

Public Health Wales: The Final Slice of Swiss Cheese

UK Association for Food Protection Conference
Wednesday 22nd November 2023



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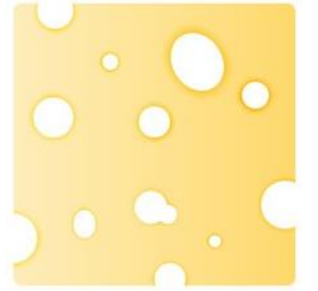
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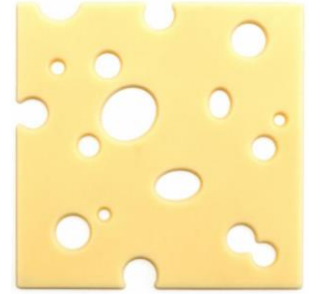
x: @DrBenJohns

Plan



- Introduction to my role and Public Health Wales
- Role of Official Control Laboratories
- Role of Welsh Food Microbiological Forum
- Ongoing research, service development & quality improvement work
- Future outlook + horizon scanning

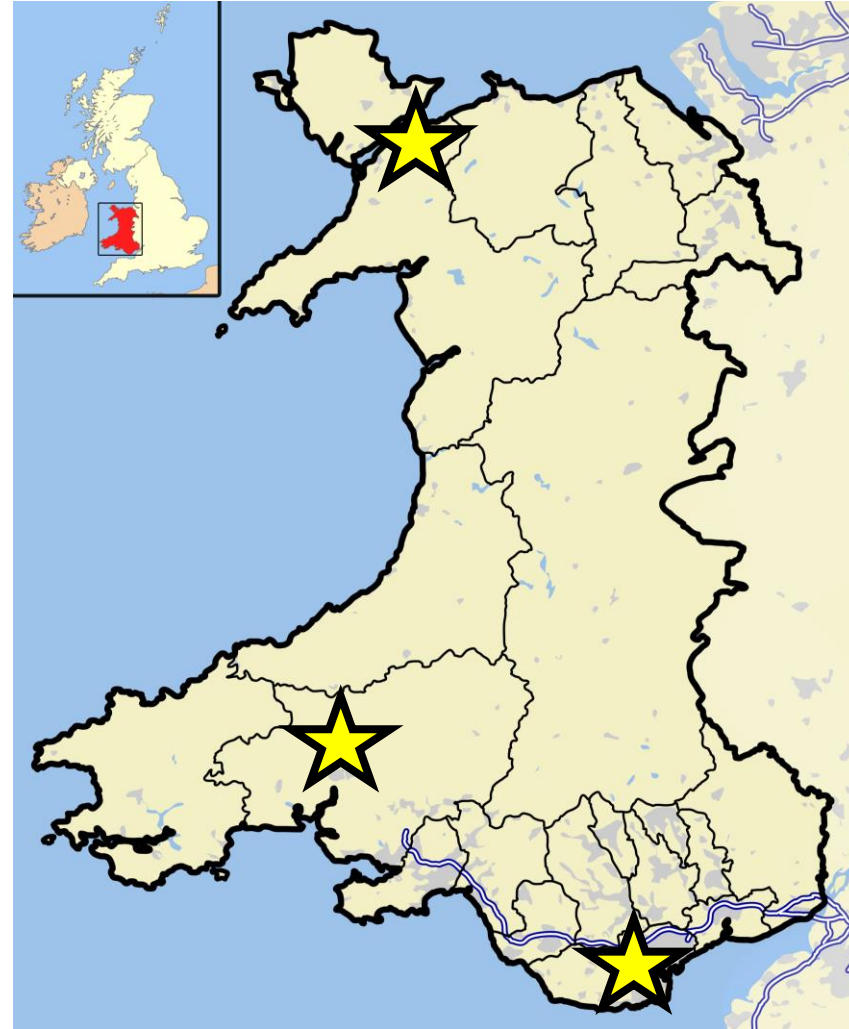
Introduction



- HCPC-registered Clinical Scientist (HSST)
- Public Health Wales Clinical Microbiology service including Wales Specialist Virology Centre during early COVID-19 pandemic
- Public Health Wales Food, Water & Environmental Microbiology Service
- Secretary & Chair-elect of the Welsh Food Microbiological Forum

Public Health Wales

- National public health agency for Wales and an NHS Trust
- Deliver clinical and public health microbiology services across Wales
- PHW FWE Network operate the only Official Control Laboratories in Wales (including CL3 facilities)



Official Control Laboratories



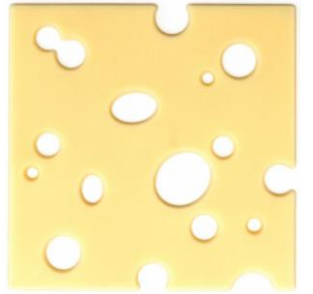
- Designated by the Food Standards Agency according to the National Control Plan
- Official Feed and Food Control Regulations 2017/625
- Food Examiners (Microbiological examination), Agricultural Analysts (animal feeds and fertilisers) or Public Analysts (Chemical analysis of food)
- Accredited by UKAS to BS EN ISO/IEC 17025:2017

Official Control Laboratories



- Must have Food Examiners for Microbiology - The Food Safety (Sampling and Qualifications) (Wales) Regulations 2013
- Food Examiners cannot be a director, owner or employee of a food business or partner in a food business (conflict of interest)
- Responsible for the examination of foods on behalf of Local Authorities (Environmental Health) for enforcement purposes (to support a prosecution) – ‘Formal Foods’

Official Control Laboratories



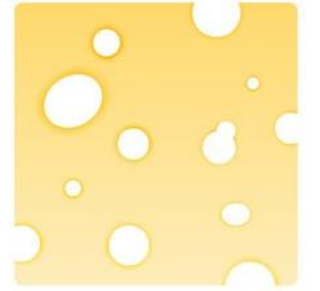
- Formal Foods must have a Chain of Evidence from time of sampling through to report authorisation (who/when/what used for all stages)
- A registered Food Examiner must:
 1. Receive the sample at the laboratory from the EHO
 2. Test / oversee microbiological testing of the sample
 3. Issue the authorised report
 4. Provide a witness statement / testimony as required by the Court

UKAS Accreditation



- United Kingdom Accreditation Service
- Inspect the laboratory in-person annually against relevant ISO standard(s) including BS EN ISO/IEC 17025:2017
- Training and competency records, internal quality assurance, external quality assurance, incident / non-conformance reporting etc.
- Independently verify that we can be relied upon to deliver accurate, reliable results across any of our three laboratories

PHW Food, Water & Environmental Microbiology



- We test food, waters (drinking water, hospital water, endoscopy rinse water, river water, sea water etc.) and environmental (aseptic pharmaceutical production units, food preparation areas etc.)
- $\approx 90,000$ samples *per annum*
- All foods including sandwiches, cooked foods, raw ready-to-eat food (such as fruit, vegetables, sushi etc.), milk, frozen foods (including ice cream, ice cubes etc.)
- Majority of testing undertaken on ready-to-eat foods

PHW Food, Water & Environmental Microbiology



Tap water from ICU

Kitchen cloth from NHS kitchen

Ships waters

Ice from fast food chain

Compost (heap) from patient with Legionnaires' disease

Oysters for seawater quality monitoring

Milk from remote farm self-service vending machine

Chicken dinner from NHS ward

Empty re-used office water dispenser bottle

Sushi from supermarket

Post-cleaning rinse water from urology flexible cystoscope

Imported mushrooms

Settle plate from pharmacy production unit

Swiss Cheese Model: Food Safety Resilience

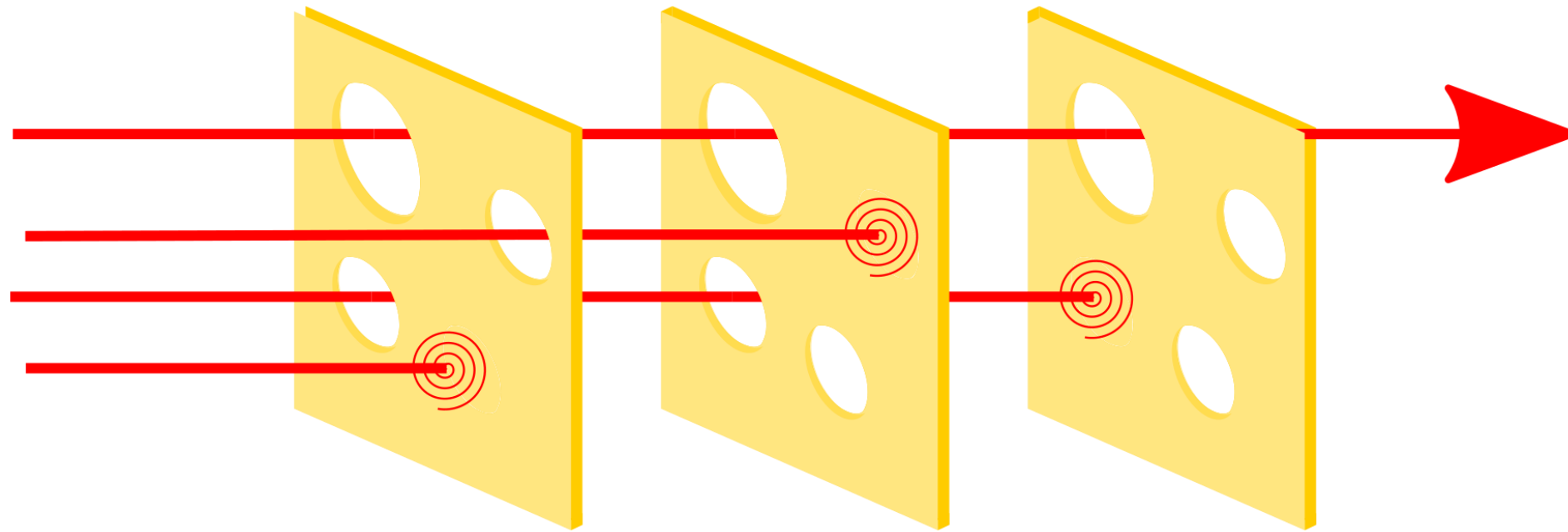
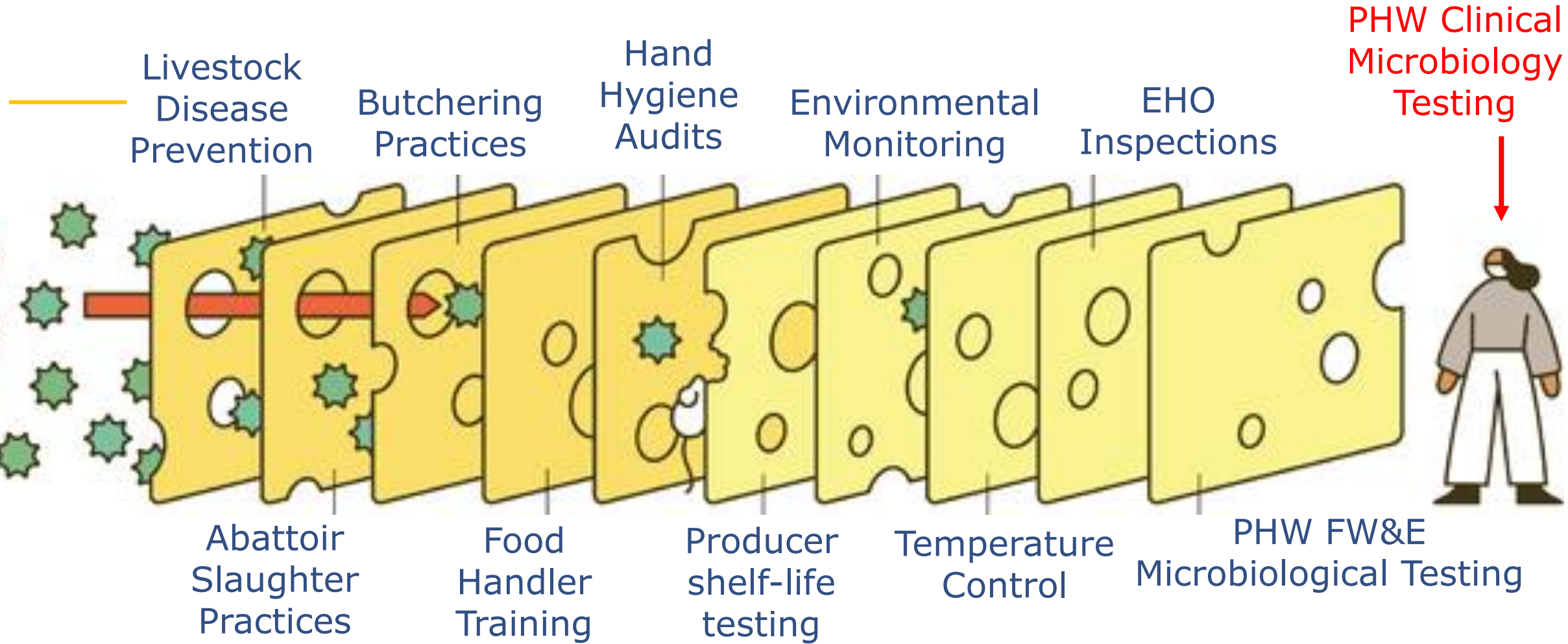


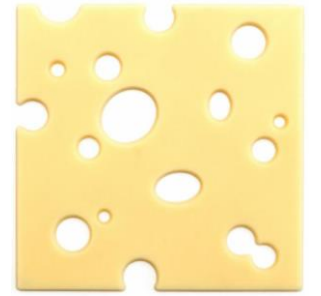
Image credit: Ben Aveling

Swiss Cheese Model: Food Safety Resilience



Welsh Food Microbiological Forum

Proactive: Food Safety Resilience



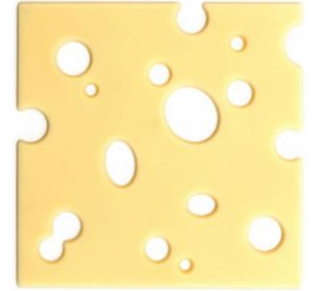
- Established in 1993, collaboration between PHW, Local Authorities from across Wales, FSA, Welsh Government and academic partners – can facilitate large, robust studies
- Previously examined: sandwiches, salads, cheese, ice, ice cream, frozen fruit, school meals, cooked chicken, bargain stores, pies & filled pastry, sauces, vacuum-packed, catering platters, shopping basket etc.
- Planning cooked chicken and microgreens from January 2024

Detection of *Listeria monocytogenes*



- One of two pathogenic *Listeria* species
- Highly robust bacteria that can replicate as both free-living saprophytes and facultative intracellular organisms that can invade and multiply within diverse eukaryotic cell types
- Ubiquitous in nature – can contaminate food processing, distribution and retail environments

Detection of *Listeria monocytogenes*



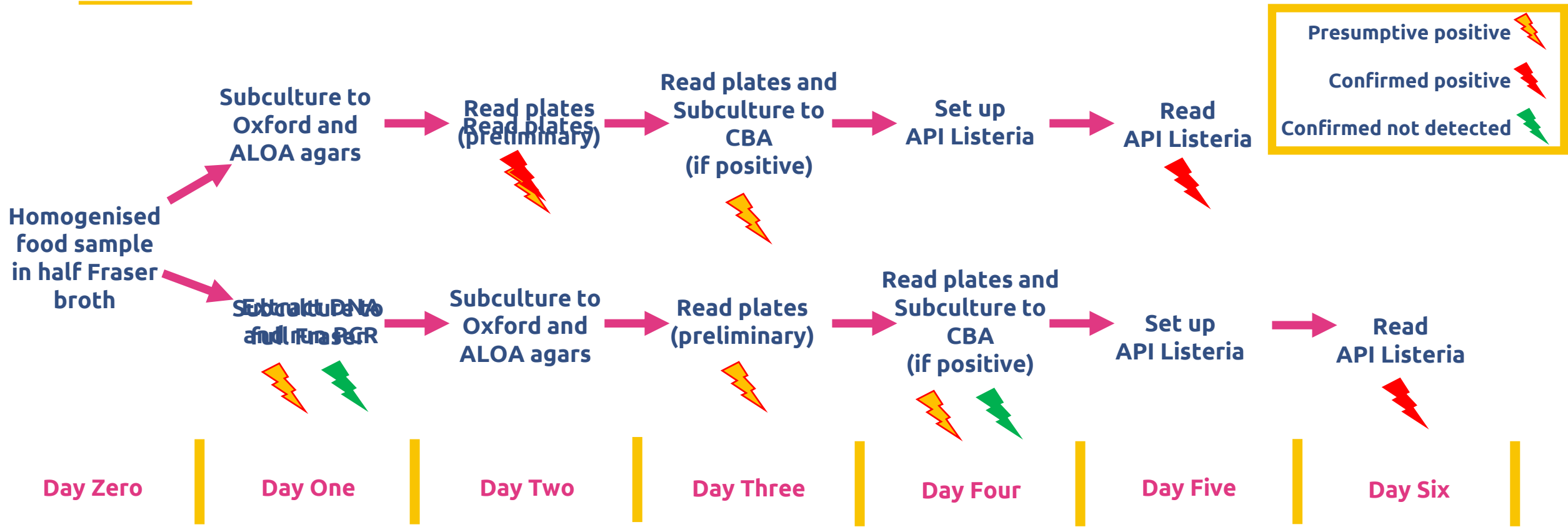
- Typically presents as gastroenteritis (+/- fever)
- Severe complications include septicaemia, meningitis, encephalitis, ophthalmitis, perinatal infections and abortion
- Immunocompromised are most at risk
- Notifiable according to the Public Health (Control of Disease) Act 1984 and Health Protection (Notification) Regulations 2010

Detection of *Listeria monocytogenes*



- 0.24 cases per 100,000 population
- 156 cases in England & Wales *per annum* (2010-19 mean)
- Pregnancy associated infections: 17.6% reported cases
 - ↳ 1/3 cases result in miscarriage or stillbirth
- Case fatality rate amongst non-pregnancy cases: 12.8%

Detection of *Listeria monocytogenes*



Detection of *Listeria monocytogenes*



- First molecular test introduced into PHW FW&E Network
- TAT reduced (negative result from 4 days to 1 day; positive result from up to 6 days to 2 days with a presumptive result after 1 day)
- >500 samples tested (including spikes, naturally contaminated and EQA's)
- Validated for foods, swabs and colony picks (confirmatory testing)

L. monocytogenes Collaboration with Food Industry Centre (Cardiff Met)



- Samples collected from foods and swabs across Wales
- Undergoing whole genome sequencing to provide insight into Listerial landscape across Wales
- Phenotypic biocide testing to understand resistant rates and elucidate molecular markers of biocide resistance
- Clear public health benefits to inform the control of *Listeria* spp.

Horizon Scanning: Microgreens



Lacks any legal definition but is commonly used to describe a specific category of young and tender edible seedlings of vegetable products. Specifically, they are immature cotyledonary leafy vegetables that are harvested when the cotyledons have fully expanded and before true leaves have emerged.



Microgreens

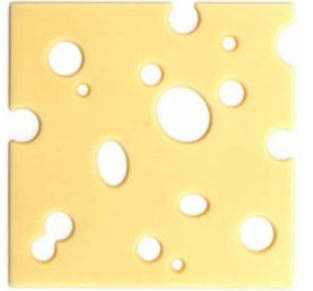


- Gaining popularity as a new culinary ingredient due to their colour and flavour diversity, short growth cycle, and reported higher concentrations of bioactive components such as vitamins, minerals, and antioxidants compared with them being harvested and consumed at maturity.
- Grown without soil and may be cultivated in a variety of systems from simple 'DIY' home systems to sophisticated vertical farms with automated irrigation, fertilizer delivery, and lighting controls.

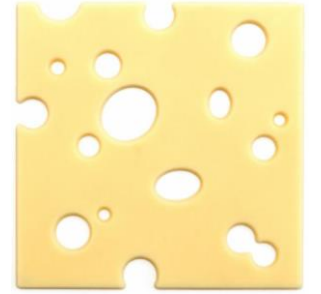
Microgreens



Microgreens

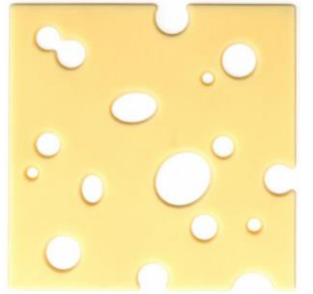


Microgreens



- Contamination: seeds, irrigation or poor hand hygiene
- Incubation in humid environment during storage/transportation (particularly if pre-washed)
- Harvesting may damage leaf/stem structure and permit infiltration which may be difficult to remove through washing
- Risks currently unknown – difficult to regulate

Future Work



- Ongoing WFMF surveys
- Ongoing *L. monocytogenes* collaboration
- Study of microgreens' microbiological risk
- Further service development and introduction of new technologies (focus on molecular)
- Consideration of STEC and *Shigella* methods

Acknowledgements



Thank you for listening

Any questions?

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