



CLEANING

FOR ALLERGEN MANAGEMENT

Malcolm Swalwell
Ecolab ANZ Food and Beverage

FAMS2019: 3rd Food Allergen Management Symposium

Agenda

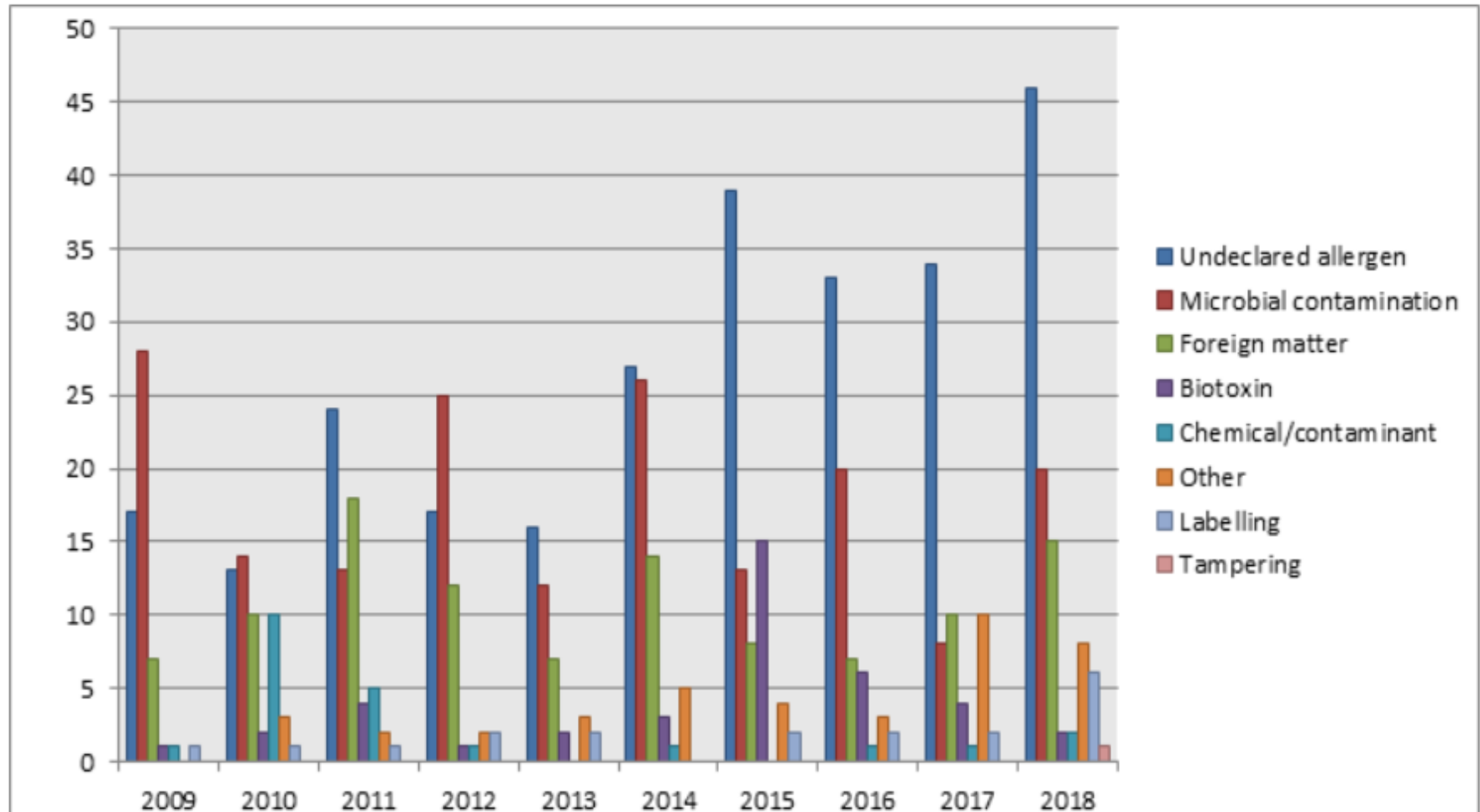
- Holistic view of process and plant to manage allergen risks in food manufacturing
- Cleaning program theory and practical applications
- Food processor case studies

Goals of session:

1. Identify common allergen management challenges addressed through cleaning
2. Emphasize cleaning as part of an allergen management strategy

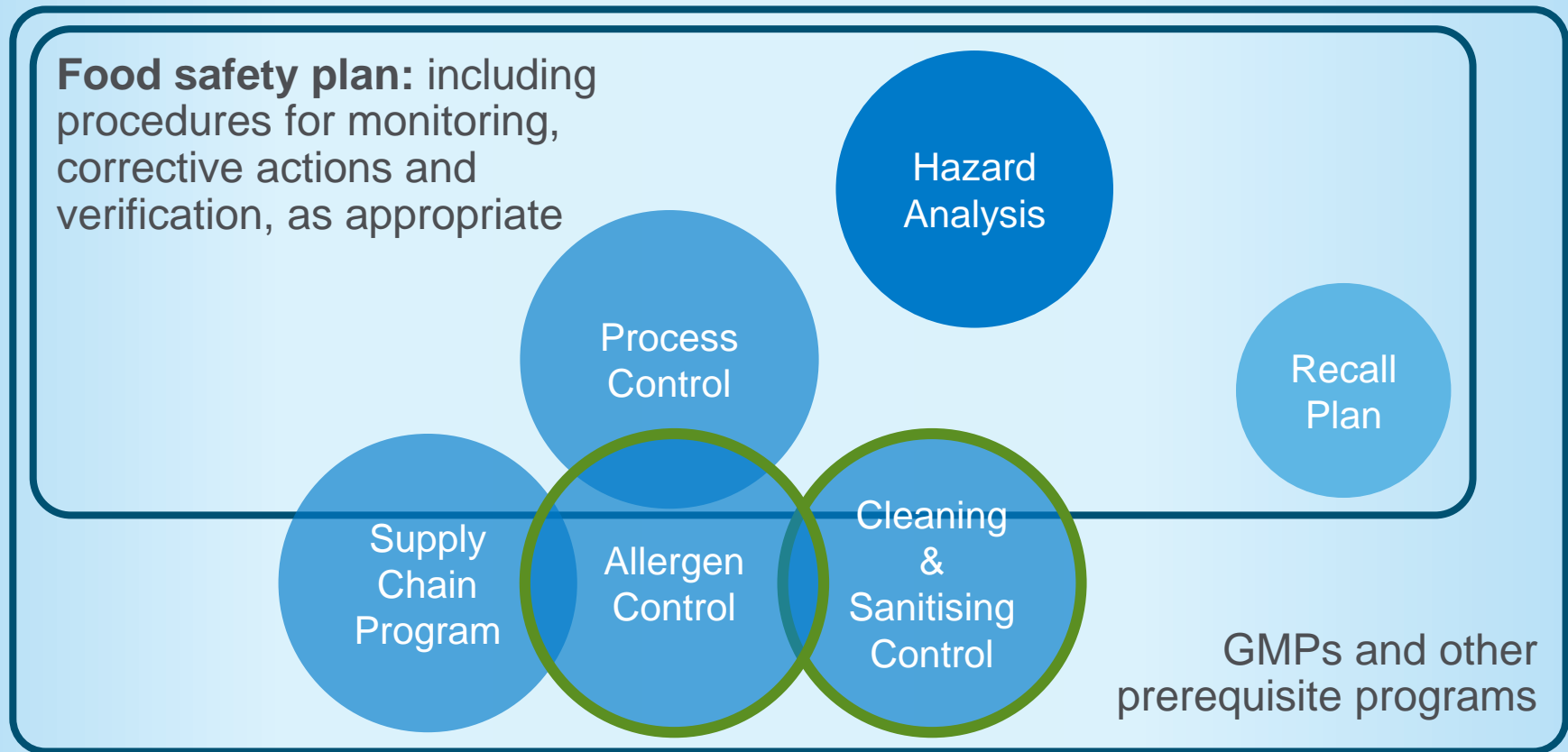
FSANZ-Coordinated Food Recalls

Figure 2: Number of food recalls coordinated by FSANZ each year, shown by recall classification, between 1 January 2009 and 31 December 2018.



Source: <http://www.foodstandards.gov.au/industry/foodrecalls/recallstats/Pages/default.aspx>

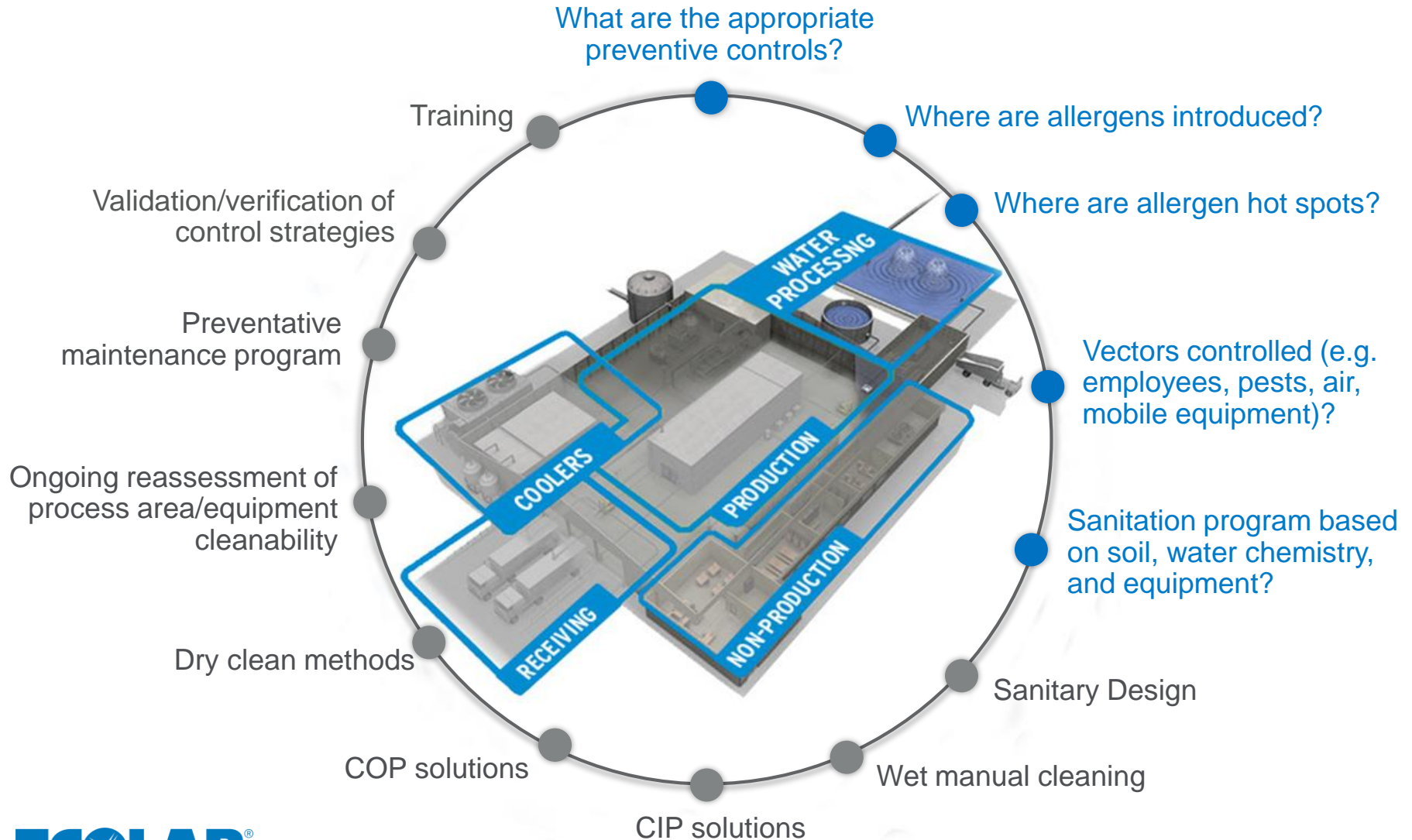
Effective cleaning is one component of an overall food safety plan to manage allergens



Food Safety Preventive Controls Alliance

Cleaning controls need to be considered as an essential part of a manufacturer's food safety plan.

Managing allergens through cleaning-based preventive controls requires a holistic look at the entire plant



Effective *cleaning* is required for allergen management

Cleaning

Process of removing soil
(e.g. proteins = food allergens)

Sanitising

Process that kills microorganisms
remaining after cleaning

**Production
Equipment
Inspection**

**Master Sanitation
Program with
scheduled routine
cleaning**

**Sanitation
Standard
Operating
Procedures
(SSOPs)**

**Personal
Protective
Equipment
(PPE)**

**Cleaning
Tools and
Equipment**

**Operator
Training**

Effective *cleaning* is required for allergen management

1. Sanitation Prep
2. Pre-Rinse
3. Wash
 1. Concentration
 2. Temperature
 3. Time
 4. Mechanical Force
4. Rinse, Inspect, Verify
5. Remove Water & Assemble
6. Pre-Op Inspection
7. Sanitise

SANITATION PROCESS

Effective *cleaning* is required for allergen management

1. Sanitation Prep
2. Pre-Rinse
3. Wash
 1. Concentration
 2. Temperature
 3. Time
 4. Mechanical Force
4. Rinse, Inspect, Verify
5. Remove Water & Assemble
6. Pre-Op Inspection
7. Sanitise

- Remove all Ingredients, Product and Packaging.
- Gross Soil Removal.
- Pre-Rinse Not Too Hot!
- **Foam** from Bottom to Top.
- Do Not Allow Foam to Dry.
- Scrub with Colour Coded Pads/Brushes.
- Separate **CIP/COP** Solutions.
- No Short Cuts!
- **Rinse** from Top to Bottom.
- Visually Inspect.
- **Validate/Verify** Analytically.
- **If Reassembling:** Use clean outerwear, wash & sanitise hands. Inspect & sanitise inaccessible parts/areas before reassembly.

Throughout the sanitation process, be aware of allergen hot spots

Harborage areas that lead to incomplete cleaning & sanitising or opportunities for cross-contact:

PM= Preventative Maintenance

Neglected inspections, maintenance (no PM program)

Shared solutions, equipment and/or parts (re-work, C&S)

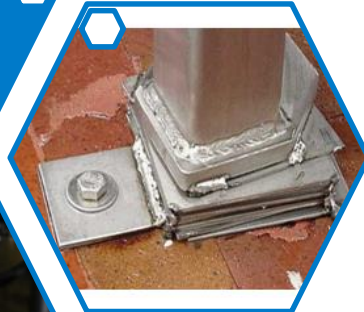
Poor sanitary design

Hard to reach/ clean

Incomplete, temporary repairs

Wear & tear, worn out equipment (age, use, chemistry)

C&S = Cleaning and Sanitising



Selecting the Right Detergent

5 KEY FACTORS TO OPTIMIZE PERFORMANCE

Match the detergent to the nature of the **SOIL**

Match the detergent to the **WATER** properties

Optimize compatibility with the **SURFACE**

Match the detergent with the **METHOD** of application

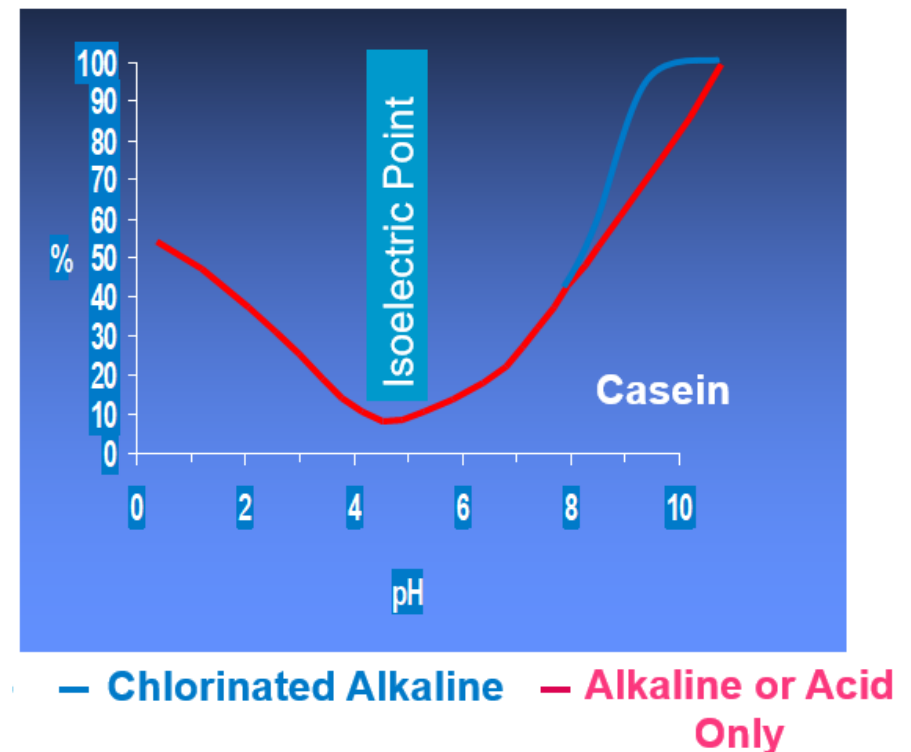
Meet **ENVIRONMENTAL** guidelines

Talk to your cleaning chemical provider!

Protein Soil = Allergens (Detergent components - What works best)

- Alkaline or Acid (?)
 - Hydrolyses proteins
- Oxidizing Agent – e.g. chlorine, peroxide donor
 - Alkaline hydrolysis booster
- Enzyme (protease)
 - Catalyst for protein hydrolysis

Solubility of Protein



Protein Structures

NATIVE PROTEIN CONFIGURATION



HEAT &/or pH



DENATURED PROTEIN



The unfolded structure is more likely to combine with other molecules, including other proteins (which leads to irreversible, large protein coagulation) due to increased binding site exposure.

Soil tenacity is increased when denatured proteins combine with minerals for the same reason.

Chemistry of Cleaning

SOIL TYPE

Fats & Oils	Carbohydrates	Proteins	Minerals
-------------	---------------	----------	----------

MODE OF ACTION

Dissolve	Liquefy	Hydrolyze	Disperse	Emulsify
----------	---------	-----------	----------	----------

CHEMISTRY

Alkaline	Acid	Oxidizer	Enzyme	Solvent	Surfactant
----------	------	----------	--------	---------	------------

- Food processing soils are typically a mixture of soil types
- Soil characteristics vary depending on factors such as processing temperature or time
 - e.g. Heat-affected versus ambient/cold process, dairy-based soiling
- Built cleaners better address complex soil challenges.

Talk to your cleaning chemical provider!

Dry Cleaning: 101

- ▲ Basic Rule of Thumb: If the environment is dry, keep it dry.
- ▲ If **any** moisture is introduced into or forms in a dry area at any time, having a method that **quickly and thoroughly removes/dries** this moisture is an absolute necessity.
- ▲ Sweeping
- ▲ Brushing / Scraping
- ▲ Vacuuming
- ▲ Detergent Wipes?
- ▲ ***Compressed air blowing and/or blasting not recommended – spreads soil around, not contained or captured.***



CASE STUDY #1: Allergen cross-contact during cleaning, ineffective COP

SCENARIO

- Dedicated cookie dough production lines for allergen and non-allergen
- Some equipment/parts cleaned COP
- All lines met “visibly clean” criteria
- Routine swabbing conducted:
 - allergen-specific ELISA on allergen production line—passed
 - ATP on non-allergen line—passed

CHALLENGE

- QA positively identified allergens from non-allergen finished product during routine testing

ROOT CAUSE

- Some equipment/parts did not fit into COP tanks resulting in incomplete cleaning
- Parts from all processing lines were cleaned in the same tank reusing detergent presenting cross-contact opportunities

CORRECTIVE ACTION & VERIFICATION

- A new tank was ordered that properly fit the equipment and parts
- Allergen and non-allergen parts/equipment were cleaned at different times using fresh detergent and rinse water or in dedicated tanks
- Non-allergen parts were routinely tested with ELISA tools in addition to ATP



CASE STUDY #2: Common challenges: CIP program not re-validated after modification; CIP rinse time shortened to accommodate schedule

SCENARIO

- Large surge in demand for milk products put strain on plant capacity
- Additional production lines for new products added utilizing existing CIP system
- Required significant additional piping
- Due to time constraints, CIP program not re-validated
- Return taking a long time to reach appropriate temperature
- CIP wash steps shortened to ensure production started in timely fashion

CHALLENGE

- Quality group positively identified allergens in non-allergen finished product through routine testing

ROOT CAUSE

- Ingredient change as new production lines added (allergens)
- CIP program not optimized for new soils
- New piping added making it difficult for appropriate cleaning and temperatures to be achieved in desired time
- CIP rinse step shortened!
- Process modified. Impacted efficacy of control measures without re-validation

CORRECTIVE ACTION & VERIFICATION

- Production stopped
- CIP program optimized for new soils, re-validated and 3DT CIP implemented for continuous monitoring
- Plant validation team expanded to include Quality and Sanitation managers (vs. only Engineering)

CASE STUDY #3: A disconnect between corporate and the plant

SCENARIO

- Ice cream plant CIP lead shared concerns of *Listeria* spp. potential
- FDA reports of ice cream positive Lm in news
- Discussion and review of CIP program, validation & verification ensued

CHALLENGE

- Conveyed periodic issues of peanut butter found in pipes
- Only raised concerns of *Listeria* spp.
- Consequence of peanut butter not realized!

ROOT CAUSE

- Corporate team performed validation (ideal situation, process, etc. and different formulation)
- New ingredient introduced (peanut butter) without re-validation
- Ineffective CIP cleaning
- Verification didn't occur once in production
- Employee not trained on chemical vs. microbial hazards. Not empowered to raise possible risks

CORRECTIVE ACTION & VERIFICATION

- Holistic view of cleaning and sanitation was emphasized as follow up
- Ecolab specialists, Corporate, Plant
- Gap in plant personnel training and empowerment addressed

- ✓ Train employees and emphasize a food safety culture
- ✓ Empower employees to raise possible risks
- ✓ Re-validation may be required when there are process modifications that impact efficacy of control measures: change in equipment, new ingredients / products / soils and change in chemistry

Summary

- The risk to food manufacturers of having allergens detected in products is increasing.
- The removal of allergen-containing soils is critical.
- This is best managed through documented Food Safety Plans.
- Different food types and processes influence the choice of cleaning regimes.

Allergen risks to food manufacturers can be mitigated through the use of cleaning programs that have been validated for allergen removal and are verified, monitored and amended as required on an ongoing basis.

Effective cleaning is one component of an overall food safety plan to manage allergens.