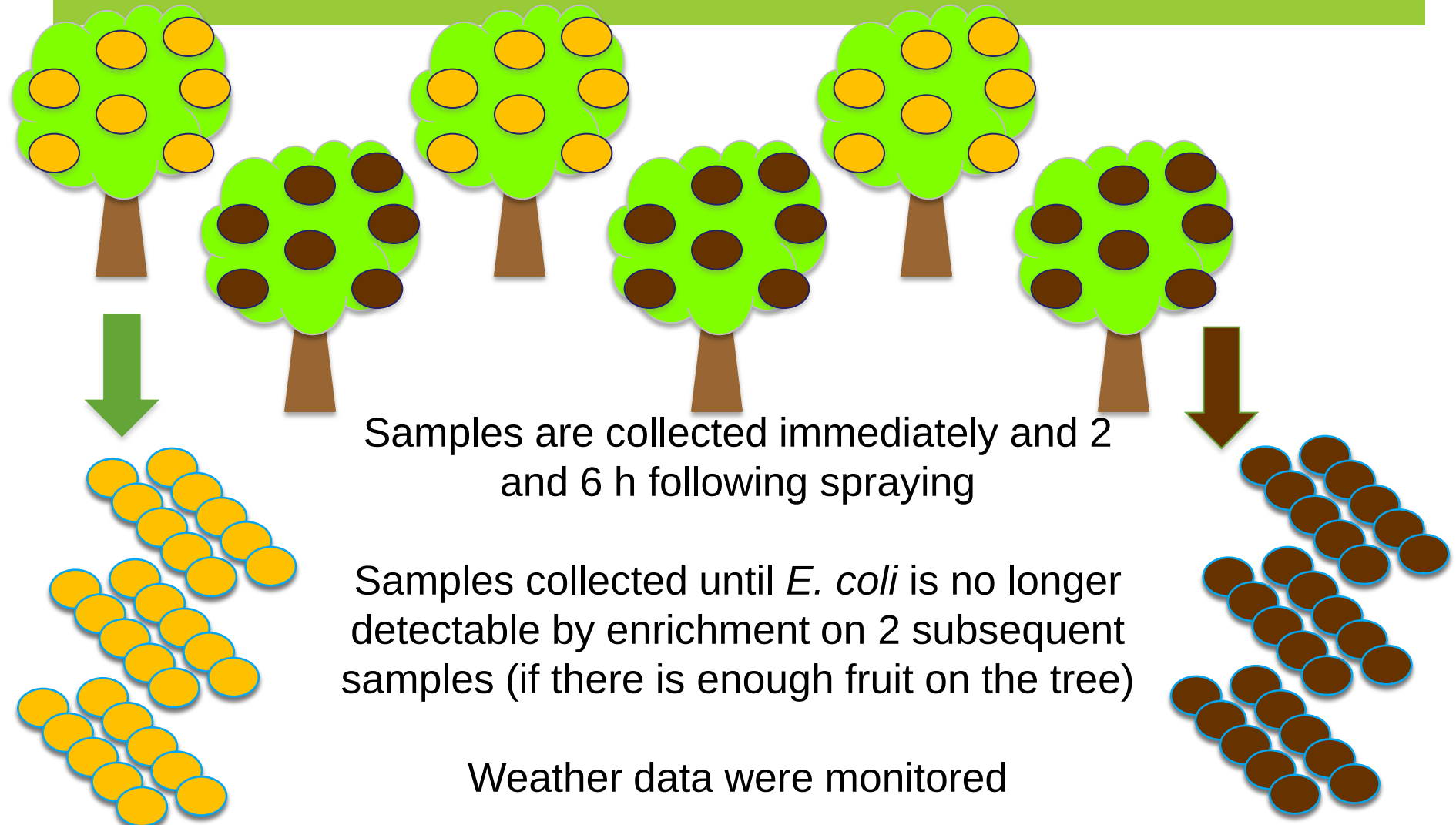
WHAT TO DO IF YOUR WATER EXCEEDS THE US FDA PRODUCE SAFETY RULE

- Corrective Measure 1a:
- Preharvest interval
 - Apply a time interval (in days) between last irrigation and harvest
 - Assume a **die off rate of 0.5 log per day, for up to 4 days**
 - Die off rate can be higher if industry data to support
 - **Target is to reduce count in water to:**
 - <126 *E. coli* in 100 ml geometric mean
 - <410 *E. coli* in 100 ml STV



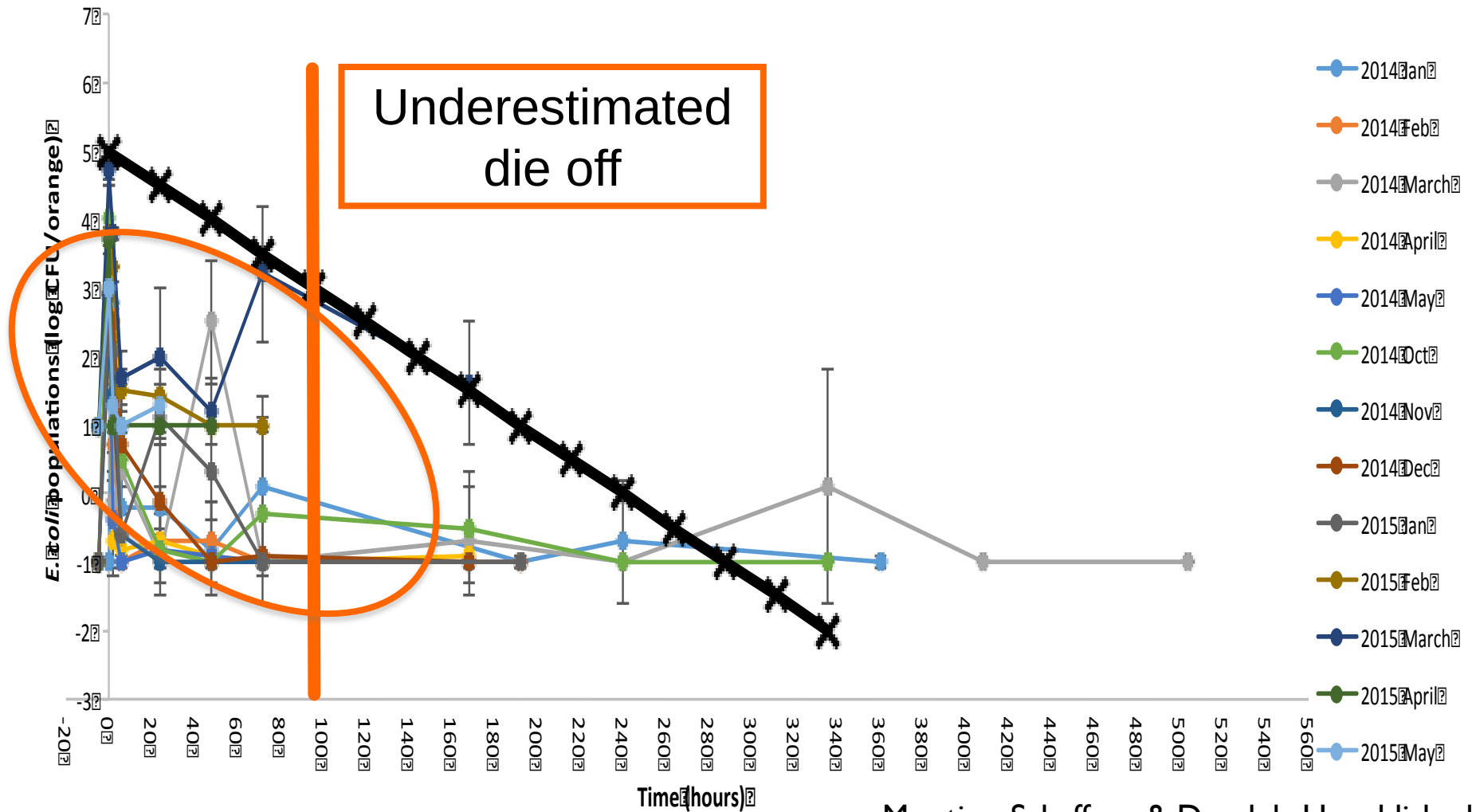


0.5 LOG/DAY DIE OFF?





0.5 LOG/DAY DIE OFF?



2 sewage
farms
upstream



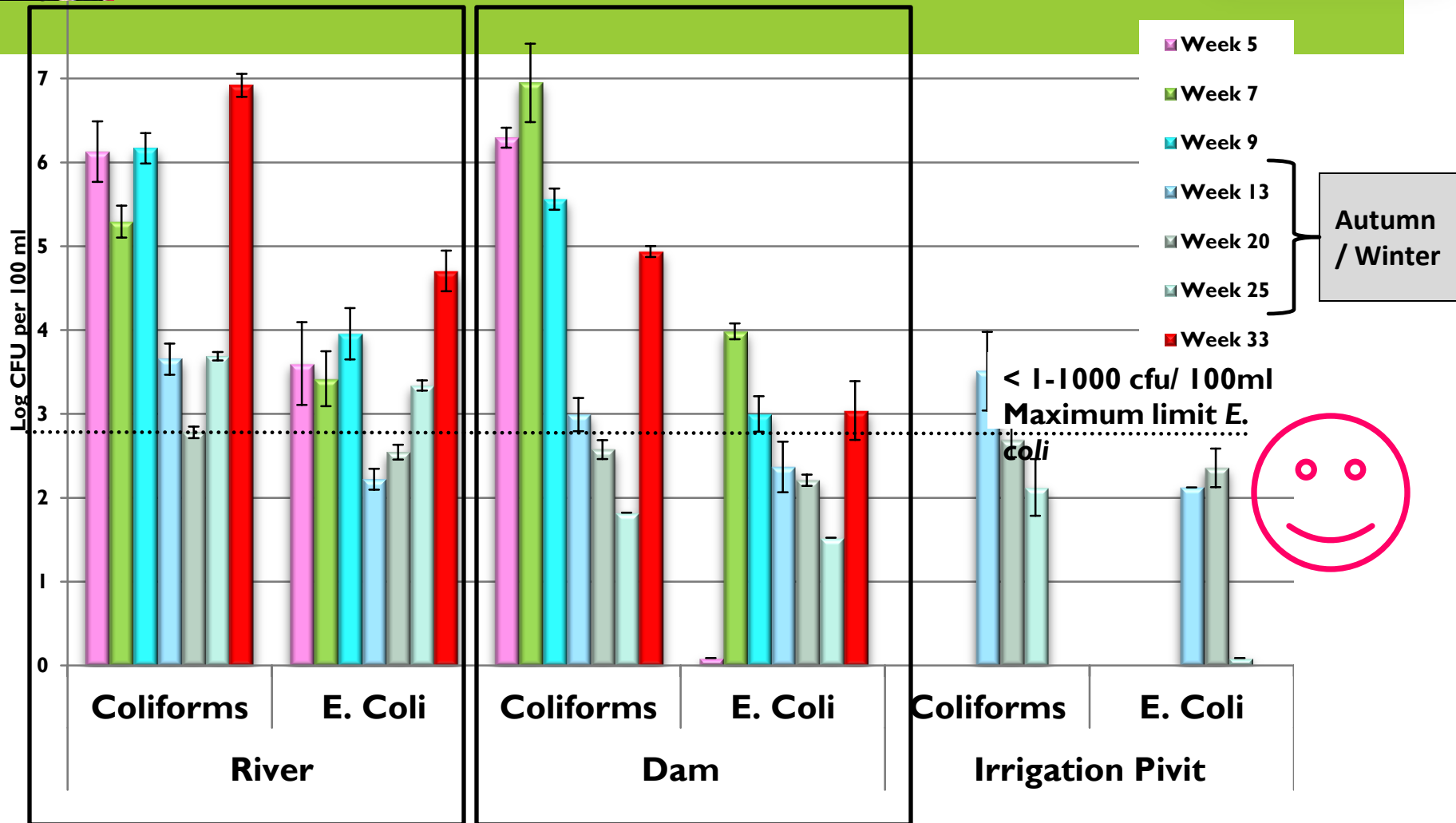
Informal
settlements



Mining
activity



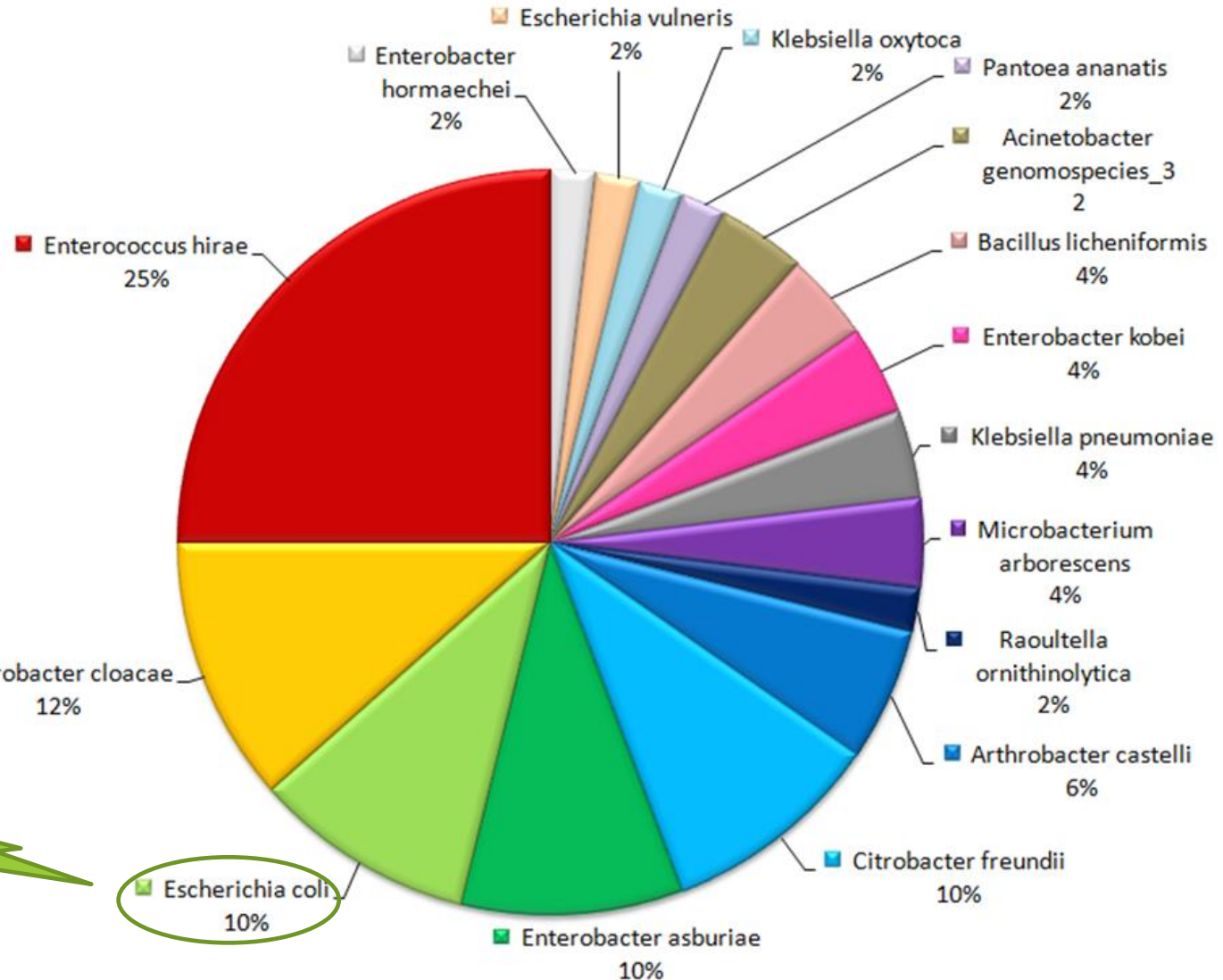
N WATER



Winter coliform and *E. coli* counts in river
Even more so in dams

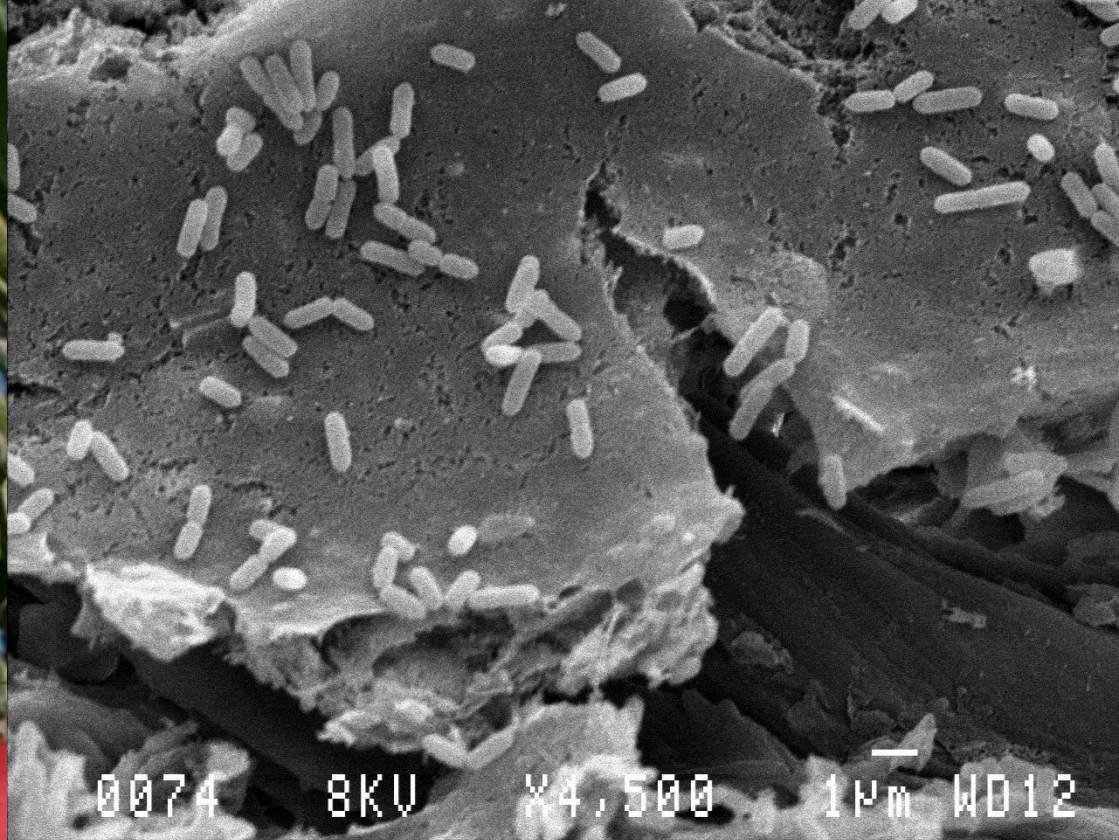
Sample points

Selective enrichment –streaking onto chromogenic media Presumptive pathogen identities confirmed using MALDI-TOF



No *E. coli* O157:H7
No *Listeria* spp.
No *Salmonella* spp

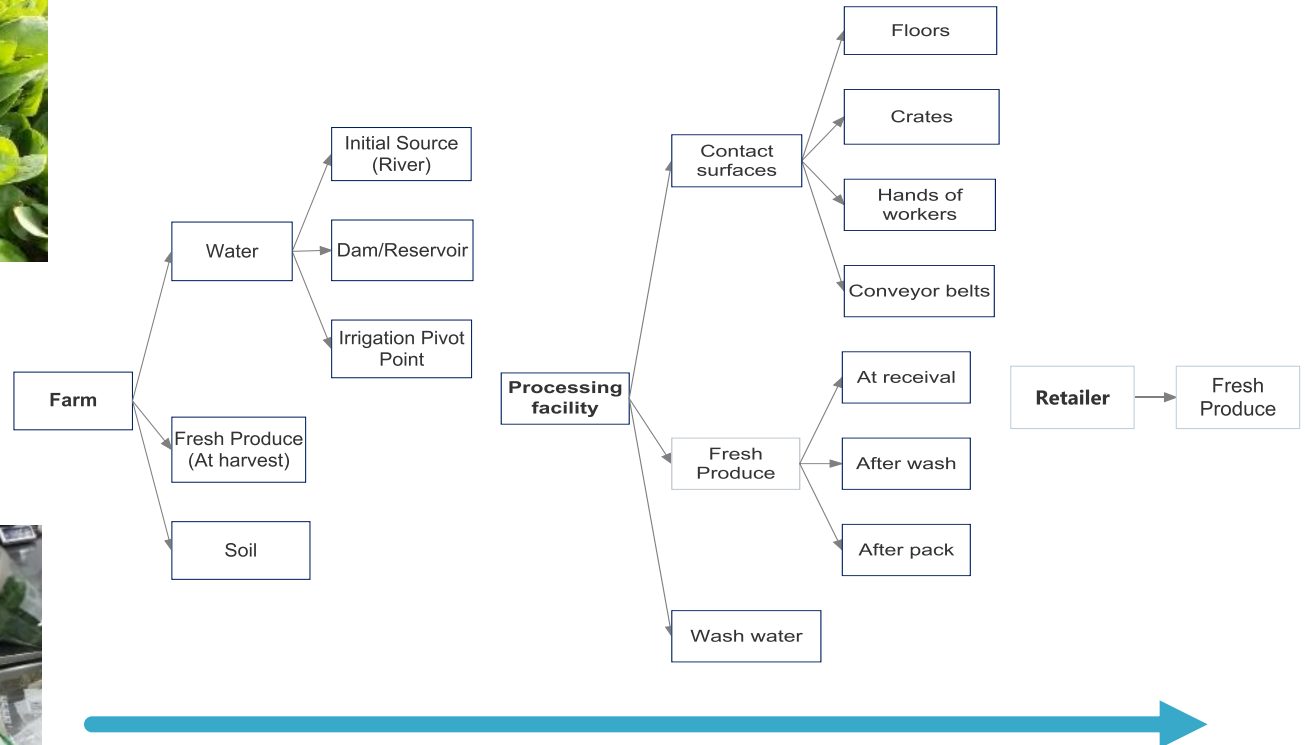
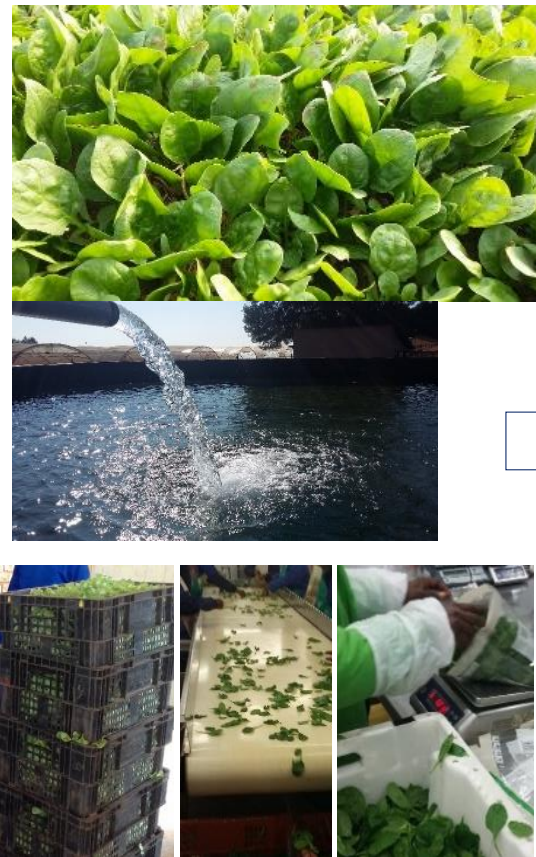
52
isolates



Listeria monocytogenes on apple surfaces

Fresh Produce supply chains (farm to retail)

6 commercial supply chains tested during 2017



900 samples in total

- No *Listeria monocytogenes*;
< 1% *Salmonella* spp.

2017 winter and summer
7 farms and 5 packhouses

Antibiotic resistance



Figure 2: Antibiotic resistance patterns of Enterobacteriaceae isolates from spinach and tomato samples from the formal and informal sector in Gauteng. Isolates that showed resistance to three or more classes were classified as multidrug-resistant.

Listeria monocytogenes in Fresh Produce: Outbreaks, Prevalence and Contamination Levels

[Qi Zhu](#), [Ravi Gooneratne](#), and [Malik Altaf Hussain](#)*

Christopher J. Smith, Academic Editor



Listeriosis outbreaks associated with fresh produce.

Outbreak Location/Year	Deaths/Cases (% Mortality)	Food Vehicle	References
Boston, USA, 1979	3/20 (15)	Raw vegetables	Ho et al. [56]
Nova Scotia, Canada, 1981	17/41 (41)	Vegetable mix for coleslaw	Schlech et al. [57]
Moncalieri and Giaveno, Italy, 1997	0/2930 (0)	Corn	Aureli et al. [13]
Texas, USA, 2010	5/10 (50)	Chopped celery	Gaul et al. [30]
Colorado, USA, 2011	33/147 (22)	Whole cantaloupes	CDC [54]
Colorado, USA, 2011	15/99 (15)	Lettuce	Shrivastava et al. [55]
Illinois and Michigan, USA, 2014	2/5 (40)	Mung bean sprouts	Garner and Kathariou [58]
California, USA, 2014	1/32 (3)	Caramel apples	CDC [5]
Ohio, USA, 2016	1/19 (5)	Packaged salads	CDC [50]

FOOD CONTROL AUTHORITY IN SA?

