

**FRESH PRODUCE  
SAFETY CENTRE**

**AUSTRALIA & NEW ZEALAND**

FOUNDING PARTNERS



THE UNIVERSITY OF  
**SYDNEY**



**FRESH  
PRODUCE  
SAFETY  
CONFERENCE  
11 AUGUST 2022**

PROMOTING SKILLS,  
SCIENCE, SYSTEMS  
AND STANDARDS

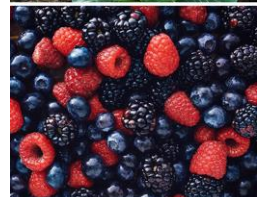


# Interpreting and responding to Microbiological Test Results



# Kashif Ahmed

- National Microbiology Manager - Symbio Laboratories
- Technical and operational management of laboratories for the analyses of Food, Dairy, Meat, Water, Soil, Agricultural, Therapeutic and Environmental samples.
- Microbiology Innovations, Commercial labs set ups & mergers, ISO-17025 Quality Management system and process optimization.
- Authorized Analyst for Department of Health Victoria and a NATA Technical Assessor.



# Interpreting Microbiological Test Results



- **Food Spoilage Indicator Microorganisms**
- **Food Pathogens (Minor and Major Pathogens)**
- **Quantitative Microbiology Analyses**
- **Qualitative Microbiology Analyses**
- **Product Limits and Limit of Reporting (LOR)**
- **Use of Microbiology results (Product release & Shelf life)**

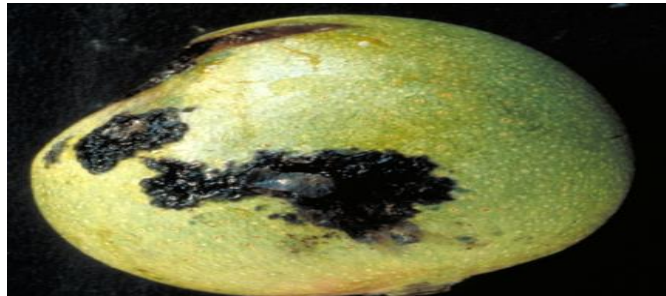


# Food Spoilage: Indicator Microorganisms

- Causes product deterioration
- Develop unpleasant odours, tastes and textures

## Examples:

- Standard Plate Count
- Yeast & Mould
- Coliform
- *Enterobacteriaceae*



# Food Spoilage: Pathogens

- Causes food borne illness
- May lead to hospitalisation or deaths

## Examples:

- *Salmonella*
- *Listeria*
- *Campylobacter*
- *E.coli* STEC
- *Bacillus cereus*
- *Coagulase Positive Staphylococci (S.aureus)*



# Food Spoilage: Major & Minor Pathogens



Illness caused by "**major**" pathogens is severe and life threatening in some cases.

## "Major" Pathogens include:

*E.coli* STEC, *Salmonella*, *Listeria*, *Vibrio* and *E.sakazakii* etc.

## "Minor" Pathogens include :

*Bacillus cereus*, *Stapylococcus aureus* & *Pseudomonas* etc.



# Microbiology Quantitative Analyses

## Examples:

Standard Plate Count

*Coliform* / *E. coli* Count

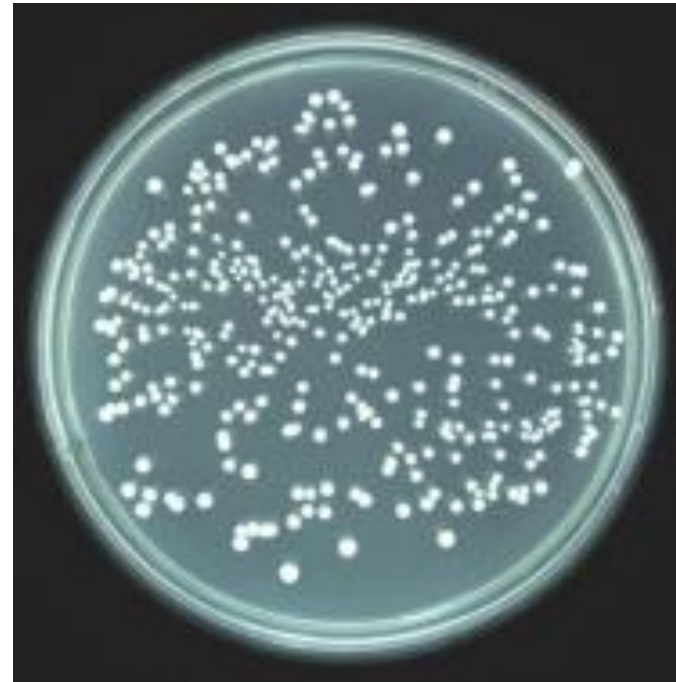
Yeast and Mould Count

*Listeria monocytogenes* count

## Result Format:

<10 CFU/g,  $10^5$  CFU/g

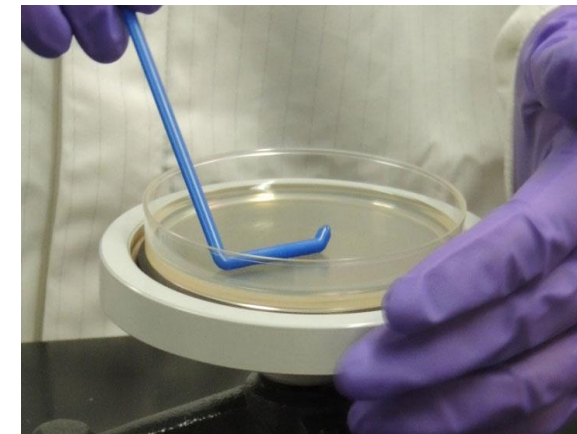
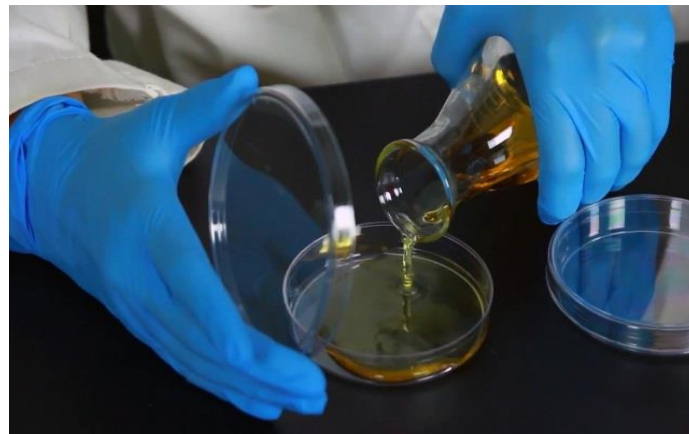
CFU - Colony Forming Unit





# Microbiology Quantitative Analyses- Principle

- Incubation 24 to 48 hours - Most tests are completed within 24 hours
- Limit of Reporting (LOR)  $<10$  or  $<100$
- Common Techniques are Petrifilm, Pour plate, Spread plate and MPN



# Microbiology Qualitative Analyses

## Ref: ISO 16140-1:

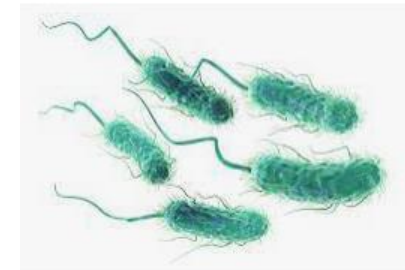
Method of analysis whose response is that the analyte is either **Detected** or **Not Detected**, either directly or indirectly in a specified test portion

## Examples:

Salmonella, Listeria, Listeria monocytogenus, Vibrio, E coli O157, STEC

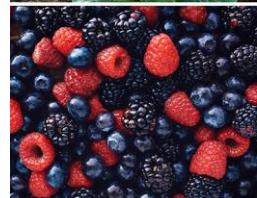
## Result Format:

Detected / Not Detected, Positive/Negative, Absent/Present



# Microbiology Qualitative Analyses- Principle

- Most analyses-must have enrichment of test amount (e.g. 25 g)
- 24 hours to 48 hours enrichment step - to grow targeted pathogen.
- Mostly requires specific Instruments (Analyser)
- Negative Result is confirmed Negative
- Positive Result – Presumptive Positives – requires further confirmatory test.



# Application of Product specifications

Compendium provides information on:

- Microorganism significant to food safety
- Microbiological criteria for food safety management

- Developed by experts from FSANZ, Consultants and Industry
- Support decision-making based on microbiological testing

 **FOOD STANDARDS**  
Australia New Zealand  
Te Mana Kounga Kai – Ahitereiria me Aotearoa



Compendium of  
Microbiological Criteria  
for Food

March 2022



# Product Limits and Limit of Reporting (LOR)



Product Limits are specified by Regulatory bodies.

## For example:

Result (cfu/g)		
Satisfactory	Marginal	Unsatisfactory
$< 10^3$	$10^3 - <10^5$	$\geq 10^5$

Limit of  $< 1000$  CFU/g means:

“**Satisfactory**” Test result should be  $< 1000$  CFU/g.

1000-100000 CFU/g is considered as “**Marginal**”

$> 100000$  CFU/g is considered as “**Unsatisfactory**”



# Product Limits and Limit of Reporting (LOR)



- Limit of Reporting (LOR) is based on test sensitivity.
- Depends on Test Technique

Testing Technique	Volume Platted	Dilution	LOR
Spread plate	0.1 mL	100	<100 CFU/g
Pour Plate	1 mL	10	<10 CFU/g
Petrifilm	1 mL	10	<10 CFU/g

- Coliform – Indicator bacteria <10 CFU/g
- Bacillus cereus-Toxin producing pathogen <100 CFU/g



# Application of Microbiology Results

- Microbiology test results for product release are based on product specifications
- Limit of Reporting (LOR) is Product specification
- Reasonable Count of Indicator Microorganisms
- Shel Life Trials – count at Time Point e.g. on Day 10 of Total Shelf Life of 12 days (Marginal Result)

## ***Bacillus cereus***

Bacillus cereus may cause foodborne illness. Bacillus cereus spores can survive heat processing and germinate again.

## ***Bacillus thuringiensis***

Soil borne bacterium used in natural insect control (pesticide). *Bacillus thuringiensis* contains protein crystal. Ask lab to further differentiate.

