

# Tank Yard Quantitative Microbial Risk Assessment

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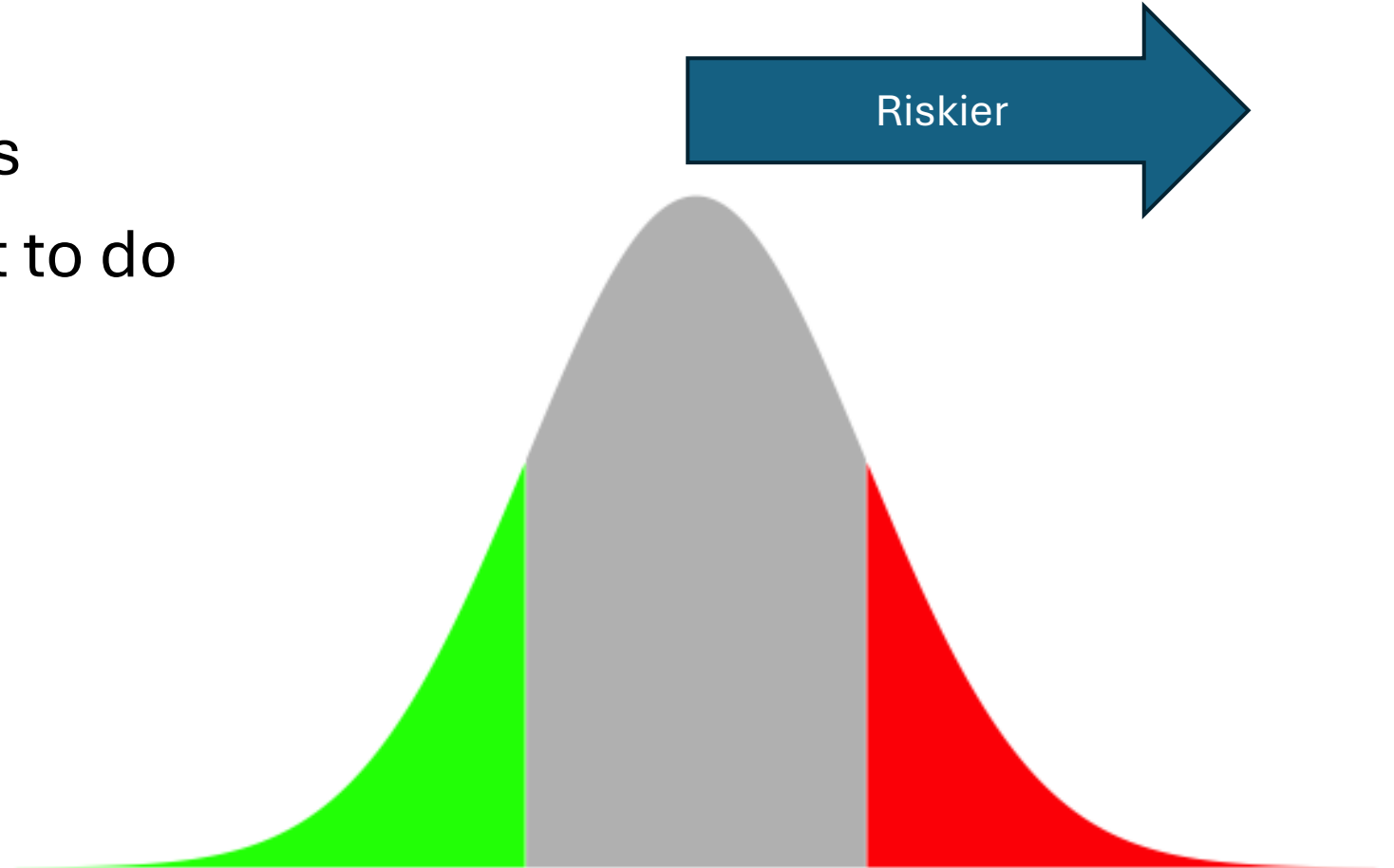
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# Risk analysis

- Risk assessment
  - How big is the risk?
  - Scientific process, using math and statistics
- Risk communication
  - How do we talk about the risk?
  - Social, psychological process
- Risk management
  - What do we do about the risk?
  - Practical, policy-based, political

# What is quantitative microbial risk assessment?

- Based in science
- Uses math and statistics
- But will not tell you what to do



# Three basic actions

Deposition from the air, cross-contamination, death



# Different processes = Different risks

- But the same basic actions apply
- Desalting in the brineyard
  - Deposition from the air
  - Cross-contamination from buckets
  - Post-packing reduction
- Desalting in the plant
- Removing brine and shipping to a second location

# Steps in Tankyard QMRA

- Desalting in the brineyard
  - Mass of pickles
  - Time
  - Surface exposure
  - Air quality
  - Settling velocity
  - CFU deposited
  - CFU/kg
  - Log CFU deposited
  - Log CFU/kg
- Transfer to containers
  - How many containers
  - Surface area per container
  - Surface quality
  - CFU deposited
  - CFU/kg
  - Log CFU deposited
  - Log CFU/kg

# Steps in Tankyard QMRA

- Packed product
  - Total CFU added
  - Total CFU/kg
  - Log CFU added
  - Log CFU/kg
- Final product
  - Log reduction per hour
  - Hours
  - Total log reduction
  - Final concentration

# The big picture

- Math connects all the steps

		Green numbers	are assumptions	
		Red cells	Are calculated by formula	
Step	Exposure parameters	Values	Comment	Units
Fermented pickles in the brineyard			These are considered "safe" by FDA	
Desalting in brineyard	-	-	Salt lowered to 2%	-
Desalting in brineyard	Mass of pickles	10000	Weight of pickles in a tank	kg
Desalting in brineyard	Time	12	How long are the pickles exposed to air	Hours
Desalting in brineyard	Surface exposure	50	What is the area of tank exposed to the air	m <sup>2</sup>
Desalting in brineyard	Air quality	0.001	What is the concentration of pathogens in the air	CFU/m <sup>3</sup>
Desalting in brineyard	Settling velocity	10	See den Aantrekker et al 2003	m/h
Desalting in brineyard	CFU deposited		Calculated	CFU
Desalting in brineyard	CFU/kg		Calculated	CFU/kg
Desalting in brineyard	Log CFU deposited		Calculated	Log CFU
Desalting in brineyard	Log CFU/kg		Calculated	Log CFU/kg
Transfer to containers	-	-	-	-
Transfer to containers	How many containers	5000	Number of containers to hold one tank	count
Transfer to containers	Surface area per container	0.2	300 square inches via google	m <sup>2</sup>
Transfer to containers	Surface quality	0.001	What is the concentration of pathogens in the buckets	CFU/m <sup>2</sup>
Transfer to containers	CFU deposited		Calculated	CFU
Transfer to containers	CFU/kg		Calculated	CFU/kg
Transfer to containers	Log CFU deposited		Calculated	Log CFU
Transfer to containers	Log CFU/kg		Calculated	Log CFU/kg
Packed product	-	-	-	-
Packed product	Total CFU added		Calculated	CFU
Packed product	Total CFU/kg		Calculated	CFU/kg
Packed product	Log CFU added		Calculated	log CFU
Packed product	Log CFU/kg		Calculated	Log CFU/kg
Final product	-	-	-	-
Final product	log reduction per hour	0.16	Breidt et al, 2007	log CFU/h
Final product	hours	10	Hold time before shipping	hours
Final product	total log reduction		Calculated	log CFU
Final product	Final concentration		Calculated	Log CFU/kg
	Kg to find 1 pathogen			



# Questions or comments?

