CLEANING AND VERIFICATION TO AVOID CROSS-CONTAMINATION

Deb Smith – Global R&D Manager, Vikan

Peter Littleton – Technical Services Manager, Holchem

Cleaning and disinfection - definitions

- Cleaning
  - The removal of materials to a level where the surface appears visibly clean
  - Cleaning removes the majority of debris from a surface

- Disinfection
  - The application of chemicals or heat to destroy micro-organisms
  - Thermal and chemical disinfection may change the structure of any remaining organic matter to the extent where it cannot be detected via sample analysis. Important with regard to allergens, species etc..

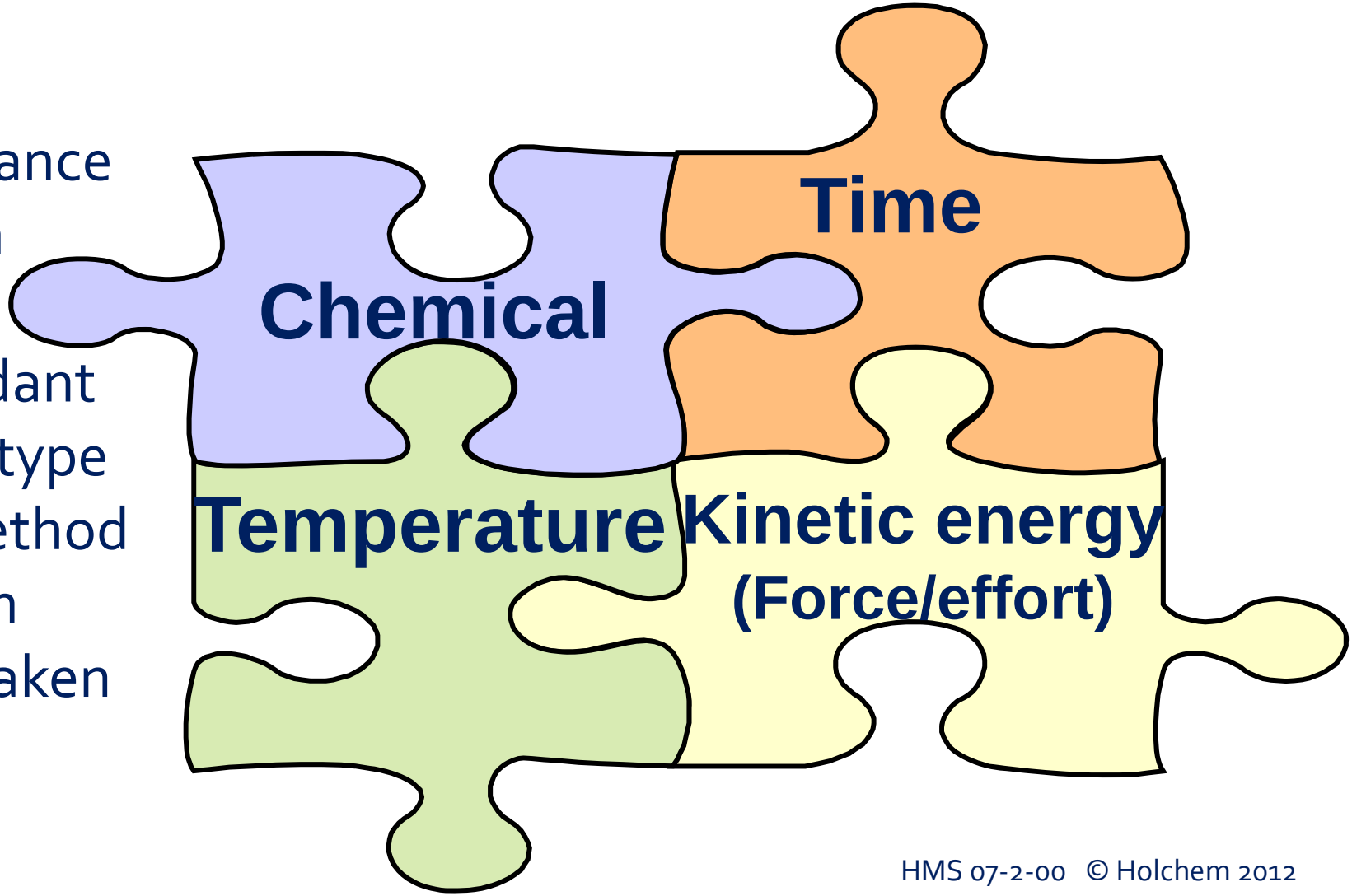
  - Sanitisers are substances that simultaneously clean and disinfect.[

Why Clean?

- Prevent product cross-contamination by
  - Microbes
  - Other product residues (including allergens and species)
  - Chemicals
  - Non-product related foreign matter
- Legal requirements
- Brand/business protection
- Discourage Pests
- Health & Safety
- Production Efficiencies

Cleaning 101 - all cleaning involves…

The importance of each varies dependant on the type and method of clean undertaken



Types of cleans

Risk of cross-contamination following

- Interim cleans
- Product changeover
- Daily cleans
- Periodic or deep cleans

Cleaning Methodology

Developed over time by a site and influenced by:

- Product type
- Equipment to be cleaned
- Risk assessment
- 3rd party advice
  - Species verification at 1% - currently set by FSA
- Historical issues – horse meat incident
- Customer demands – increased

Cleaning Methodology

Designed to ensure required results are achieved

- Manual cleans
- Chemical cleans
  - Foaming
  - CiP
- Mechanical cleans
  - Tray/rackwash

Manual Cleaning

Requires

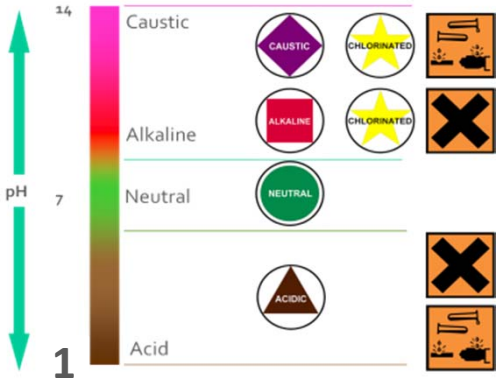
- Appropriate cleaning equipment
- Appropriate cleaning chemicals
- Trained staff
- PPE
- Time
- Effort (gross debris removal, scraping, scrubbing, wiping, rinsing etc..)

Manual cleaning - equipment

Manual cleaning – Chemicals

Choose to suit

- Soil to be removed
- Equipment to be cleaned
- Occupational exposure risk to the staff using them
- Compatibility with the cleaning equipment used
- Desired level of clean
  - Detergent
  - Sanitiser



Manual cleaning – Staff

- People are a vital part of manual cleaning
- Staff should be trained in the use of the chemical and cleaning equipment to be used
- PPE – gloves, goggles, apron, as appropriate
- Conscientious - time and effort required

Manual cleaning – spread of contamination

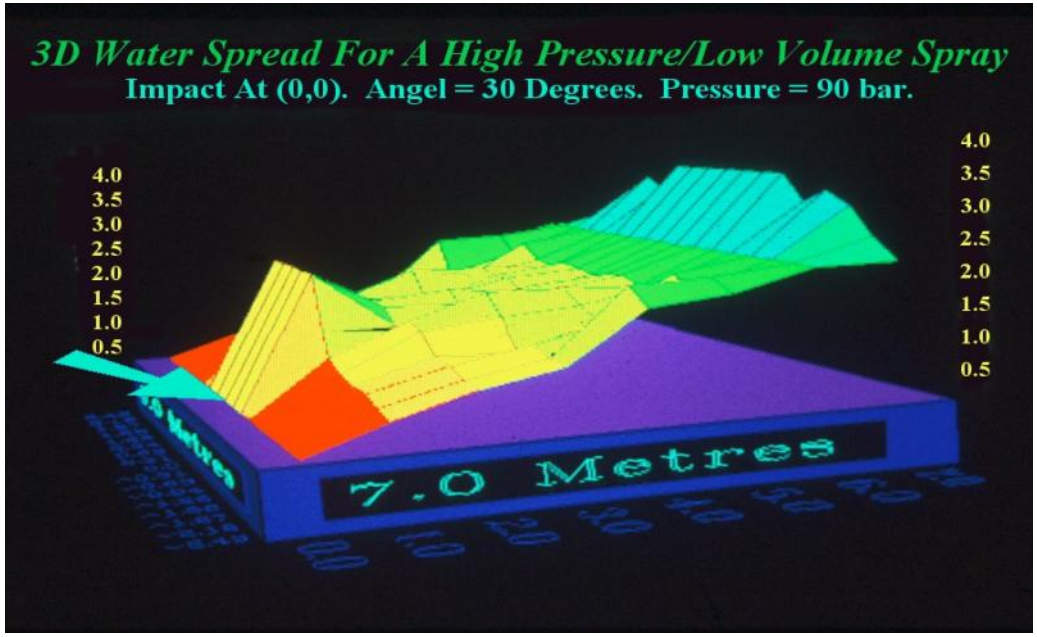
The action of cleaning can spread contamination

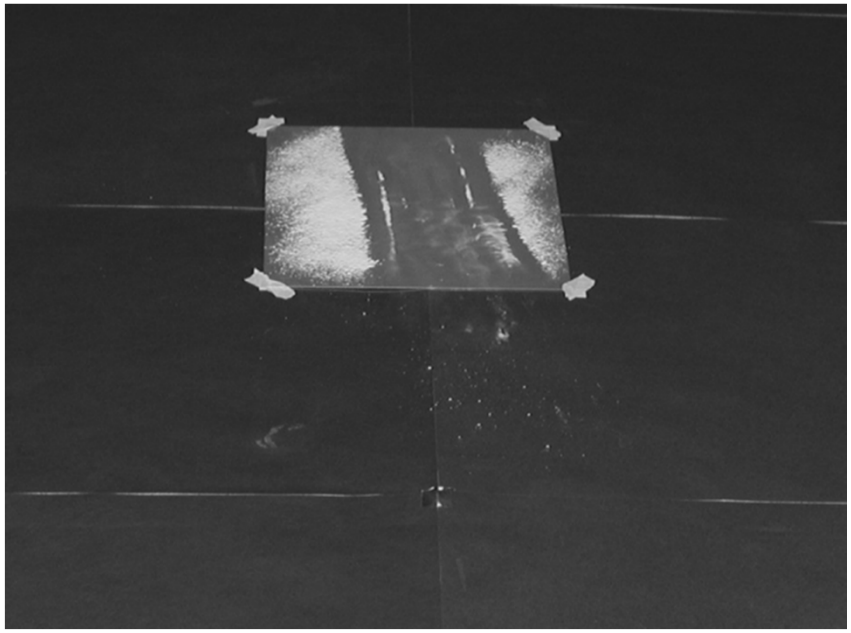
Microbial counts in air after different cleaning activities (Camdpen BRI)

Activity	Total viable count/m^3	Yeast and mould/m^3
Floor cleaning	1383	307
Equipment cleaning	1192	318
Waste disposal	488	95
Tray washers	383	58
Non-production	107	25

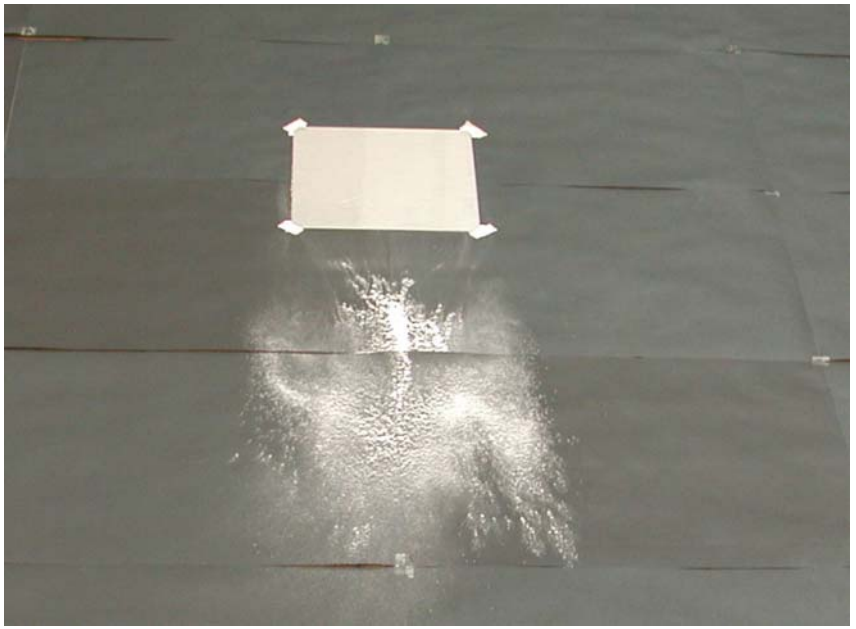
Manual cleaning – spread of contamination

Wet cleaning

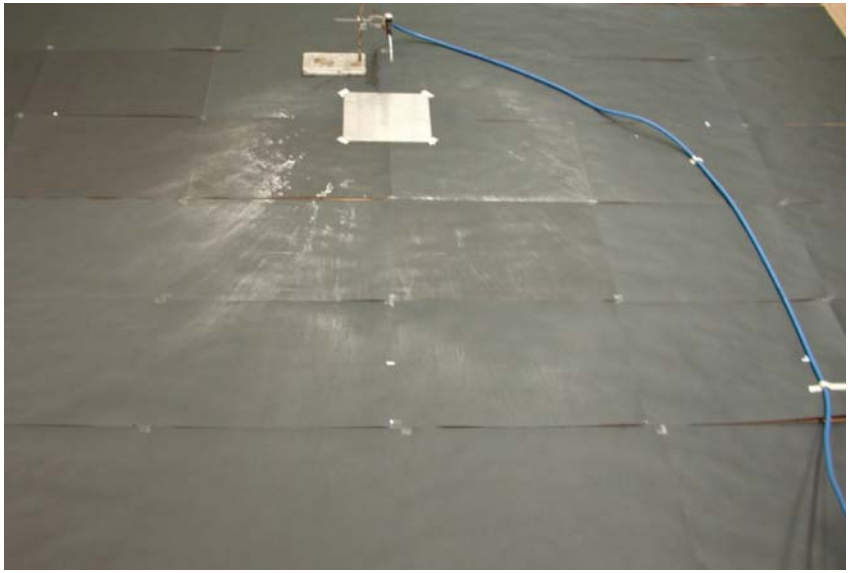




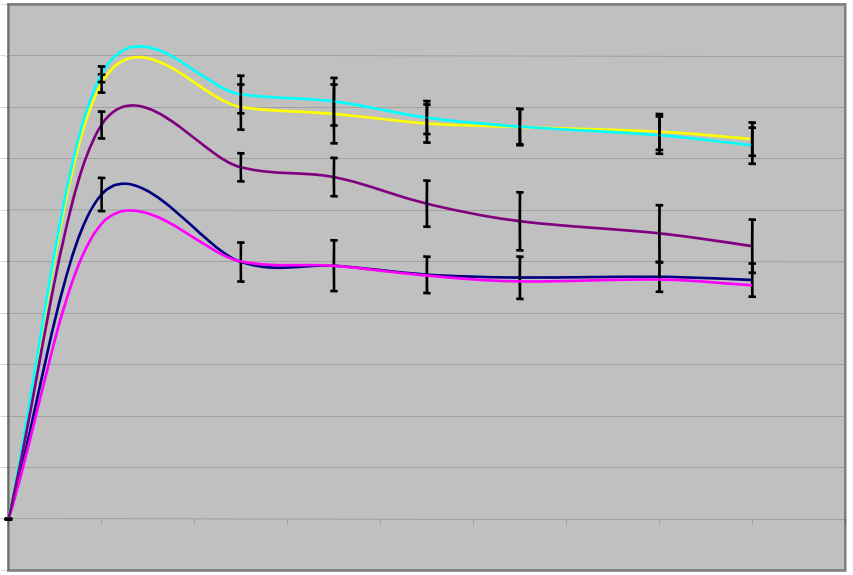
Vacuum cleaner



Broom



Compressed air



Flour & Compressed air

Courtesy of Campden BRI

Manual cleaning – spread of contamination

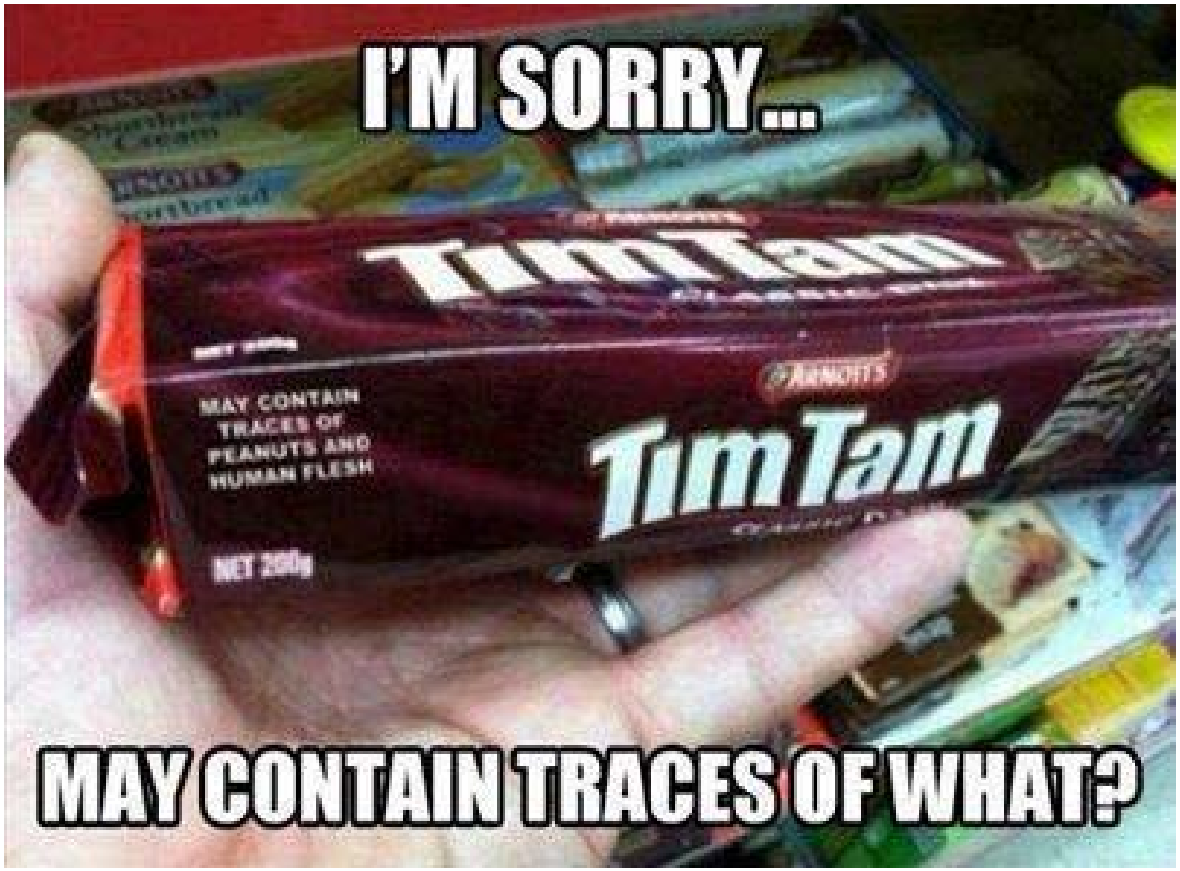
If not properly cleaned between uses, cleaning equipment can become a source and vector of contamination

Survey of cooked product areas for *Listeria monocytogenes* (Campden BRI)

- 10,000 samples
- Equipment - very low
- Floors - 17% positive
- Drains - 25%
- **Cleaning equipment - 47%**

Manual cleaning – spread of contamination

- Hygiene staff can be a source and vector of contamination
  - Microbes
  - Allergens
  - Foreign bodies
  - Species?!



Hygiene process control - Definitions

Validation	The process of checking that something satisfies a certain set of criterion	Will a cleaning regime "work"
Verification	The act of reviewing, inspecting, testing, etc. to establish and document that a regime meets the requirements	Has a cleaning regime "worked"
Monitoring	Visual inspection, hand-over sheets	Did it happen

Reasons for validation and verification

- Food safety
  - Microbiological
  - Chemical
  - Physical
  - Allergenic
- Species control
- Requirement of all 3rd party food safety standards
- Cost-effective execution of the hygiene operations
- Monitoring key performance indicators (KPI's).

Validation methods

- Microbiological
  - TVC
  - Species specific
  - DNA
  - ATP
- Physical
  - Visual
  - Colourimetric
- Species
  - DNA
  - ELISA
- Chemical
  - pH paper
  - Test kits
- Allergen
  - ELISA
  - Lateral flow
  - DNA (PCR)

Validation of Detergents and Disinfectants

- There are defined standards for disinfectants
  - EN1276 and EN 13697
  - Define efficacy under set criteria

- No such regime exists for detergents
  - Efficacy is dependant on many variables

- Validation is about the cleaning regime not a component part of that regime.

Validation Methods – Microbiological

- Specialist lab facilities needed
- Relies on growing the living organisms
- Several days to get results – more if you're looking for species identification
- Generally recognised as the "Gold Standard" for this type of contamination
- Quantification method.

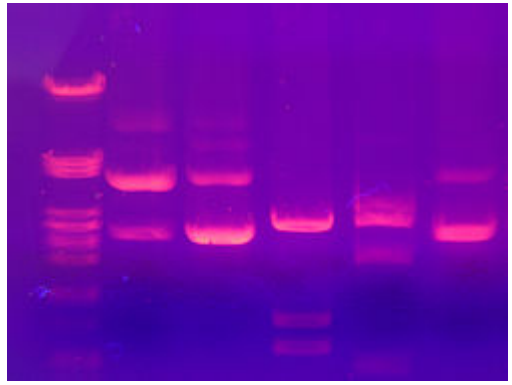
HMS 07-2-00

Validation Methods – Physical

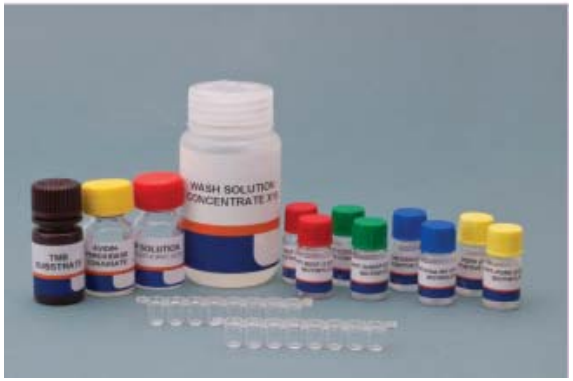
- Relies on visual assessment of the equipment and plant
- Benefits from being a real-time assessment
- Can be undertaken readily by trained staff.

Validation Methods - Species

- DNA methods: -
  - Highly sensitive – 0.1%
  - Several days to get result
  - Expensive to undertake
  - Restricted number of laboratories that can undertake the testing

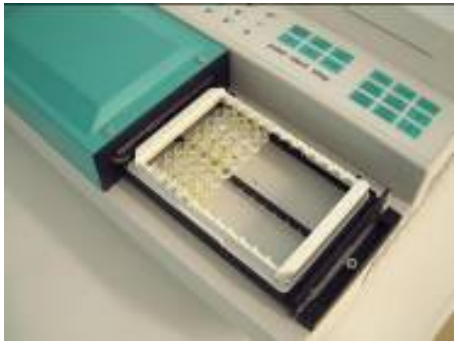


- ELISA methods: -
  - Sensitive to the 1% in product level
  - Lab facilities needed
  - Only viable for un-processed meats

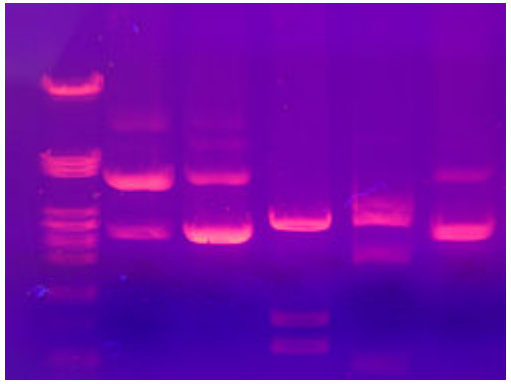


Validation Methods - Allergen

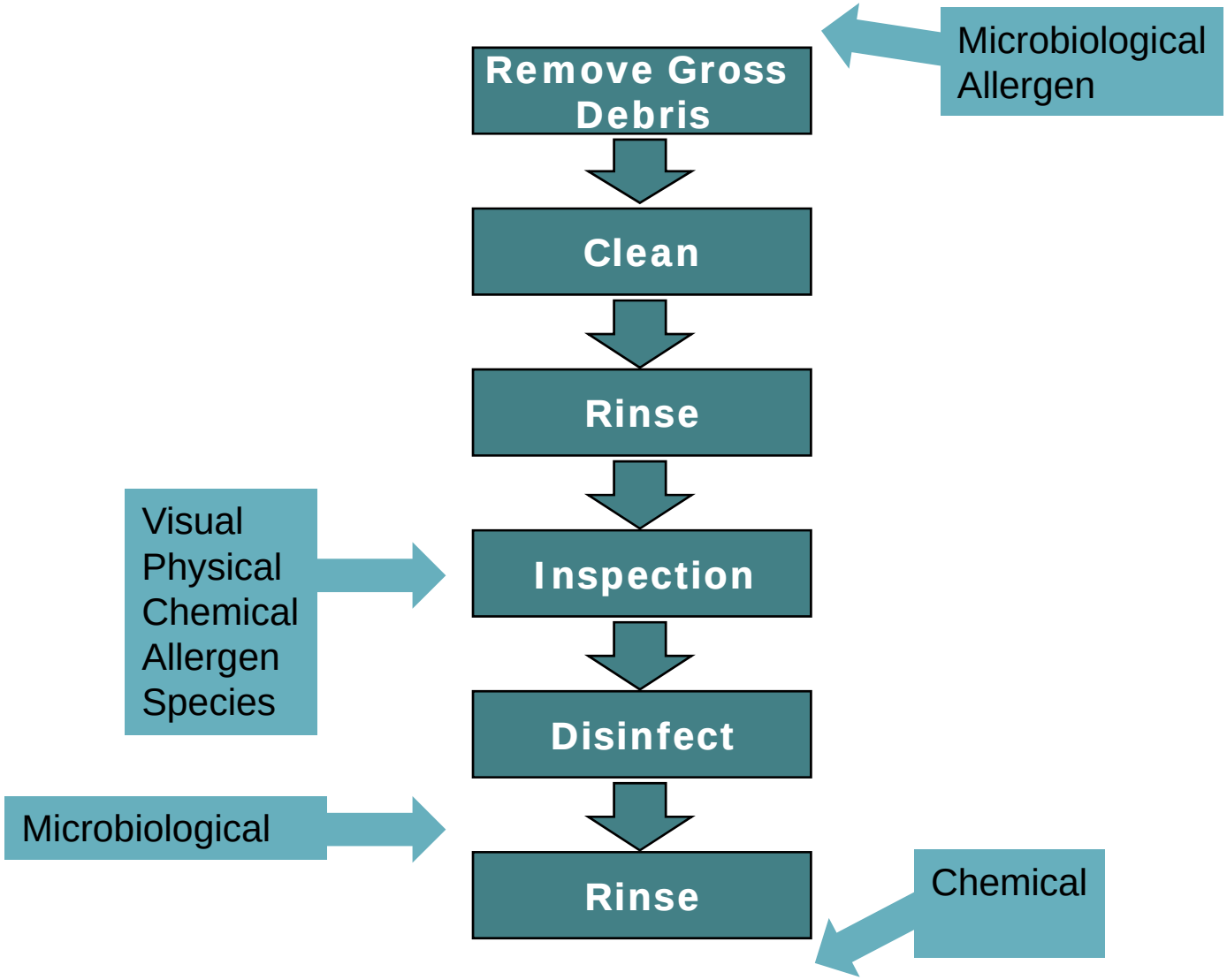
- ELISA (Enzyme Linked Immunosorbant Assay)
  - Sensitive
  - Highly specific
  - Generally done in laboratories
  - Quantification method



- DNA (PCR)
  - Highly sensitive
  - Not looking for reactive particle
  - Susceptible to cross-contamination
  - Not recommended by UK retailers



Stages of cleaning – when to validate



Verification methods

- Microbiological
  - ATP
- Physical
  - Visual
  - Colourimetric
- Chemical
  - pH paper
  - Test kits
- Allergen
  - Lateral flow
- Species
  - ELISA

Verification Methods - Chemical

- Test strips can be used to test from presence of: -
  - Alkaline chemicals
  - Acidic chemicals
  - QAC based disinfectants
  - Peracetic Acid based disinfectants
  - Hypochlorite
- Gives real-time results
- Quickly and easily undertaken.

Verification Methods - Microbiological

- Micro methods cannot be utilised for verification due to the timescales involved

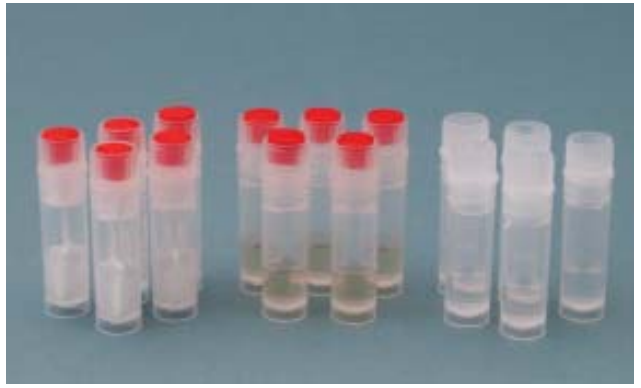
- Closest we've got is ATP technology

Verification Methods - Physical

- Relies on visual assessment of the equipment and plant
- Benefits from being a real-time assessment
- Can be undertaken readily by trained staff

Verification Methods - Species

- Factory based ELISA methods: -
  - Sensitive to the 1% level in product
  - Can be used in the factory
  - Only viable for un-processed meats at the moment
  - Validated for detection of product not surface swabs



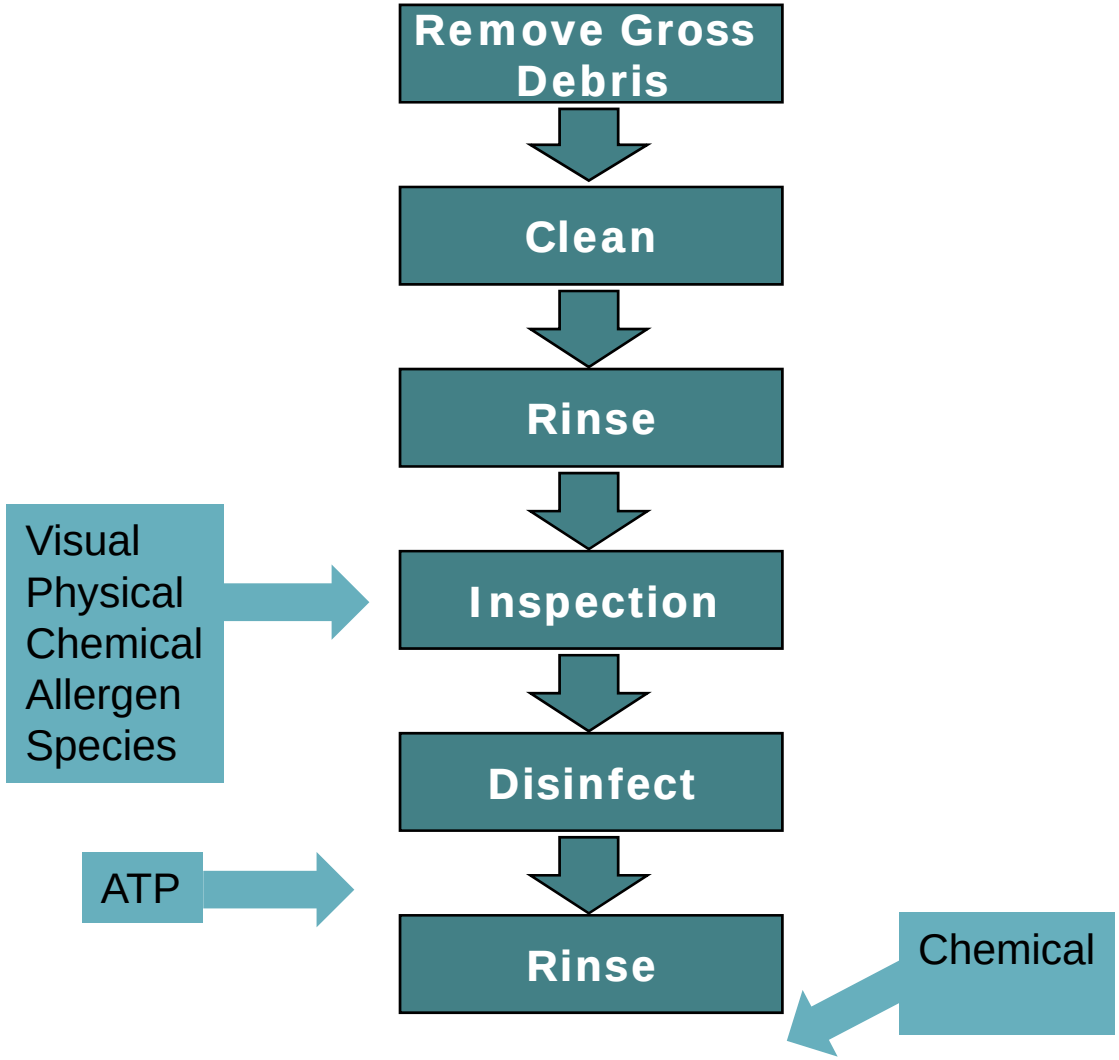
HMS 07-2-00

Verification Methods - Allergen

- Factory based ELISA
  - Requires lab facilities
  - Quantification method

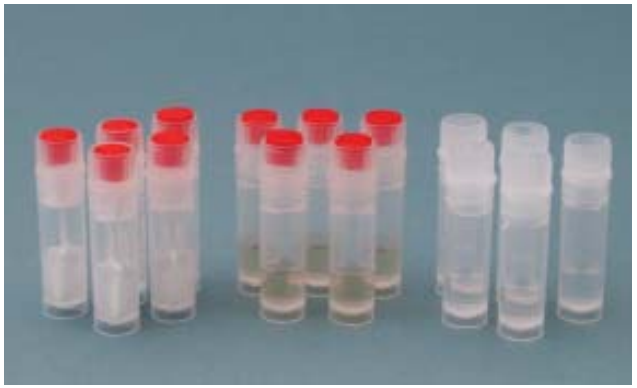
- Lateral Flow Devices
  - Rapid, accessible & specific
  - Results in minutes
  - Cost effective
  - Easy to use

Stages of cleaning – when to verify



Case study – species testing

- Produce a pork containing product.
- Undertake a validated clean-down.
- Produce a beef product and take first-off-the-line sample
- Undertake on-site ELISA testing for presence of **Pork**
- Provides verification that clean-down has been effective.



HMS 07-2-00

Case Study - Inter-product Clean Involving Allergens

- The company manufactures sandwiches for multiple retailers
- Production operatives undertake change-over cleans so a neutral detergent / disinfectant (sanitiser) is chosen: -
  - Reduced operative H&S risk
  - Emulsification retains allergenic component in fat matrix
  - Additional biocidal activity
- Efficacy assessed by: -
  - Visual
  - ATP
  - Rapid allergen test.

Any questions?

Deb Smith
Global R&D Manager / Hygiene Specialist
dsmith@vikan.com
07500 220139

1-3 Avro Gate
Broadmoor Road
South Marston Park
Swindon
Wilts
SN3 4AG

Peter Littleton
Technical Services Manager

peter.littleton@holchem.co.uk
07748 141618

Holchem Laboratories Ltd
Gateway House
Pilsworth Industrial Estate
Pilsworth
Bury
BL9 8RD

