Bivalve Purification Management

A one-day Seafish training programme for managers

A Seafish/REHIS joint award

Delivered by Seafish approved trainer – Martin Syvret

Aims

- Assisting industry towards protecting the consumer and with Food Law compliance
- Understanding your Environmental Health Officer (EHO)

Objectives

- To provide industry with a greater understanding of what is possible, practicable and reasonable in operating a commercial purification and despatch centre in the UK

- To allow industry to be able to discuss with EHOs about their current operating protocols so that Official Controls imposed are effective and result in requirements that are not too onerous or too lenient, but appropriate, balanced, proportionate and consistent

Outcomes

- Greater individual understanding of the hazards involved in bivalve shellfish purification and the management controls needed to produce safer shellfish

- Seafish/REHIS qualification

Scope

- All of the scenarios are real and have been observed
- They do not represent mainstream or normal practice
- They have been selected to illustrate key learning points

General approach

- **Identify the hazard/risk activity**

- **Consider content of appropriate:**
    - regulation
    - Good Manufacturing Practice Guidelines (GMPG)
    - science

- **Evaluate what is possible/practicable**

- **Agree reasonable approach/position:**
    - discuss
    - arrive at consensus and conclusions

- **Definitions:**
    - tank/system/facility

seafish

The food science and technology of depuration

General perspectives on the food science and technology of depuration relevant to official controls & hazard identification

seafish

Depuration and bacterial reduction

Table 1. Effect of depuration on mussels artificially contaminated with *Escherichia coli*.

Time (h)	*Escherichia coli* (MPN/100 g)*	*Escherichia coli* (log MPN/100 g ± SD)*	Percentage (%)†
0	7.1×10^5	5.8 ± 0.2	100
4	3.8×10^4	4.6 ± 0.1	5.3
6	4.3×10^4	4.6 ± 0.2	6.1
10	2.0×10^4	4.3 ± 0.2	2.9
16	4.0×10^3	3.6 ± 0.1	0.6
20	9.2×10^3	3.9 ± 0.3	1.3
24	3.0×10^3	3.5 ± 0.2	0.4
30	2.4×10^3	3.4 ± 0.1	0.3
42	5.4×10^3	3.7 ± 0.3	0.8

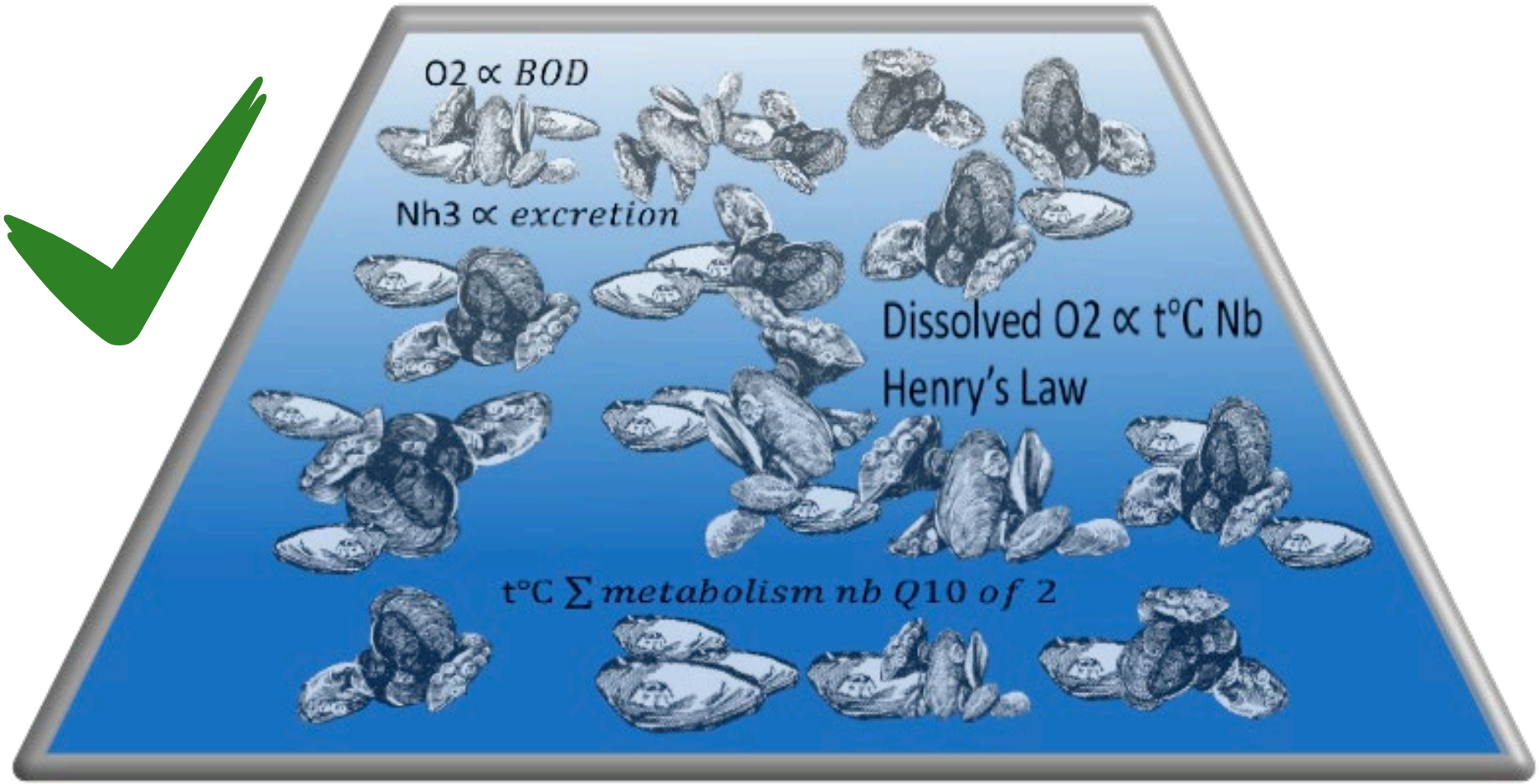
* Values derived as an average of two independent experiments.

† Percentage with respect to the initial concentration of *E. coli* (time 0).

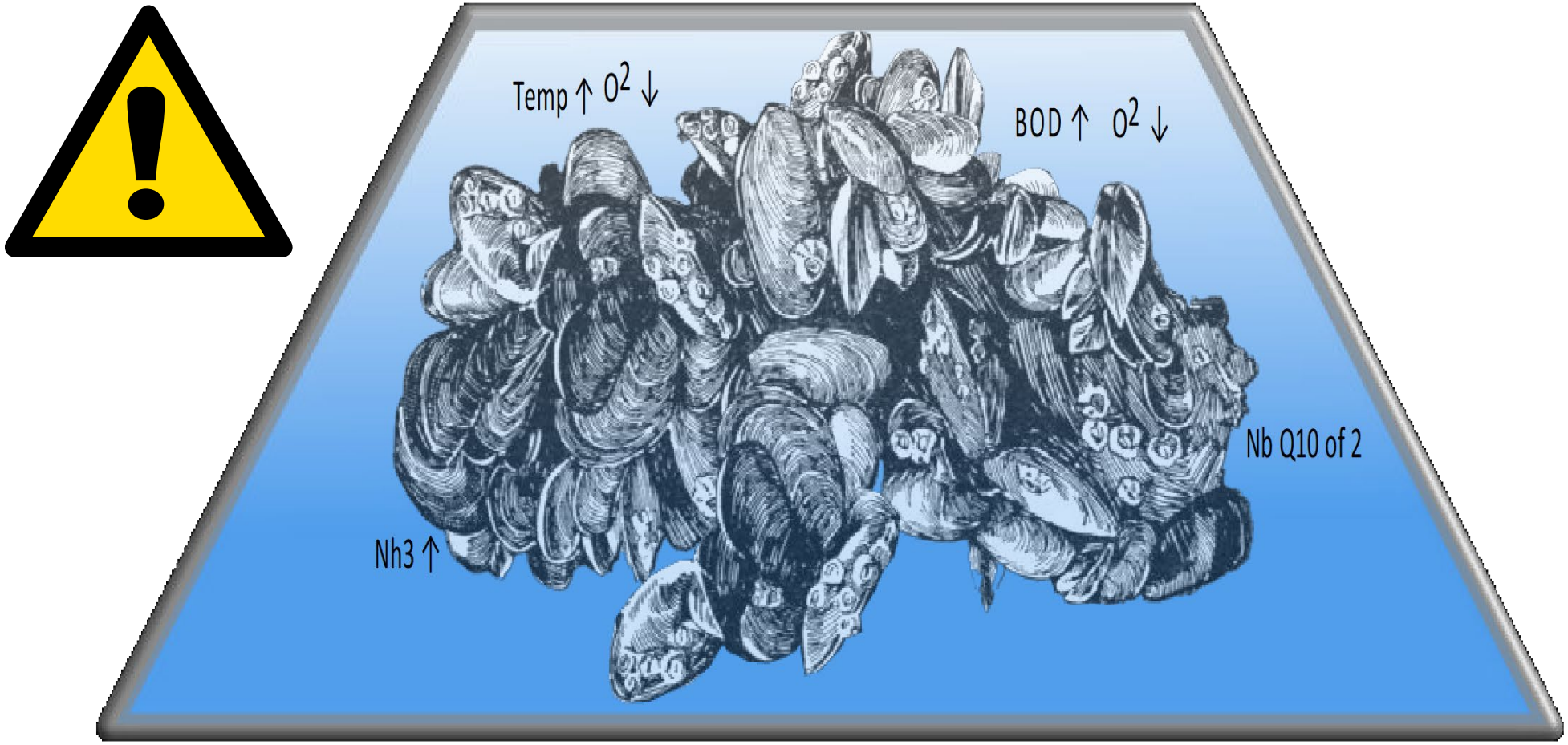
Elimination of Escherichia coli from mussels during treatment in a shellfish depuration system

seafish

Relationship between biomass: water ratio and physiological parameters



Incorrect biomass: water ratio and physiological parameters

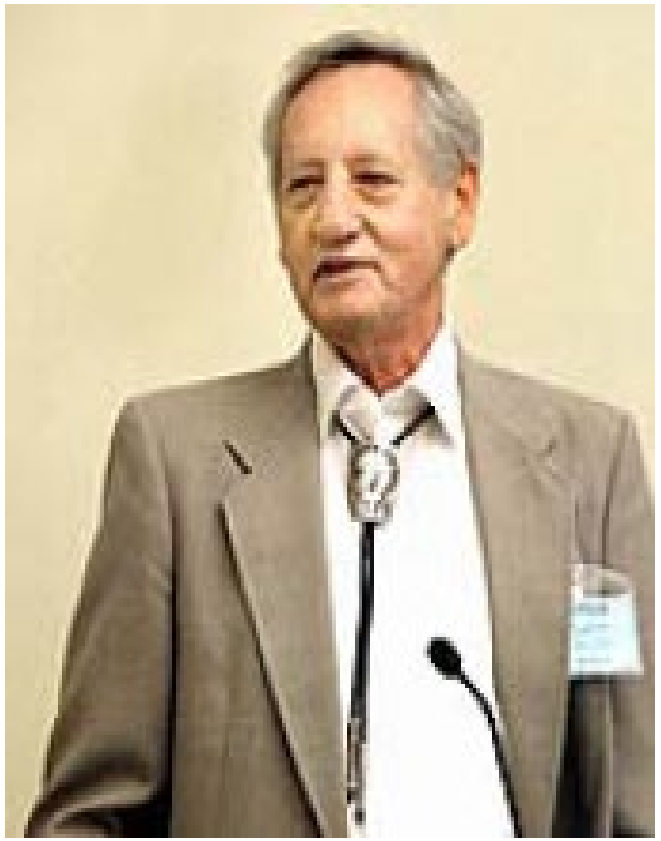


Food safety management systems

Identifying significant hazards and when and where they occur in the food production process

“Contributory factors” (P.I.I.M.S.) and ‘hazard mapping’

Factors that Contribute to Outbreaks of Foodborne Disease. Journal of Food Protection Vol 41, No 10 PP 816-827, 1978



Dr Frank Bryan USA:

All foodborne disease outbreaks were ‘hallmarked’ by an association between hazards and certain steps in the process

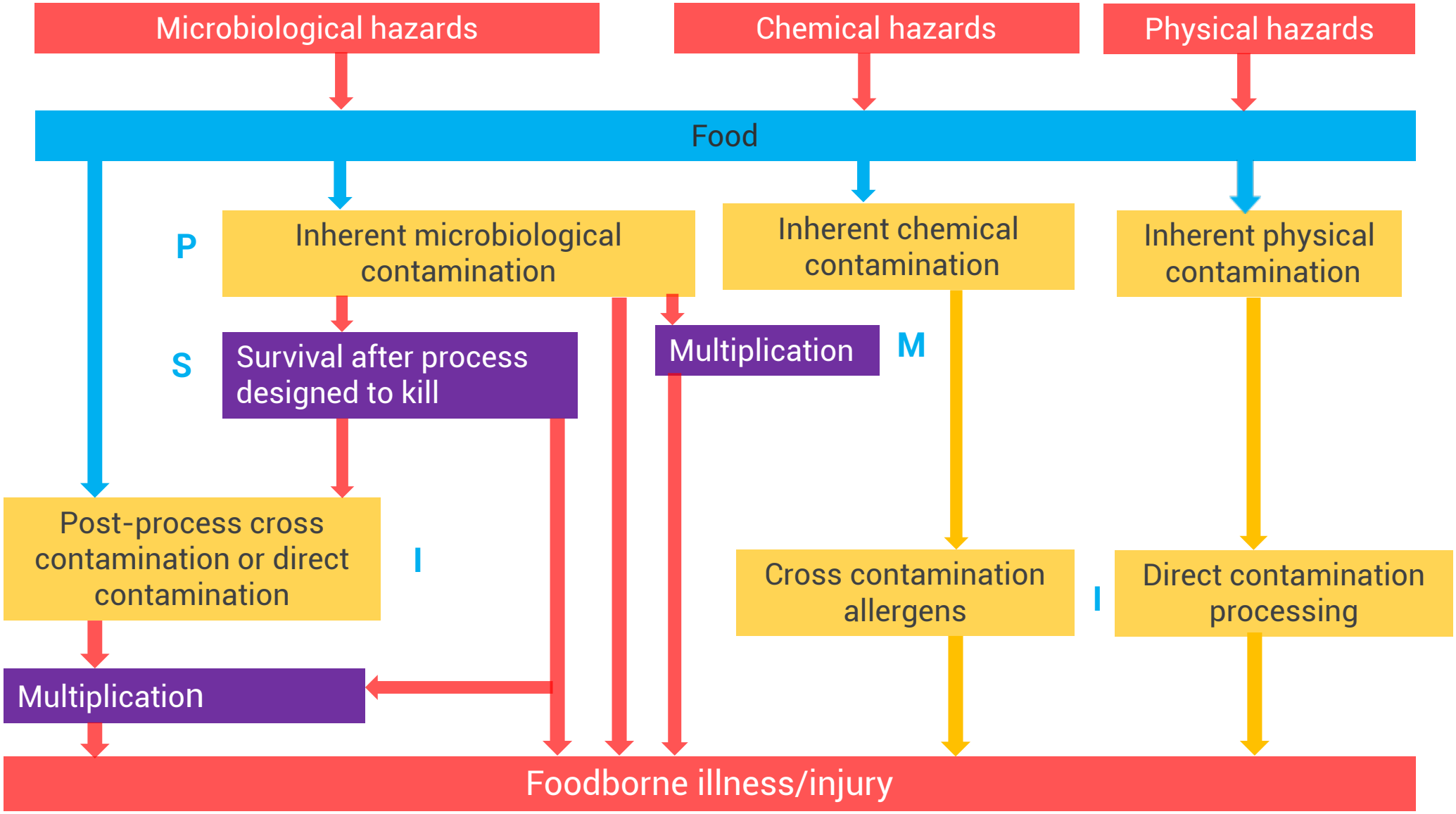
Called the nature of these associations ‘contributory factors’ represented by **P.I.I.M.S:**

- **P** Presence of inherently contaminating hazards
- **I** Introduction of hazards via direct contamination
- **I** Introduction of hazard via a cross-contamination pathway
- **M** Multiplication of hazards
- **S** Survival of hazards

Consideration of the **hazard**, the **process step** and the contributory factor underpins **‘hazard mapping’**.

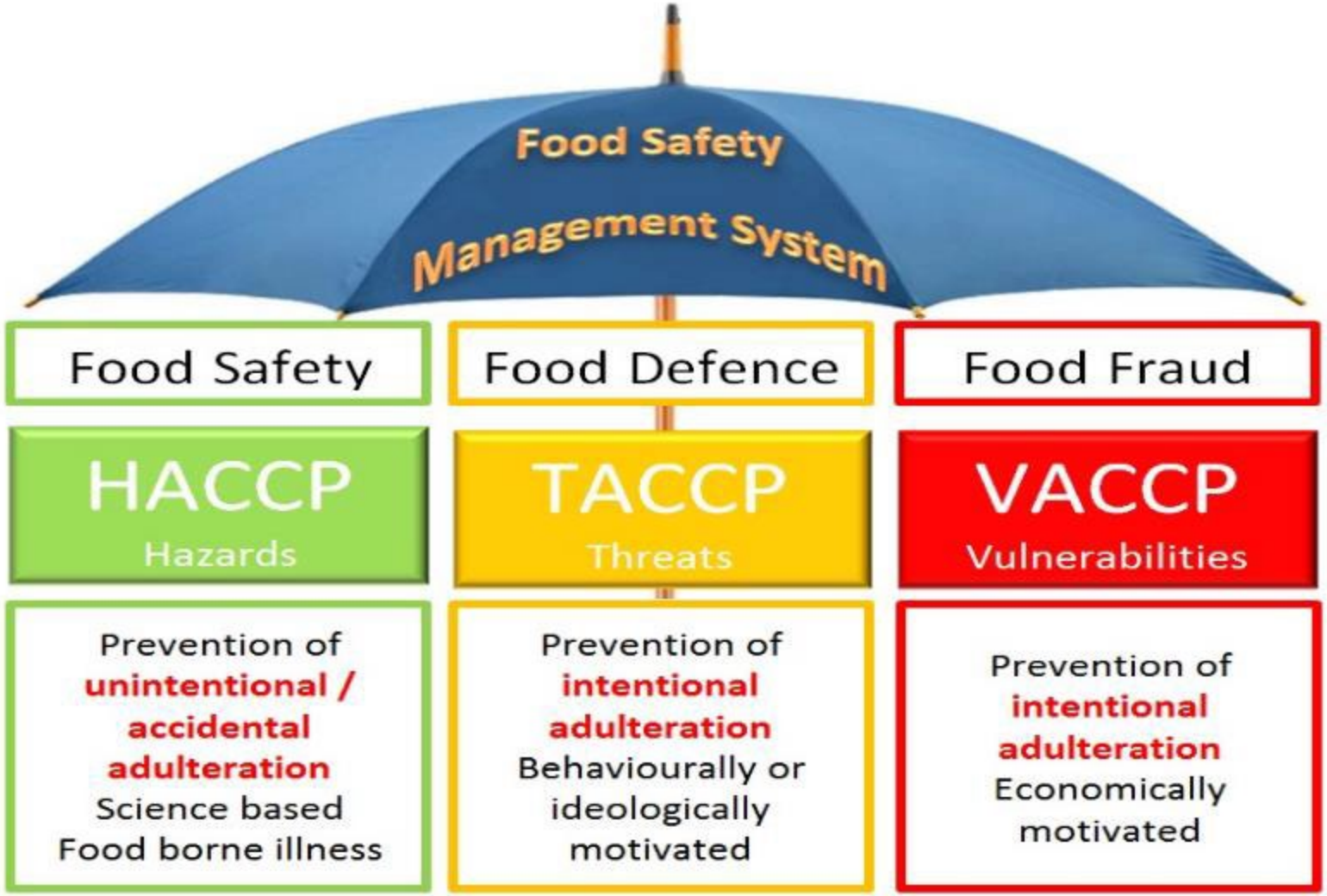
seafish

Foodborne illness – culmination of chain of events



seafish

Evolution of modern food safety management systems



P – Presence of inherent contamination

Scenarios considering depuration control measures in terms of the contributory factor of the presence of inherent hazards

Scenario 1: using contaminated water in purification operations

Scenario 1: using contaminated water in purification operations

Using contaminated water in purification operations – legal and scientific considerations

- Legislation - 853/2004, 178/2002 and 852/2004
- GMPG - step 13 - purification – structural hygiene
- Science:
  - Existing purification systems are validated to treat water supplies contaminated with low levels of microbiological contamination, but not with highly contaminated water
  - The engineering capability exists to treat even the foulest of seawater to bring it within specification, the only true limitation is the cost

Using contaminated water in purification operations – possible and practicable

- Water treatment can render any water safe – at a cost
- Single pass systems are sensitive to abstracted water quality
- Recirculation systems have reduced water requirements

Using contaminated water in purification operations – reasonable?

- Consider:
    - Type and degree of contamination
    - Availability of effective technical solution
    - Competence of a business to implement solution
    - Availability of **alternatives** to treatment (what are these?)
- What works for your business?

Poll questions – scenario 1

seafish

Scenario 1 – suggested recommendations

- Abstraction should be allowed where the treatment of the seawater can be demonstrated to meet the definition of clean seawater

- Alternative solutions can be considered:

    - Tankering clean seawater
    - Artificial seawater
    - Re-siting abstraction point
    - Tide dependent abstraction

- Report pollution events

I – Introduction by direct contamination

Scenarios considering depuration control measures in terms of the contributory factor of introduction of hazards by direct contamination

Scenario 2: obstructed seawater feed & flow in purification systems

.

Scenario 2: obstructed seawater feed and flow in purification systems

Obstructed seawater feed and flow – legal and scientific considerations

- Legislation – 852/2004, Chapter. II, 5
- GMPG – step 18 – purification centre – HACCP systems
- Science:
    - Reduced flow rate and oxygen levels of water
    - Potential additional contamination

Obstructed seawater feed and flow – possible and practicable

- Caged inlet points
- In-line catch baskets
- Drain cleaner attachment for pressure washer
- Back flush:
  - with hypochlorite to deter long term fouling of pipes by mussel settlement
  - acute blockage by crabs and seabirds (isolated examples witnessed)
- System may still be operating within approved parameters, but not as efficiently as it can

Obstructed seawater feed and flow in purification systems – reasonable?

- Discussion

- Consider:
    - flow rates.

    - dissolved oxygen levels above minimum required (5mg/litre):
        - records
        - verification measurements (what does your DO or flow meter say?)

    - impact on UV efficiency
    - remedial action required
    - why did it happen?

- Recommendations

seafish

Poll questions – scenario 2

Scenario 2 – suggested recommendations

- It may be reasonable to allow the cycle to continue provided there is evidence that operating conditions are within acceptable limits:
    - specific end product testing may be necessary
    - the problem should be corrected ASAP and steps taken to avoid a recurrence
    - may require positive release following investigation of impact of cause
- Other actions may include:
    - closer examination of UV effectiveness
        - damaged
        - occluded

I – Introduction by cross contamination

Scenarios considering depuration control measures in terms of the contributory factor of introduction of hazards by cross contamination

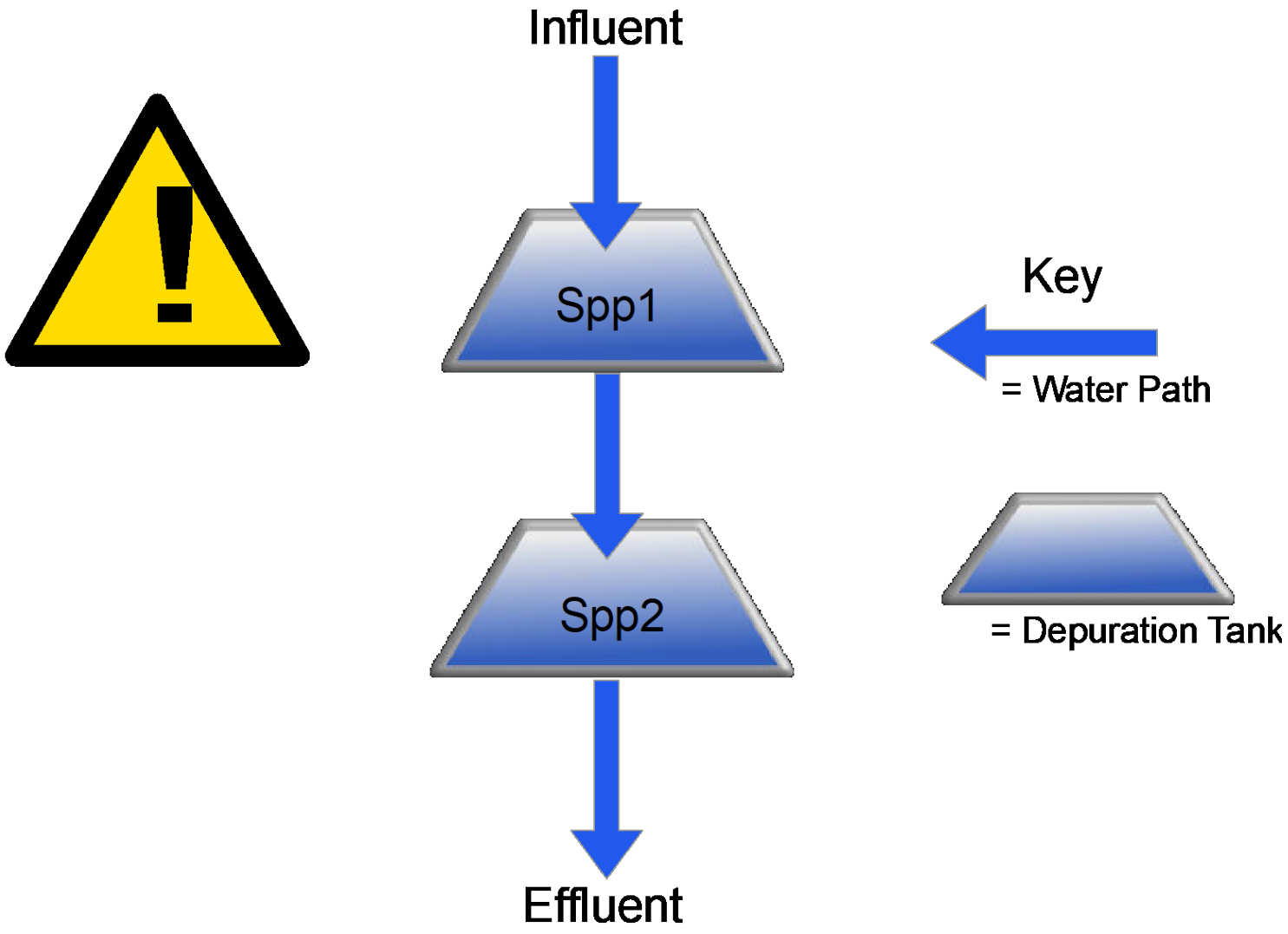
Scenario 3:	placing two bivalve species within the same system
Scenario 4:	holding crustaceans and bivalve shellfish in adjacent systems or together in the same water system
Scenario 5:	placing purified bivalves back into active purification tanks
Scenario 6:	dead bivalves and mud balls in tanks
Scenario 7:	cross contamination during post purification handling
Scenario 8:	algal matt growth in purification systems and water holding tanks
Scenario 9:	washing purified batches with contaminated seawater
Scenario 10:	re-immersion in display cabinets, post purification
Scenario 11:	temperature & time control

.

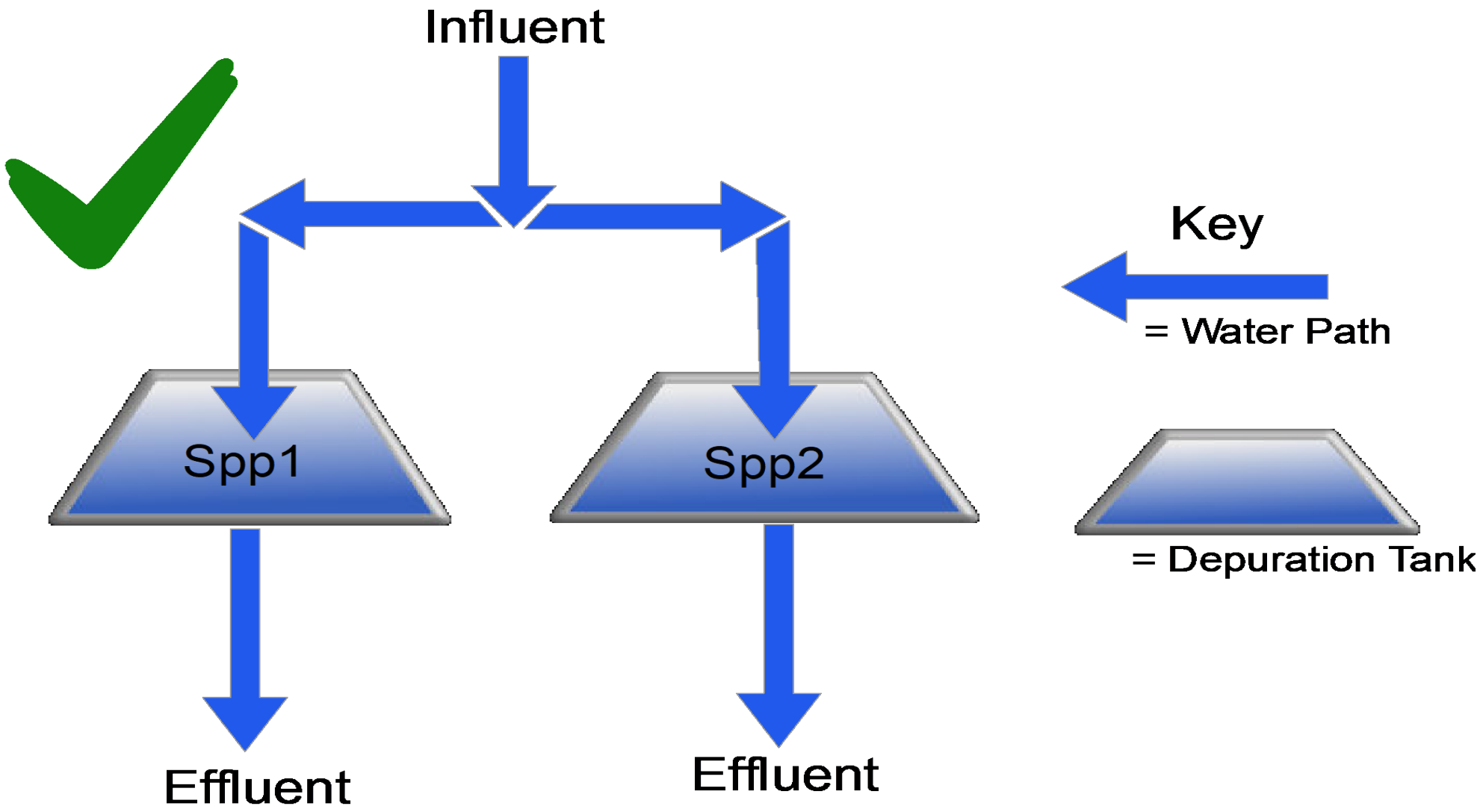
seafish

Scenario 3: placing two bivalve species within the same system

Further process design dual species depuration



Process design dual species depuration



Two species within the same system – legal and scientific considerations

- Legislation - 853/2004, Annex III, Section VII, Chapter. IV a4 and a6

- GMPG - step 14 - purification – loading tanks

- Science:
    - different bivalve species have different environmental and physiological needs
    - cross contamination is a risk

Two species within the same system - possible and practicable

- Can share **water supply** in single pass system if held in separate tanks as long as **all** discharge to waste
- Separate tanks in a single pass system do not count as the same system
- An operator may have multiple species and multiple batches in the same facility

Two species within the same system – reasonable?

- Discussion
- Consider:
  - water path – is it the same system?
  - Species specific temp. and salinity needs
    - oysters and mussels not similar
  - Old regs allowed this (pre 2006)
- Recommendations

seafish

Poll questions – scenario 3

Scenario 3 - suggested recommendations

- No mitigating factors (but old Reg's allowed this)
- Stop purification
- Separate species
- Re-purify for full cycle
- Exceptions may include:
    - *Mytilus edulis and Mytilus Trossulus*
    - *Tapes Decussatus and Tapes Philippinarum*

SCENARIO 4: Holding Crustaceans and Bivalve Shellfish in adjacent systems or together in the same water

Holding crustaceans and bivalve shellfish together – legal and scientific considerations

- Legislation - 853/2004, Annex III, Section VII, Chapter. IV a4 and a6
- GMPG - step 14 - purification – loading tanks
- Science:
    - Crustaceans excrete *Vibrio* spp
    - Represent a serious human health risk in ready to eat products
    - Spray could carry cross contamination into bivalve tanks and packing area – aerosol transmission
    - The mechanism for cross contamination is not fully understood

Holding crustaceans and bivalve shellfish together in adjacent systems – possible, practicable and reasonable?

- Temporary physical barriers may be effective at separating crustaceans and bivalve holding areas
- Water systems **MUST** be separate
- Cross contamination must be avoided
- Management capability?
- Risk assessment? e.g. proximity of tanks

Together in the same water system– possible, practicable and reasonable?

- No mitigating factors for LBM/crustacea mixing
- Don't do it
- However, storing crustaceans in display or wet holding systems is permissible

seafish

Poll questions – scenario 4

Holding crustaceans and bivalve shellfish in adjacent systems – suggested recommendations

- Separate by time / space / barriers
- Cleaning of screens and barriers as part of regular hygiene and cleaning practice
- Cross contamination must be avoided:
  - onus on the operator to **demonstrate** adequate safety

Together in the same water system – recommendations

- Bivalves must not be used for human consumption and should:
  - be disposed of, or
  - be purified (consider potential length of Vibrio residence time), or
  - be relayed

- Crustaceans can continue to market and sale

seafish

Scenario 5: placing purified bivalves into active purification tanks

Placing purified bivalves back – legal and scientific considerations

- Legislation - 853/2004, Annex III, Section VII, Chapter. IV a4

- GMPG - step 15 - purification – operation checks

- Science:
  - contamination of purified batch
  - re-suspension of detritus
  - possible recontamination

Placing purified bivalves back – possible and practicable

- Bivalves do not have to be suspended in seawater after purification
- Chilled storage is adequate
- Conditioning can be carried out using clean seawater in tanks set aside for that purpose

seafish

Placing purified bivalves back – reasonable?

- Discussion
- Consider:
  - purifying bivalves
  - what is the risk?
  - what is the cost of restarting the clock
  - how long have they been purifying?
    - one hour into the cycle?
    - one hour from the end of the cycle
- Recommendations

seafish

Poll questions – scenario 5

Scenario 5 - suggested recommendations

- The bagged bivalves are contaminated and must be:
    - debagged
    - washed
    - purified

- The bivalves in the tank must be risk assessed:
    - restart the ‘42hr clock’

Scenario 6: dead bivalves and mud balls in tanks

Dead bivalves and mud balls in tanks – legal and scientific considerations

- Legislation - 852/2004, Chapter. II 5
- GMPG - step 14 - purification – loading tanks
- Science:
    - dead bivalves contaminate batch
    - mud balls contaminate batch

seafish

Dead bivalves and mud balls in tanks – possible and practicable

- Dead bivalve shellfish may not open
- Mud balls may not be apparent
- Automated grading prior to purification may not identify duds
- Hand grading will find duds but is very labour intensive
- Animals should not die during normal purification
- Regular visual inspections of tanks help to spot problems
- Decaying bivalves do smell

Dead bivalves and mud balls in tanks – reasonable?

- Discussion

- Consider:
    - how many dead or duds?
    - what species?
    - size and type of operation:
        - staff resources available
        - use of mechanical grading
    - seasonality
    - harvesting methods
    - post harvest / and pre-purification handling and storage
    - impact on shelf life / mortality of LBM

- Recommendations

Poll questions – scenario 6

Scenario 6 - suggested recommendations

- **Just a few dead bivalve shellfish**
  - Where the bivalve flesh has started to putrefy:
    - drain down tank and inspect all trays
    - remove dead/duds
    - restart the clock and re-purify

- **Significant numbers of dead bivalve shellfish:**
    - this suggests a failure in procedures, or
    - problems with pre-purification handling or
    - issues concerning the supply of LBM
    - LBMs possibly over-stressed and **unsuitable for further treatment**

- Duds which are clean empty shells are not a significant food safety risk

Scenario 7: cross contamination during post-purification handling

Cross contamination – legal and scientific considerations

- Legislation - 852/2004, Chapter. II 5
- GMPG - step 19 – purification centre – HACCP systems and FSA cross contamination guidance
- Science:
    - cross contamination between un-depurated and depurated batches

seafish

Cross contamination – possible and practicable

- Many operators only have one set of debyssing, grading and cleaning equipment in the centre through which both pre- and post-depuration mussels must pass
- Effective cleaning of equipment between batches will remove sources of cross contamination
- How is cleaning properly validated?

Cross contamination – reasonable?

- Discussions

- Consider:
    - cost of duplicating equipment
    - footprint of building
    - ease of cleaning – what is effective?
    - management capability
    - post purification bivalve shellfish are effectively contamination free

- Recommendations

Poll questions – scenario 7

Scenario 7 - suggested recommendations

- The use of the same equipment is acceptable provided batch separation and clean down are effective
- This can be as simple as removing bivalve shellfish and rinsing equipment
- A deep clean may not be needed
- A thorough clean down is not needed when unpurified bivalves are following purified bivalves with a minimal time delay

Scenario 8: algal mat growth in purification systems and water holding tanks

Algal mat growth – legal and scientific considerations

- Legislation - 852/2004 and 853/2004
- GMPG – step 16 – purification centre – HACCP systems
- Science:
    - potential for these algal species to be toxic
    - potential to crash oxygen level during dark period
    - algal mats can provide a reservoir of contaminated material

Possible and practicable

- Purification systems should be cleaned down between purification cycles
- Purification and conditioning operations should use clean seawater

Reasonable?

- Consider:
    - how long has this been going on?
    - does this suggest a systemic management failure?
    - how can we know the seawater is clean?

seafish

Poll questions – scenario 8

Scenario 8 - suggested recommendations

- Seawater may be contaminated

- As biotoxin contamination is a possibility the potentially affected batch should be:
    - relayed, or
    - disposed of, or
    - released for sale **following** re-purification and EPT = positive release

- As this suggests a failure in management controls, a review of **all** procedures and practices may be warranted

Scenario 9: washing purified batches with contaminated sea water

Washing purified batches with contaminated seawater – legal and scientific considerations

- Legislation - 853/2004, Annex III Section VII Chapter. IV 5
- GMPG - step 19 - purification centre – HACCP Systems
- Science:
    - contaminates bivalve shellfish

seafish

Washing purified batches– possible and practicable

- Bivalve shellfish cannot be immersed during washdown
- Can use potable water
- Can use **treated** Class B seawater
- Can use artificial seawater
- Can use Class A water untreated

Washing purified batches with contaminated water – reasonable?

- Discussion

- Consider:
  - why might this have happened / what went wrong?
  - who was responsible?
  - how should it be avoided?

- Recommendations.

Poll questions – scenario 9

Scenario 9 - suggested recommendations

- No mitigating circumstance – contaminated water must never be used in this way:
    - halt dispatch
    - all suspect bivalves should be re-purified
    - check records to see if this error has occurred previously
    - consider product recall
    - permanent management procedures should be modified to avoid re-occurrence
- This is a significant system failure and will require a new risk assessment

Scenario 10: re-immersion in display cabinets, post purification

Re-immersion in display cabinets, post purification – legal and scientific considerations

- Legislation - 853/2004, Annex III, Section VII, Chapter. VIII 2
- GMPG - step 20 - wrapping and packing
- Science:
  - poor controls can lead to stressed and cross-contaminated bivalves

Possible and practicable and reasonable?

- Animals will survive in cabinets
- Design of cabinets is inadequate to provide confidence that the LBM will remain safe for consumption
- **Not allowable in legislation**

seafish

Poll questions – scenario 10

Scenario 10 - suggested recommendations

- Display cabinet immersion is not permissible (**unless in an approved premises**):
  - withdraw cabinet from use
  - dispose of contents:
    - not for human consumption without purification.

M – Multiplication of hazards

Scenarios considering depuration control measures in terms of the contributory factor of multiplication 9persistence) of hazards

Scenario 11: temperature & time control

Scenario 11: temperature and time control

- Legislation - 853/2004, Annex III Section VII Chapter. IV 5
- GMPG - steps 19 & 22 - HACCP systems and transportation
- Science - multiplication of contaminating hazards due to loss of temperature and time control. Can occur at any point in the process
  - 'just-in-time-process' = minimise the number of goods held in stock
  - eliminate '*delay-steps*'
  - An aspect of broader 'process-control'

HARVESTER TAG

Cooling option (circle one): Traditional Rapid Cool On-Board Cool

HARVESTER SPL # or AQ # _____

DATE OF HARVEST _____ TIME OF HARVEST _____

Time of Refrigeration, if applicable _____

Legal Harvest Area Name or # _____

Specific Harvest Location Name or # _____

Type of Shellfish _____ Quantity of Shellfish _____

THIS TAG IS REQUIRED TO BE ATTACHED UNTIL CONTAINER IS EMPTY
OR IS RETAGGED AND THEREAFTER KEPT ON FILE FOR 90 DAYS

Poll questions – scenario 11

Scenario 11 - suggested recommendations

- This a critical aspect of process control
- Includes both temperature and time aspects
- Shelf life and end user instructions cover multiplication control measures:
    - live product/discard dead shellfish
    - store chilled
    - dispose of contents
- Options for bivalves that have fallen out of temperature and time controls?
    - re-depurate
    - discard
    - root cause analysis – potentially broader failure of process control

S – Survival of hazards

Scenarios considering depuration control measures in terms of the contributory factor of the survival (persistence) of hazards

Scenario 12: incorrect biomass to water ratio
Scenario 13: bivalves not submerged during purification operation
Scenario 14: animals bagged during purification process
Scenario 15: poorly maintained UV system – quartz tubes fouled

Scenario 12: incorrect biomass to water ratio

Incorrect biomass to water ratio - legal and scientific considerations

- Legislation - 853/2004, Annex iii, Section VII, Chapter. a3. Chap. III.2 (a-c)
- GMPG - step 14 - purification – loading tanks
- Science:
    - oxygen depletion and degraded environmental conditions will result in reduced filtering rates with a consequent impact on purification. Shelf life decrease and increased mortality may also occur
    - species and purification system dependent

seafish

Biomass to water ratio - possible and practicable?

- Centres should monitor water quality:
    - oxygen levels
    - animal activity
    - general water quality
- Higher biomass/water ratios can be accommodated in some systems and for some species by:
    - higher flow rates of well oxygenated water
    - reducing the mass of animals in the system and restart the process

seafish

Biomass to water ratio - reasonable?

- Discuss

- Consider:
  - degree of risk
  - species
  - seasonal water temperature
  - frequency and duration of the issue
  - business capability
  - impact of action / inaction

- Recommendations

Poll questions – scenario 12

seafish

Scenario 12 - suggested recommendations

- Overstocking of tanks should not take place as a standard practice
- May be allowed as a temporary solution to a short-term problem:
    - not an excessive increase
    - compensatory actions are taken
- Increase frequency of monitoring
- End product testing of the affected batch

Scenario 13: bivalves not submerged during purification operation

Bivalves not submerged – legal and scientific considerations

- Legislation - 852/2004, Chapter. II 5
- GMPG - step 15 - purification – operation checks
- Science - bivalves cannot depurate when not immersed

Possible and practicable

- Some bivalve will 'climb' out of the water even under optimal conditions. Shortly after initial immersion bivalve shellfish will expand as they open their shells
- For large masses of bivalve shellfish it is not easy to estimate the expansion of the total volume i.e. bulk bin systems are susceptible to this.

Reasonable?

- Why is it happening?
- What should be the appropriate operator action?
- Impact of action/inaction

seafish

Poll questions – scenario 13

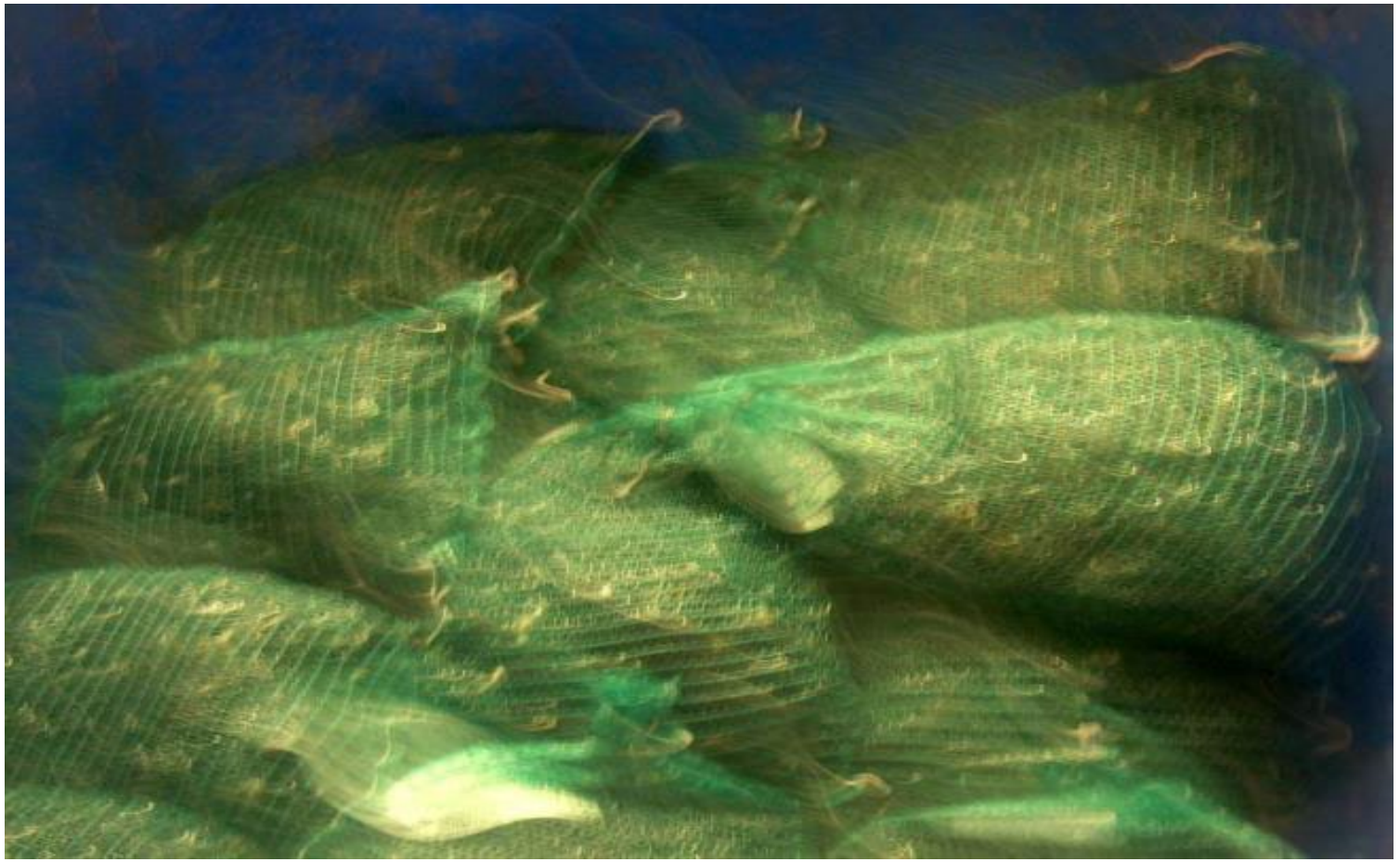
Scenario 13 - suggested recommendations

- **Reduced headspace:**
    - ongoing monitoring and specific end product testing may be necessary
    - where there is evidence that 'adjustments' to environmental parameters is sufficient to accommodate reduced headspace this may be allowable as a **temporary** solution to a **short-term** problem

- **Overfilled systems with non-immersed bivalves should be:**
    - emptied
    - cleaned down
    - correctly stocked
    - purification cycle restarted

- However, where there are just a few bivalves that have climbed up the side of the tank and out of the water, these can be picked off, and set to one side, allowing the greater bulk of (immersed) bivalves to continue purification

Scenario 14: animals bagged during purification process



Animals bagged – legal and scientific considerations

- Legislation - 852/2004, Chapter. II 5
- GMPG - step 18 – purification centre – HACCP systems
- Science - animals unable to open and respire = cannot effectively depurate

Possible and practicable

- Not possible to effectively purify bagged bivalves
- Operators do *condition* bagged bivalves
- Operators may mistakenly attempt to purify bagged bivalve shellfish

Reasonable?

- Why is it happening?
- What should be the appropriate operator action?
  - Are there any mitigating factors?
  - Conditioning vs. purification – what is the difference?
- Impact of action/inaction

seafish

Poll questions – scenario 14

Scenario 14 - suggested recommendations

- **NOT** allowable in any way during purification operations - operator must restart purification with un-bagged bivalves

- **However,**
  - conditioning of purified bivalves is allowable provided:
    - bivalves can respirate
    - there is sufficient head room in the bags
  - during conditioning, batches of the same species can be mixed provided:
    - they are from the same category of water
    - individual bags are traceable

    This is only allowable in a licensed/approved dispatch centre

Scenario 15: poorly maintained UV system – quartz tubes fouled

Poorly maintained UV system – legal and scientific considerations

- Legislation - 852/2004, Chapter. II 5
- GMPG - step 18 - purification centre – HACCP systems
- Science:
    - fouled quartz tube reduces UV transmission
    - can result in an unsafe system and an invalid process

Poorly maintained UV System – possible and practicable?

- Fouling takes time
- Site specific factors
- Seasonality
- Environmental conditions
- Can be predictable
- Planned maintenance
- High intensity systems usually have a wiper and UV sensor

Poorly maintained UV system - quartz tubes fouled – reasonable?

- Discussion
- Consider:
  - how long does it take to clean the tube?
    - Low intensity – minutes
    - High intensity – hours
  - risk assessment
  - cleaning schedule
  - records
  - is there a system in place to manage this?
  - is there a failure in the system?
- Recommendations

seafish

Poll questions – scenario 15

Scenario 15 - suggested recommendations

- Cleaning frequency – after every cycle is most likely unreasonable
- Frequency should be based upon evidenced need
- If on examination a UV tube is found to be fouled, then a reasonable response would be to have the tube cleaned and the ‘clock restarted'
- You must have, and must use a system to manage UV tube planned maintenance for:
    - inspection
    - cleaning
    - replacement

General control measures

Scenarios re training and fraudulent records:- considering depuration general control measures in terms of all the contributory factors

Scenario 16: purification centre staff not adequately trained
Scenario 17: false records – food fraud/crime

Scenario 16: purification centre staff not adequately trained

Staff training – legal and scientific considerations

- Legislation- 852/2004, Annex II Chapter. XII
- GMPG - step 16 - purification centre – HACCP systems
- Business unable to effectively manage operations if staff not competent
- Lack of training and/or qualifications however does not always mean incompetent staff
- Training vs supervision

Staff training – possible and practicable

- What is possible?
  - Seafish approved courses exist for operatives and managers
  - Shellfish Training Centre established by Seafish
  - remote and online courses and exams now available

- What is practicable?
  - it takes time to organise courses (although the availability of remote courses has recently changed this)

Staff training – reasonable?

- Discuss
- Consider:
  - what are the risks?
  - size of business
  - availability of specialist training
  - business capability to offer in-house training
  - business capability to provide adequate supervision
  - evidence of competence, or lack of competence
  - Impact of action / inaction
- Recommendations

Poll questions – scenario 16

Scenario 16 - suggested recommendations

- Operators should be given a reasonable time period within which to receive training from an approved trainer
- Note: do not confuse lack of training qualifications with lack of competence. Any **requirement** for formal training of experienced staff must be based on evidence of lack of competence
- Competent managers can deliver informal instruction to staff, particularly new entrants
- Stronger case exists for requiring managers to have formal qualifications
- Ensure all inhouse training is documented and dated
- Staff may require additional:
  - training
  - instruction
  - supervision
- What else?

Scenario 17: food fraud/crime

- Legislation:
  - Food Safety Act 1990 (UK) as amended by Regulation 178/2002/EC, contains rules to ensure that food placed on the market is safe to eat, consumer is not misled as to the quality or description of the food
  - 852/2004, 853/2004, 2017/625 and 2019/624 all apply, along with other nonfood legislation

- Food fraud definition:
  - *any **deliberate** act by a business or individual to deceive others in regard to the integrity of food to gain undue **advantage***
  - for example: adulteration, substitution, tampering, simulation, counterfeiting and misrepresentation

- GMPG – appendix 4 and 5 – record keeping – general; registration doc

- Science:
  - the monitoring and control of provenance, loading and environmental parameters is essential to effective management of purification
  - provenance and category of harvest seawater

seafish

False records – possible and practicable

- Monitoring equipment available, reasonable cost and reliable
- Training is available to ensure staff trained and competent
- Management must be effective
- Clear guidance exists of what is to be measured:
  - Seafish guidance
  - training courses
- Examples of evidence for traceability:
  - registration document; GPS records; photos

False records - reasonable?

- Consider:
  - operator error?
  - management failings?
  - malicious intent?
  - breaking the law for financial gain?
  - risk to public health?

seafish

Poll questions – scenario 17

Scenario 17 - suggested recommendations

- Effective documented traceability is key to ensuring provenance of LBMs
- Ensure that staff have the correct calibrated equipment and training in order to ensure that they have the ability to keep accurate records
- Know your suppliers and, if necessary, inspect/audit their operations. They shouldn't have anything to hide
- Expect customers such as retail multiples to audit your processes and documentation
- **Food fraud resilience self-assessment tool**
- Develop a counter-fraud strategy that considers the risk of food fraud
- Establishing an anti-fraud culture within a business is vital. A negative or ambivalent culture can become problematic as bad practice may go unchallenged, or taking short cuts may be normalized (Source: FSA)

seafish

Next steps?

What techniques and approaches can you take back to your business that will help you identify food safety hazards?

How confident are you now that you can identify food safety hazards when operating your purification systems?

Challenge test your business – EHO for a day!

- Sometimes it can be hard to spot issues and identify both good and bad practise when you are ‘too close to the coalface'

- Could you step back and put on another hat for the day? Imagine you are an EHO, and this is the first inspection of your purification centre.
    - how would you approach this?
    - where would you start?
    - what are the main things that you are trying to establish?

- Department cross-audits for larger businesses?

Steps to forming an accurate first impression - step 1

1. Walk the line - water and shellfish:
   - water intake to waste discharge (source; storage; treatment; re-use; disposal)
   - raw material reception to product dispatch (handling; washing; chilled storage; records; traceability; avoid recontamination)
   - Challenge your staff - ask your staff questions about the systems

Steps to forming an accurate first impression - step 2

2. Don't inspect the kitchen?
   - or the walls
   - or the doors

These areas are important, but they aren't where you should focus in order to identify the main food safety issues with LBM purification. NB: not all control points are critical!

Where should your priority for scrutiny therefore be? → *What affects the operation of the purification tanks and the shellfish within them*

Steps to forming an accurate first impression – step 3

3. Audit the records and paperwork – this will be a priority for any EHO inspection

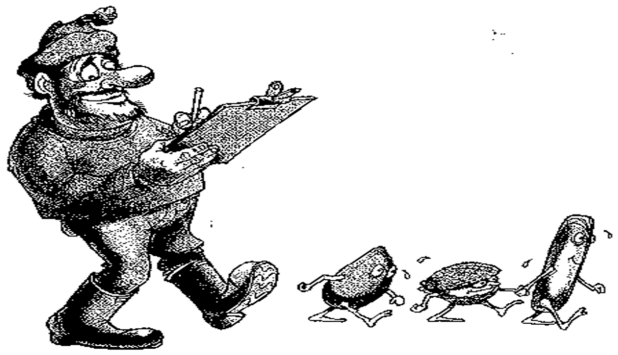
- Bivalves in +42hrs = bivalves out. Therefore, check the intake/dispatch

- Tank records (UV on/off; temp.; flow rates; cleaning; water re-use)

Steps to forming an accurate first impression – step 3

3. Audit the records and paperwork – *contd*

- When was the current HACCP plan and underlying policies last reviewed? Have there been any changes/modifications since the last review?
- EPT (type; frequency)
- Other records?



Steps to forming an accurate first impression – step 4

4. Testing

- DIY – carry out key tests yourself (examples - DO; temperature; salinity; turbidity)

- Ask your staff to demonstrate:
    - use of monitoring equipment
    - calibration / maintenance
    - examining UV quartz sleeve.

seafish

Techniques and approaches to also consider

- EPT:
  - more needed?
  - frequency of testing based on risk-based analysis

- Technology adopted:
  - are you using existing technology to maximum affect? (optimisation, cleaning, maintenance and calibration)
  - is there other technology that you could use to enhance your systems? (ozone; protein skimmers, venturis and chillers)

- Training:
  - are your staff trained and/or supervised? Training up to date? Need refreshing?
  - are they motivated and do they understand why what they do matters?

Thank you for your contributions

- Review and discussion
- A link to a webpage of resources will be emailed to learners by Seafish
- Online feedback requested

Seafish update…

- Training opportunities for industry include:
    - Bivalve Purification Operations training course for your colleagues
    - Elementary and Intermediate Food Hygiene eLearning training available
    - Food Authenticity and Integrity Verification training course
- Contact the Seafish Onshore Training team for more information onshore@seafish.co.uk

Thank you

Here to give the UK seafood sector **the support it needs to thrive.**