




## LISTERIA CONTROL IN SEAFOOD PROCESSING ENVIRONMENTS: – A FIVE-POINT PLAN

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Faroe Islands Aquaculture Association, 28<sup>th</sup> February 2020

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## Listeriosis 2018




EU One Health Zoonoses Report 2018

**Table 2:** Reported hospitalisations and case fatalities due to zoonoses in confirmed human cases in the EU, 2018

Disease	Number of confirmed human cases	Status available (%)	Hospitalisation			Deaths			
			Number of reporting MS <sup>(b)</sup>	Reported hospitalised cases	Proportion hospitalised (%)	Outcome available (%)	Number of reporting MS <sup>(b)</sup>	Reported deaths	Case fatality (%)
Campylobacteriosis	246,571	27.7	18	20,948	30.6	72.7	16	60	0.03
Salmonellosis	91,857	43.2	15	16,556	41.7	67.0	17	119	0.19
STEC infections	8,161	37.3	18	1,151	37.8	60.4	20	11	0.22
Yersiniosis	6,699	26.4	14	519	29.3	56.8	15	3	0.08
Listeriosis	2,549	42.4	17	1,049	97.0	57.6	19	229	15.6
West Nile fever <sup>(a)</sup>	1,548	44.7	10	634	91.6	84.6	11	137	10.5
Echinococcosis	793	29.6	13	109	46.4	35.1	14	3	1.10
Q fever	789	NA <sup>(c)</sup>	NA	NA	NA	58.7	12	8	1.70
Brucellosis	358	44.4	9	159	71.1	29.9	10	1	0.93
Tularaemia	300	32.0	11	69	71.9	47.7	11	0	0.0
Trichinellosis	66	21.2	6	9	64.3	27.3	6	0	0.0
Rabies	1	NA <sup>(c)</sup>	NA	NA	NA	100.0	1	1	100.0

MS: Member State.  
(a): Instead of confirmed human cases, the total number of human cases were included.  
(b): Not all countries observed cases for all diseases.  
(c): NA: Not applicable as the information is not collected for this disease.

The European Union summary report on trends and sources of zoonoses, zoonotic agents and food-borne outbreaks in 2018  
EFSA Journal 2019;17(12):5926

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## Maior food groups affected

	2017	2016	2015	2014	2013	Data source
<b>RTE food</b>						
<b>RTE food – occurrence (%) by detection method (number of tested samples by detection method; number of reporting MS)<sup>(a)</sup></b>						
Fish and fishery products	6.0% (n = 6,730; 22 MS)	5.1% (n = 2,918; 22 MS)	3.2% (n = 4,658; 22 MS)	5.8% (n = 3,436; 16 MS)	5.1% (n = 3,479; 20 MS)	EFSA
Meat and meat products (beef, pork, broiler and turkey meat)	1.8% (n = 22,544; 19 MS)	3.3% (n = 15,161; 23 MS)	2.8% (n = 16,789; 21 MS)	2.1% (n = 67,215; 18 MS)	3.4% (n = 44,977; 21 MS)	EFSA
Soft and semi-soft cheeses made from raw or low-heat-treated milk	0.9% (n = 6,117; 17 MS)	2.6% (n = 853; 15 MS)	1.4% (n = 730; 13 MS)	1.0% (n = 2,573; 13 MS)	4.2% (n = 2,542; 13 MS)	EFSA
Hard cheeses made from raw or low-heat-treated milk	0.1% (n = 5,039; 15 MS)	1.0% (n = 509; 9 MS)	1.3% (n = 858; 11 MS)	0.2% (n = 10,175; 9 MS)	0.7% (n = 1,609; 12 MS)	EFSA
Fruit and vegetables	0.6% (n = 1,773; 17 MS)	0.7% (n = 1,043; 16 MS)	2.1% (n = 1,456; 17 MS)	3.0% (n = 1,503; 17 MS)	2.1% (n = 1,991; 15 MS)	EFSA
Salads	4.2% (n = 902; 14 MS)	1.9% (n = 1,042; 14 MS)	1.9% (n = 1,238; 13 MS)	1.1% (n = 1,154; 15 MS)	2.4% (n = 1,822; 14 MS)	EFSA

2018 - Overall rate for *L. monocytogenes* in RTE fishery products was 3.0%.  
Highest levels reported in The Netherlands, Germany and Poland

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## Listeria – the perfect storm

- Survives in the processing environment
- Grows in the processing environment
- Grows in the storage and distribution chain
- Grows particularly well in the human body



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## Listeria related to RTE fish products



A



B

A  
B  
AB

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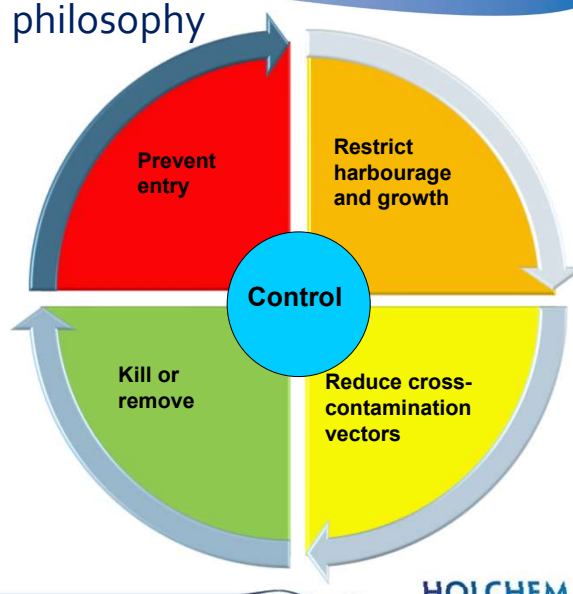
## Pathogen control philosophy

Campden BRI  
food and drink innovation



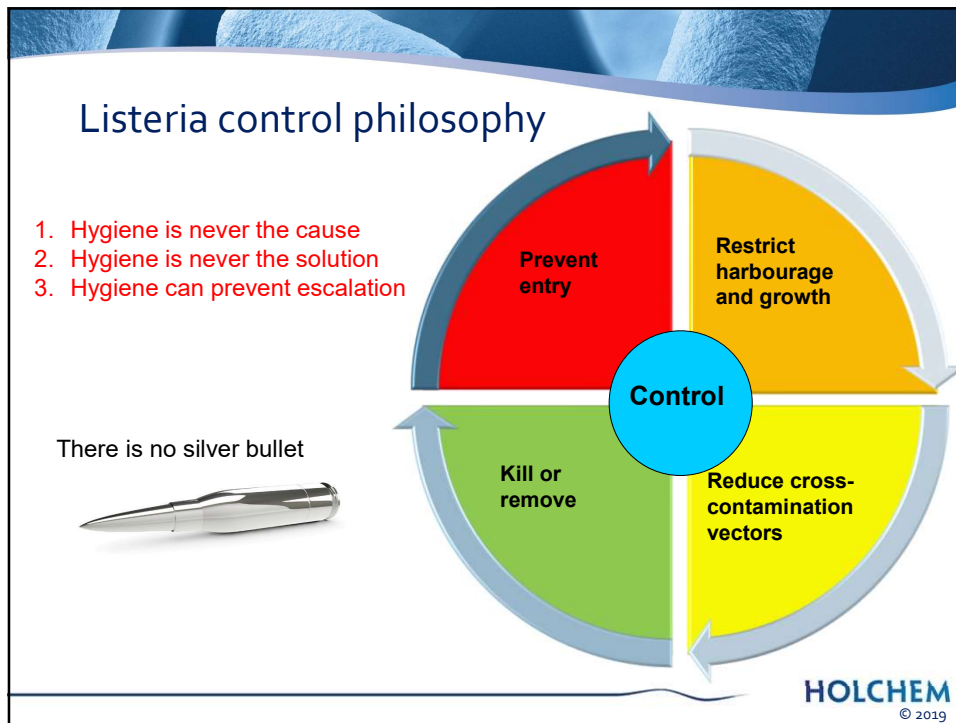
PEPSICO

Salmonella and dry foods

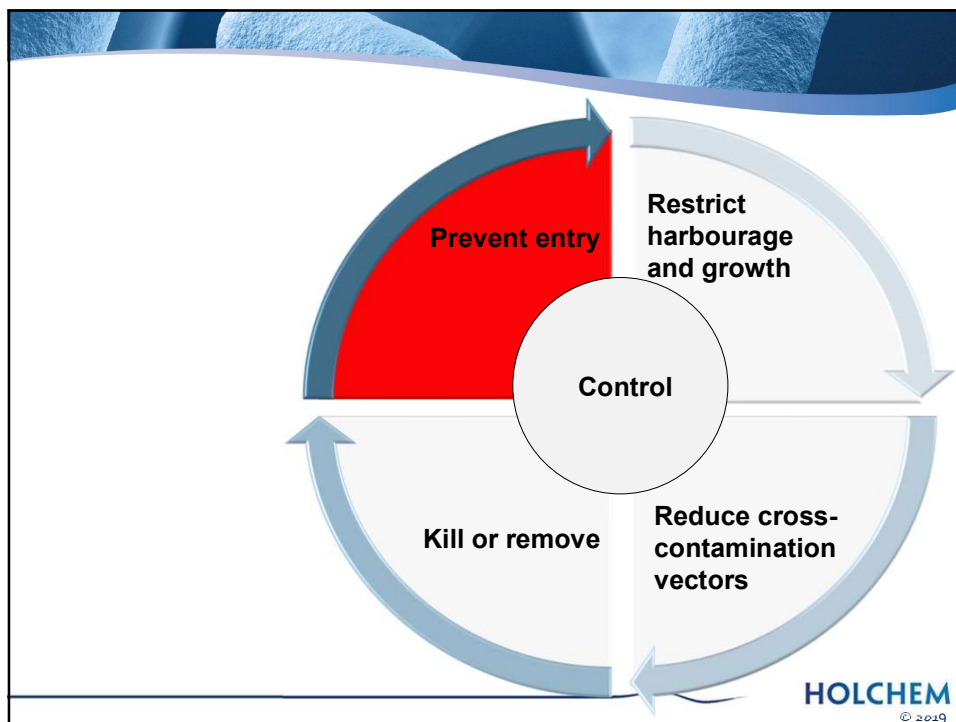


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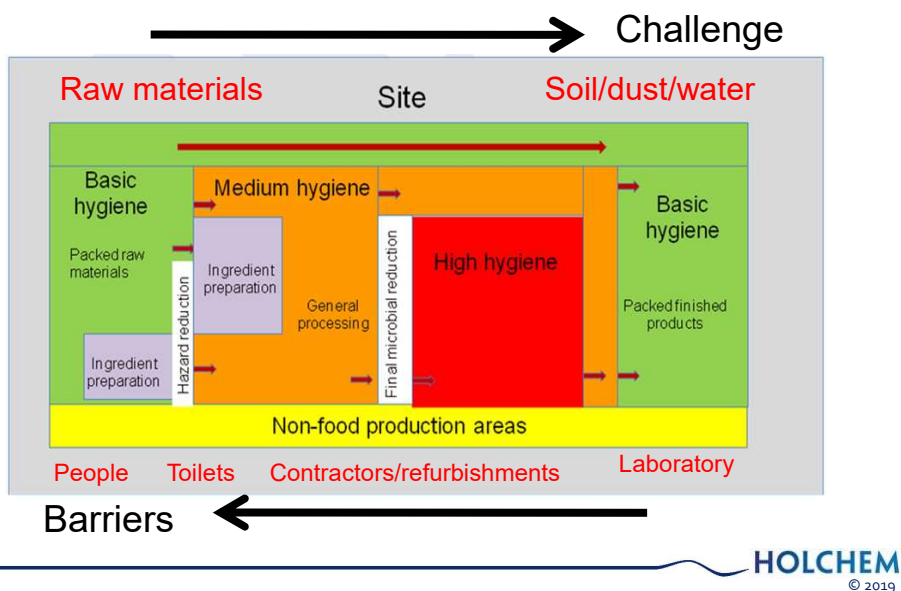


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## Listeria barriers



9

## Factory barrier



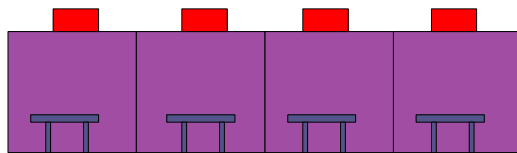
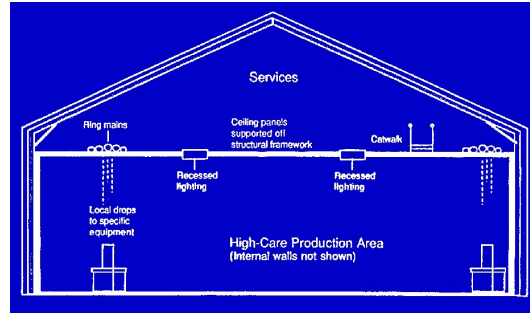
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## A box within a box

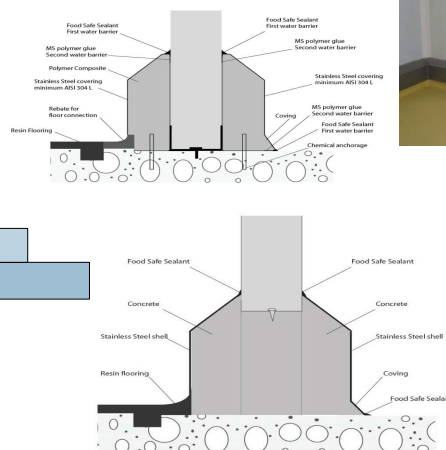
- External services
- Product, packaging, equipment, personnel only
- Small as possible
- Fewest, controlled entrances



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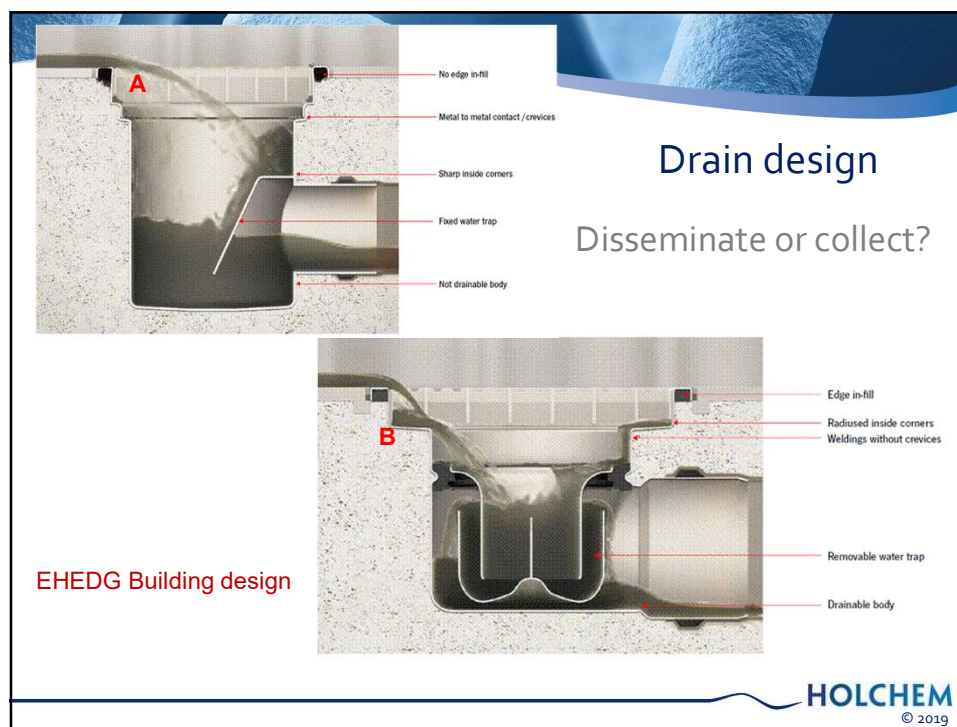
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## Wall-to-floor junctions?

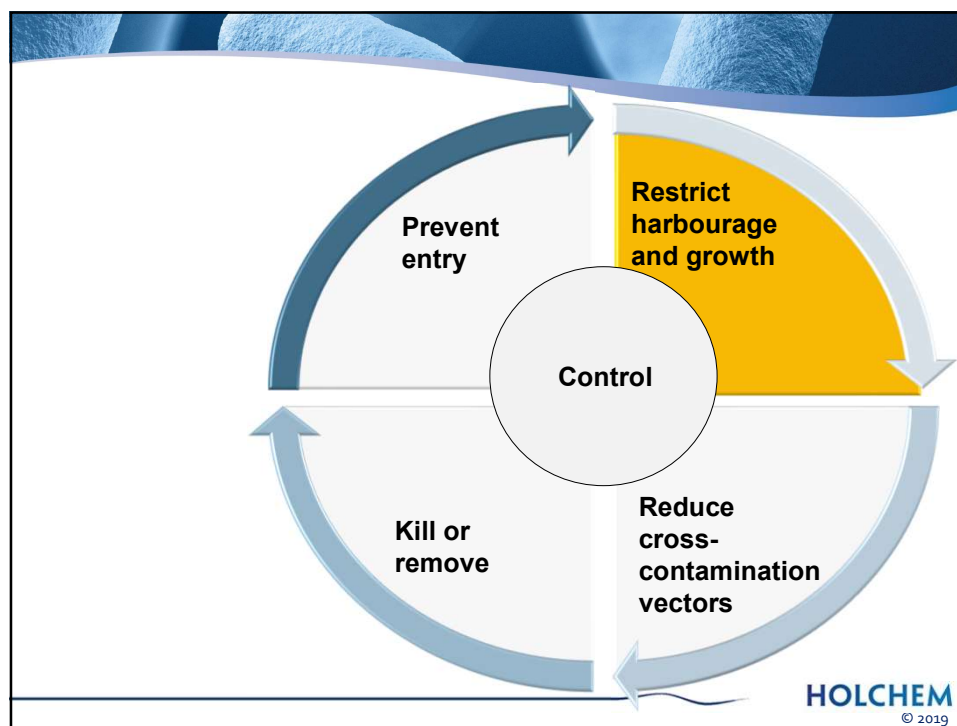


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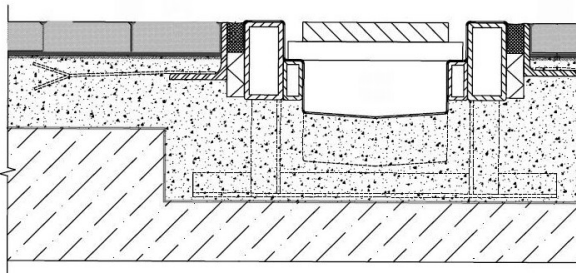
## Wall floor interfaces



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## Drain/ sub-floor interfaces?



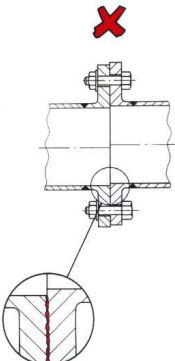
EHEDG Building design 2014

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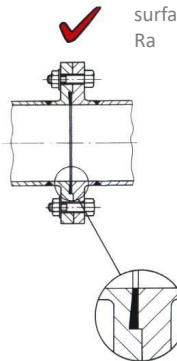
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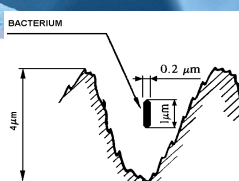
## Joints



✗



✓



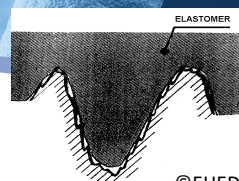
BACTERIUM

4 μm

0.2 μm

1 μm


Typical representation of a surface profile of 0.8 μm Ra




ELASTOMER

© EHED

1.5 N/mm<sup>2</sup> contact pressure required using 70° Shore A hardness



A metal-to-metal joint is a 10 lane highway!



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17

## Contamination by personnel

Food workers

12% carried *L. spp*

7% carried *Lm*




Chemical workers

No carriage

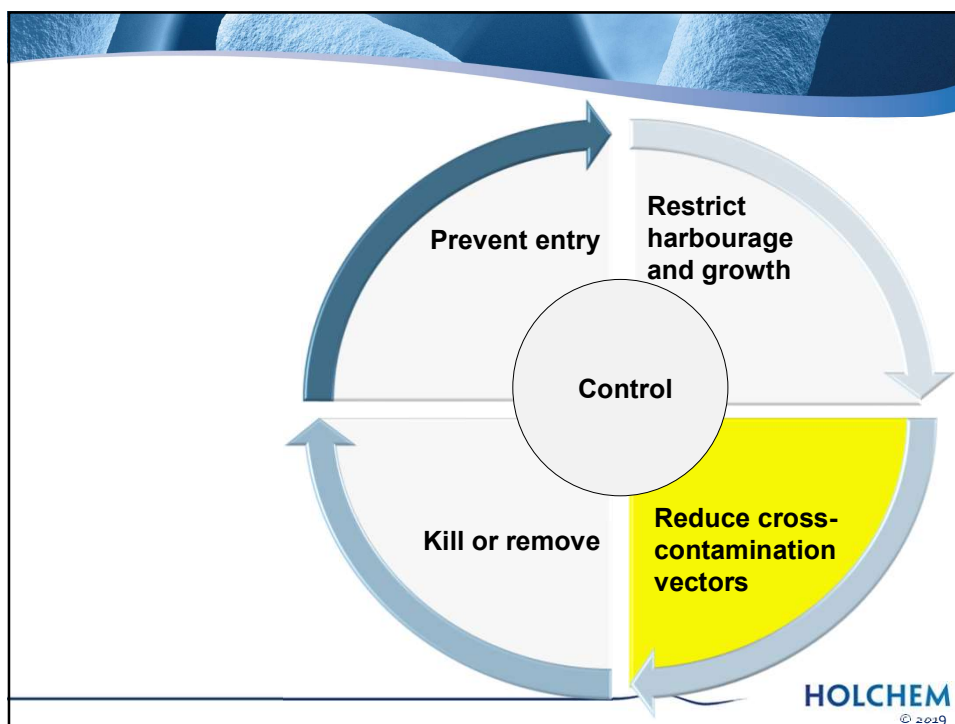
Segregation of low/high risk personnel?

Ker et al (1993) Prevalence of *Listeria* spp. on the hands of food workers. *Journal Food Protection*, 56:525-527

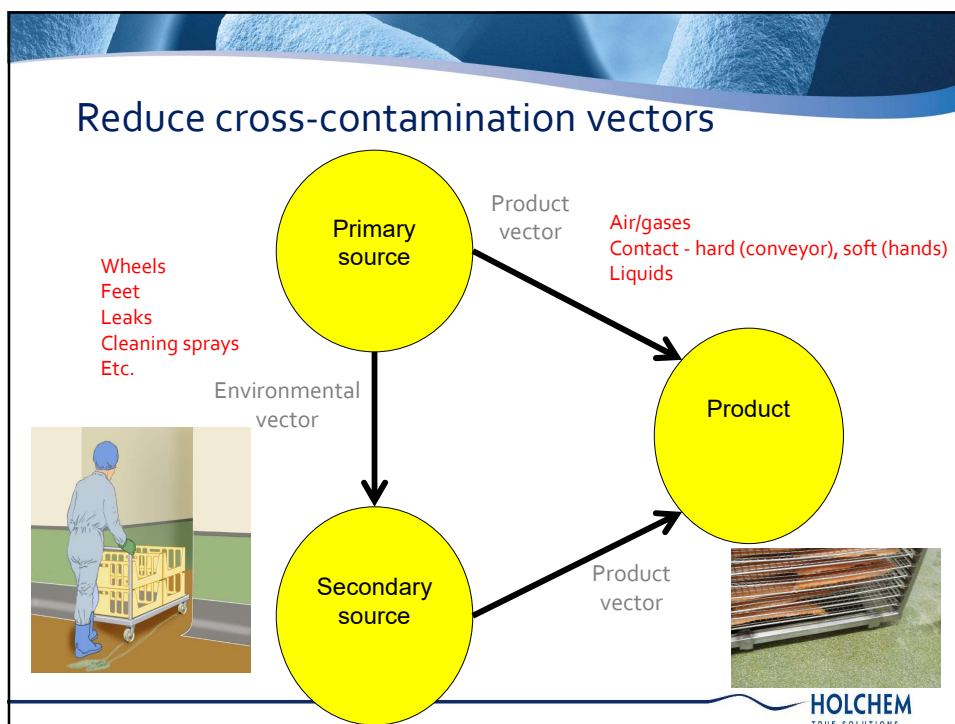


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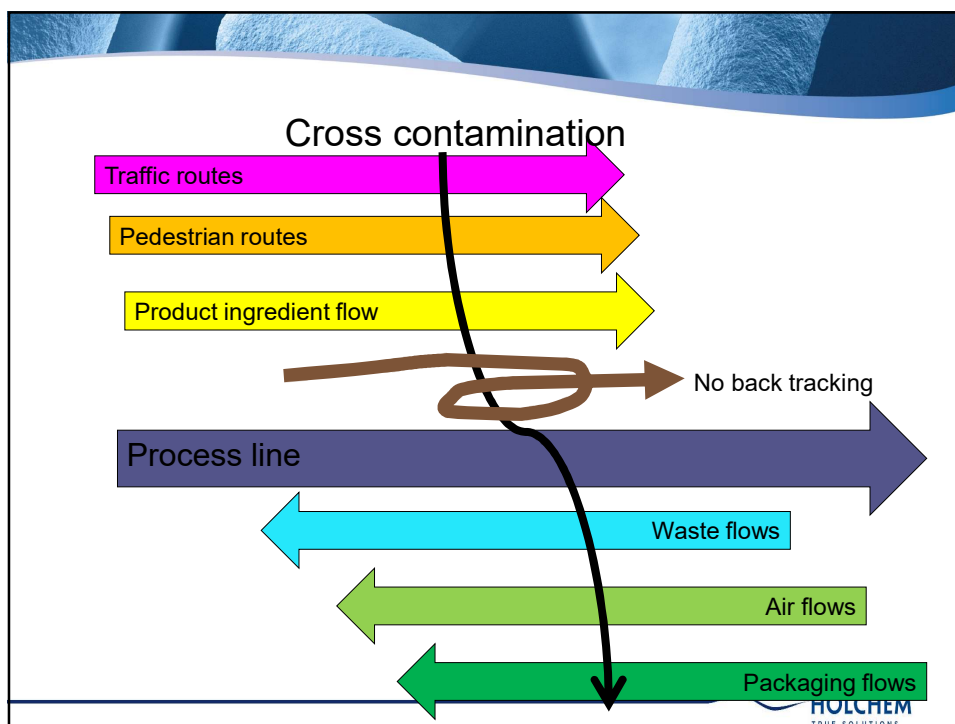
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19



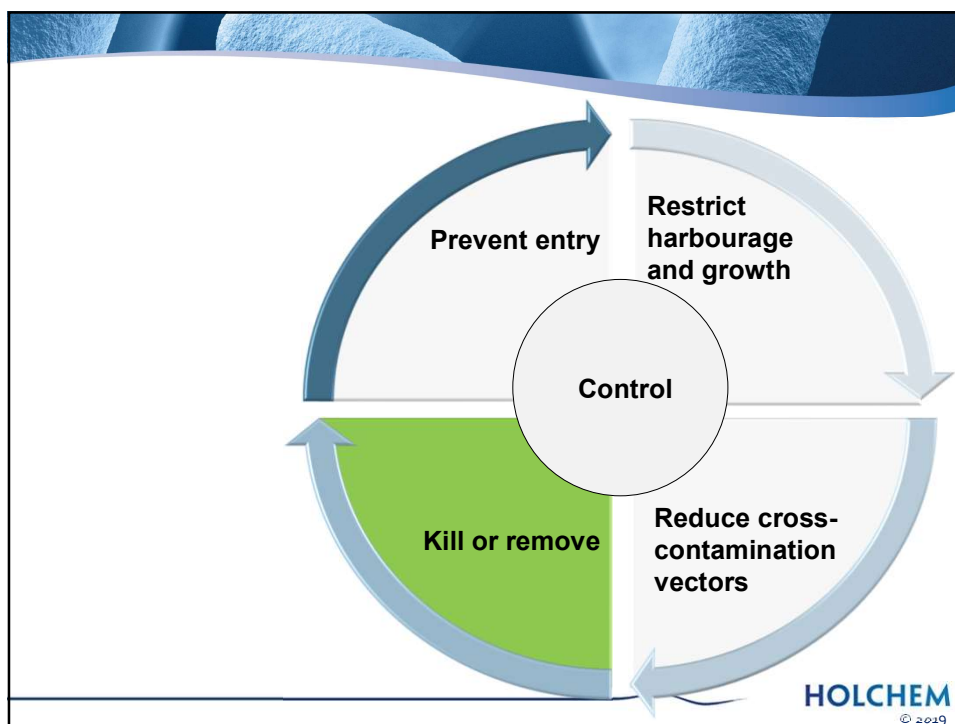
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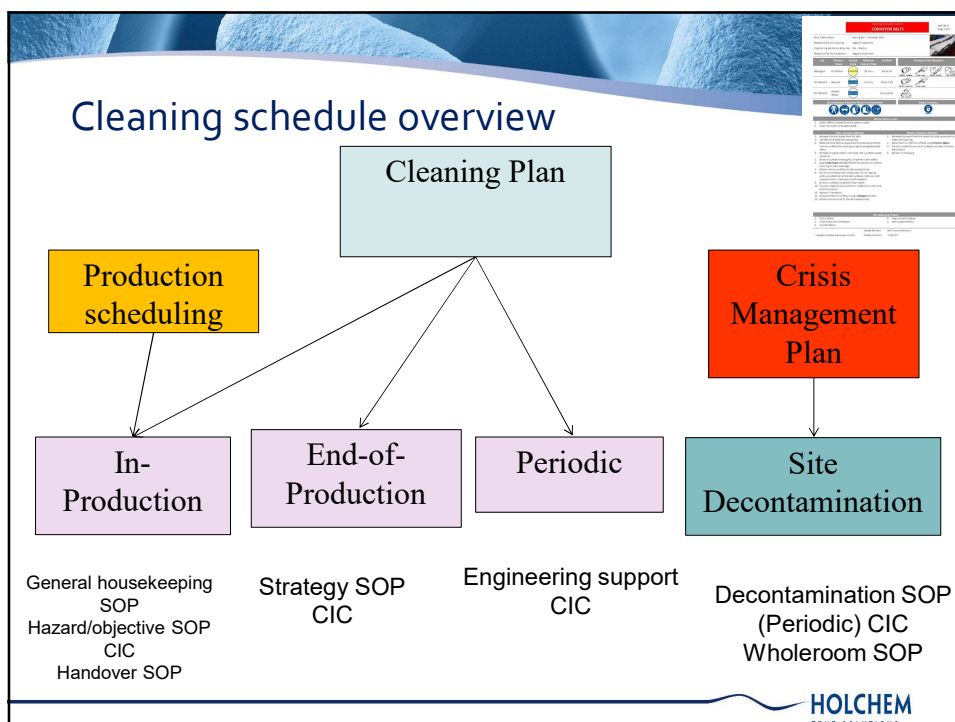
21



22



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24

## End of production

- Handover from production to hygiene
  - Defined cleaning window
  - Removal of all product and packaging
- Sequence
  - Gross solids removal, rinse, Listeria sources (e.g. drains), environment, equipment
- Chemical rotation
  - pH not disinfectants
- Cleaning validation – worst case scenarios
  - Hygienic design dead zones, most difficult to remove soil, minimal acceptable cleaning programme

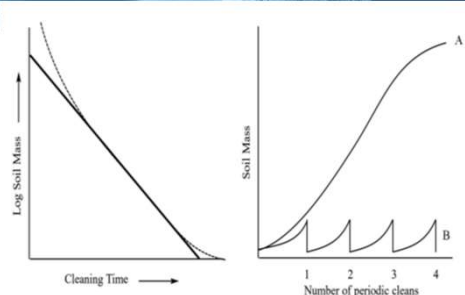


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## Periodic cleaning

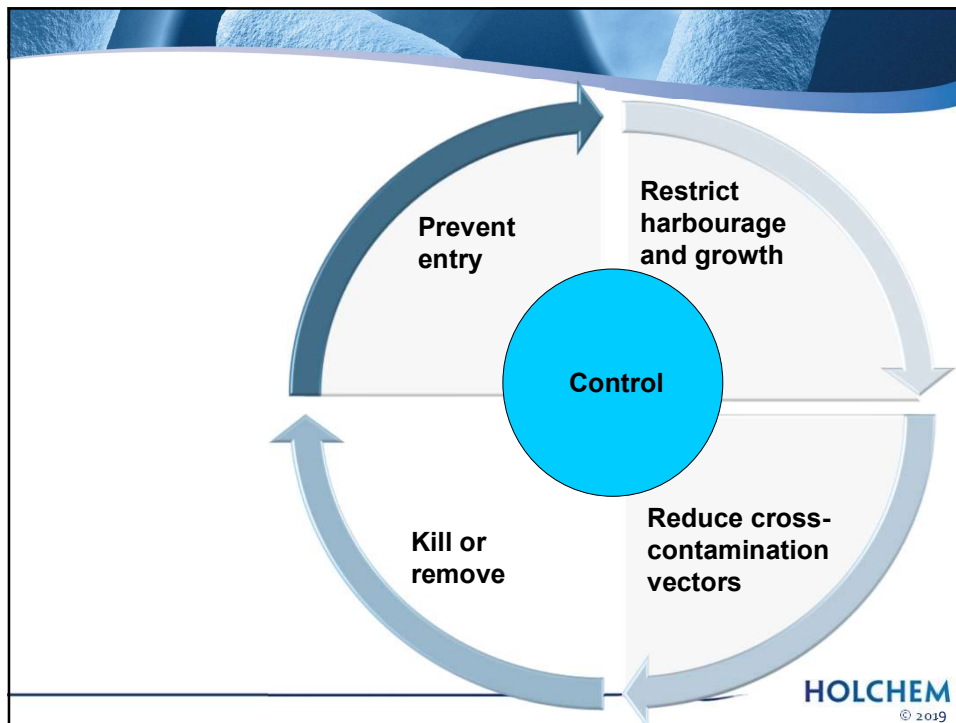
- Cleaning is not 100% efficient so soil will accumulate with time
- Periodic cleans are required
  - Additional energy
  - Additional strip down
  - Alternative chemicals e.g. scale removal (acid clean)
  - Heat



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## Sampling strategy

Are the barriers preventing pathogen entry?

- Sample around barriers during the day e.g. personnel changing, product entry tunnels, air supply and verify performance

Is everything under control during production?

- Sample known/suspected sources and transfer vectors – are they in control?
- Sample collector points e.g. footwear, tote wheels, cleaning equipment, drains – is there any evidence of the presence of a pathogen?
- Investigative studies if yes

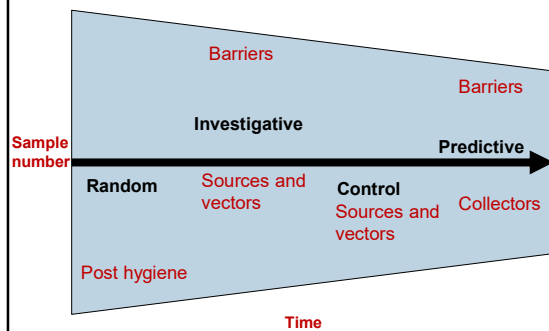
Do we have pathogen free processing equipment for subsequent production?

- Verify cleaning and disinfection performance

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## Environmental sampling plan maturity



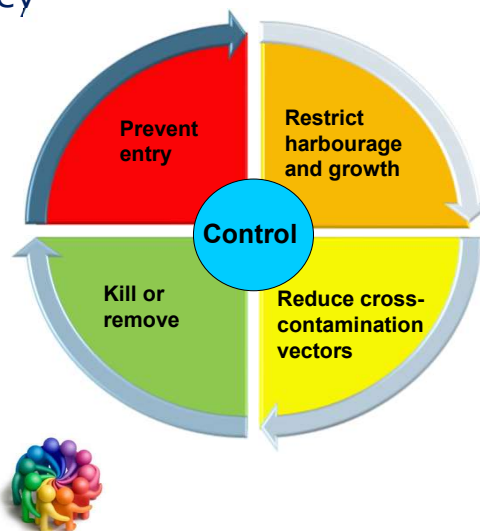
Listeria – I will find you  
and I will kill you!

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## Listeria 5 point plan – key learnings

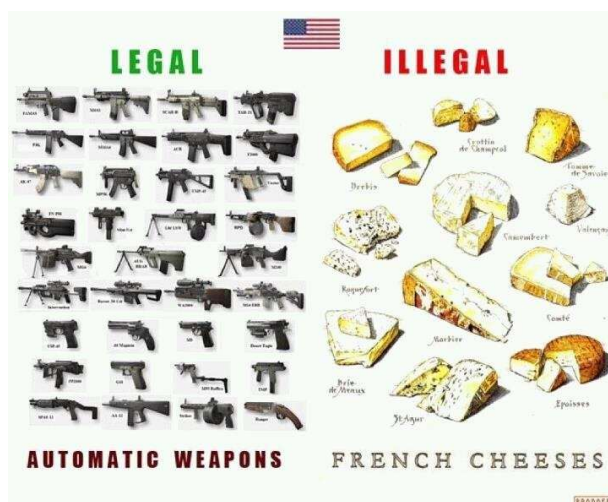
- Stop Listeria entering high hygiene
  - **Technical**
- Provide an infrastructure that does not harbour Listeria
  - **Engineering**
- Prevent Listeria moving from sources to product or the environment
  - **Production**
- Remove Listeria at defined time intervals
  - **Hygiene**



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## Realistic risk assessment?



Listeria  
control in  
context!

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<https://www.holchem.co.uk/about/downloads/>

Environmental Sampling Plan  
Listeria Management Plan

<https://www.holchem.co.uk/shop/accredited-training-courses-2020/14-listeria-management/14-listeria-management-2020/>

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32