Listeria-kontroll i laks og lakseprodukter

FAGDAG OM LISTERIA-KONTROLL

GARDERMOEN, 13. NOVEMBER 2019

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Listeria-kontroll: et økende behov?

Listeria bacteria outbreak: Sainsbury's urgently recall contaminated smoked salmon

Four ill and one dead from Listeria in salmon

Danish fish producer unhappy with food authorities

SALMA-laks trekkes tilbake: frykter listeria

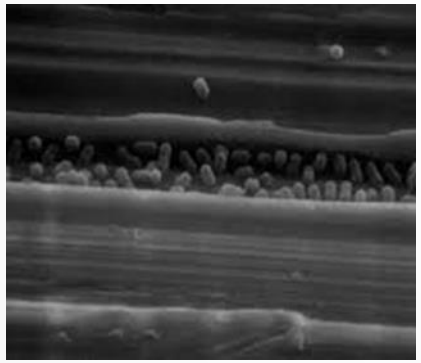
Multi-country outbreak of Listeria monocytogenes linked to consumption of salmon products

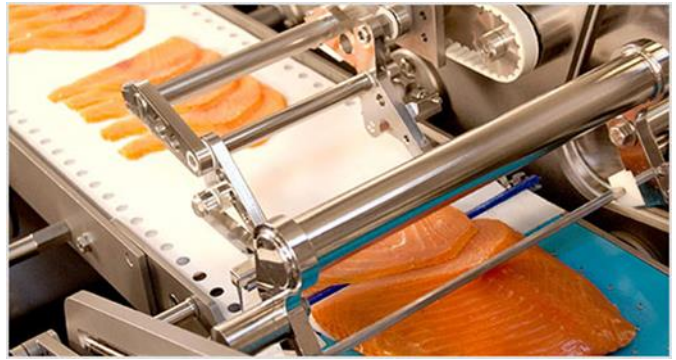
Two listeria outbreaks caused by smoked fish consumption—using whole-genome sequencing for outbreak investigations

Listeria control strategies

Environmetal **AND** raw material/product control

1. Prevent entry
2. Prevent establishment
3. Reduce cross contamination
4. Remove, kill or inhibit growth of *L. monocytogenes* in raw materials and potential risk products





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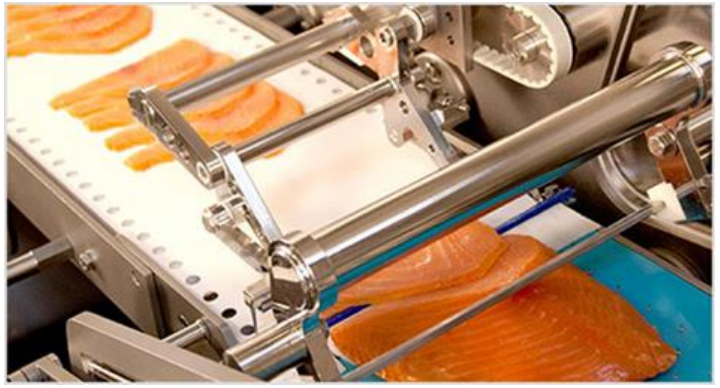
Important criteria for Listeria mitigation strategies on salmon

- Effect on *L. monocytogenes* (kill + inhibition)
- Robust effect under industry conditions
- Suitable for high throughput processing
- Approved for use
- Consumer acceptance
- No negative sensory effects
- Provide Cost-benefit



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Selected interventions for salmon

Interventions/technologies	Reported effects on Listeria (kill/growth inhibition)	Salmon of relevance for treatment
Chemical		
Organic acids/salts	Growth inhibition	Fresh, smoked
Oxidative compounds	Kill: 0-99% reduction	Fresh
Lauryl arginate	Kill: 0-99% reduction	Smoked
Liquid smoke	Kill + Growth inhibition	Smoked
Biological		
Bacteriophages	Kill: 50-99.9%	Fresh, smoked
Bacteriocins (e.g. nisin)	Kill: 50-99.9%	Fresh, smoked
Protective cultures	Growth inhibition	Fresh, smoked
Physical		
Ultraviolet light (UV-C)	Kill: 0-99% reduction	Fresh, smoked
Pulsed Light	Kill: 90-99% reduction	Fresh, smoked

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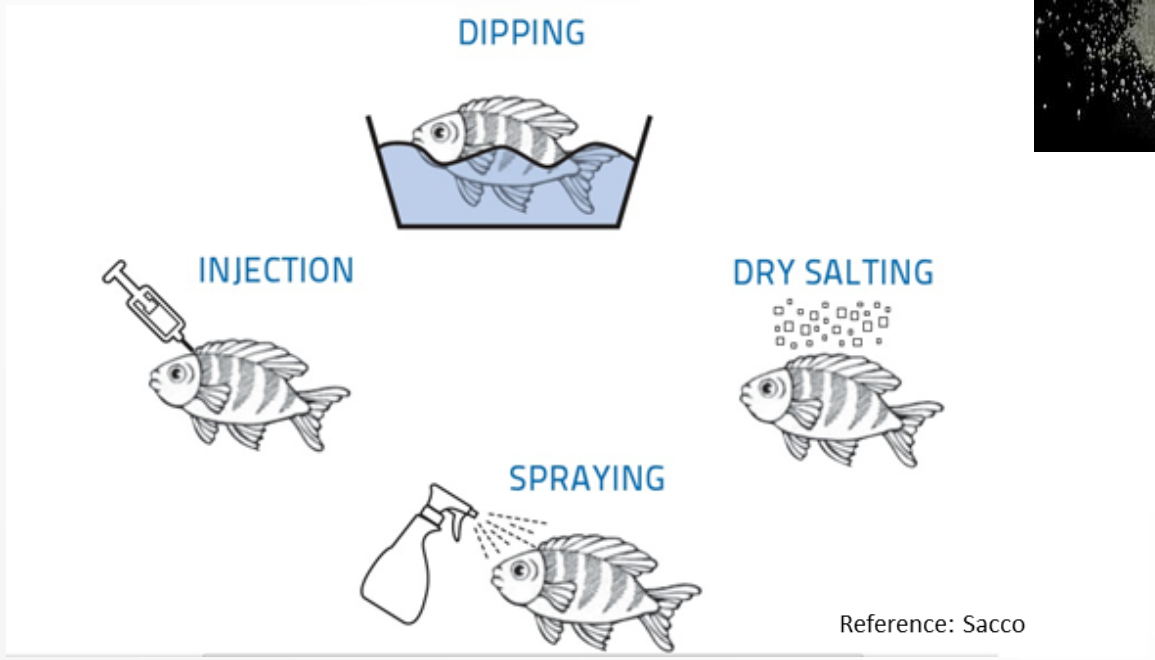
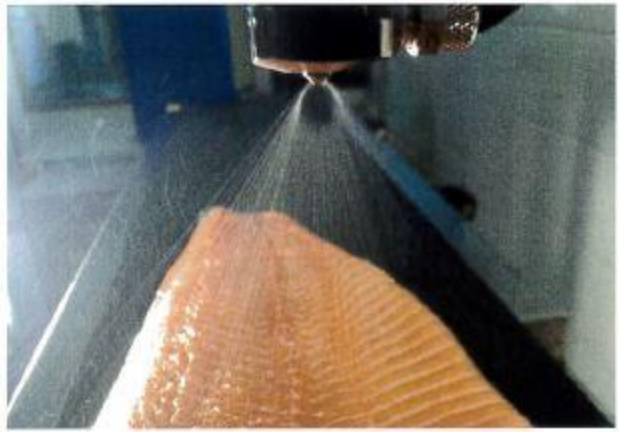
Application of Listeria mitigation strategies on salmon



Reference: Sacco



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Cold-smoked salmon: Organic acid salts for L. monocytogenes growth inhibition

- Verdad N6, a «Label Friendly» vinegar fermentate, was added in the salting process

- **Parameters tested**
  - Concentration of Verdad N6
  - Effect of storage temperature
  - Degree of smoking

Slicing, contamination and storage of CS salmon

Contaminate salmon with L. monocytogenes + vacuum packing + storage 4°C and 8°C → Sampling

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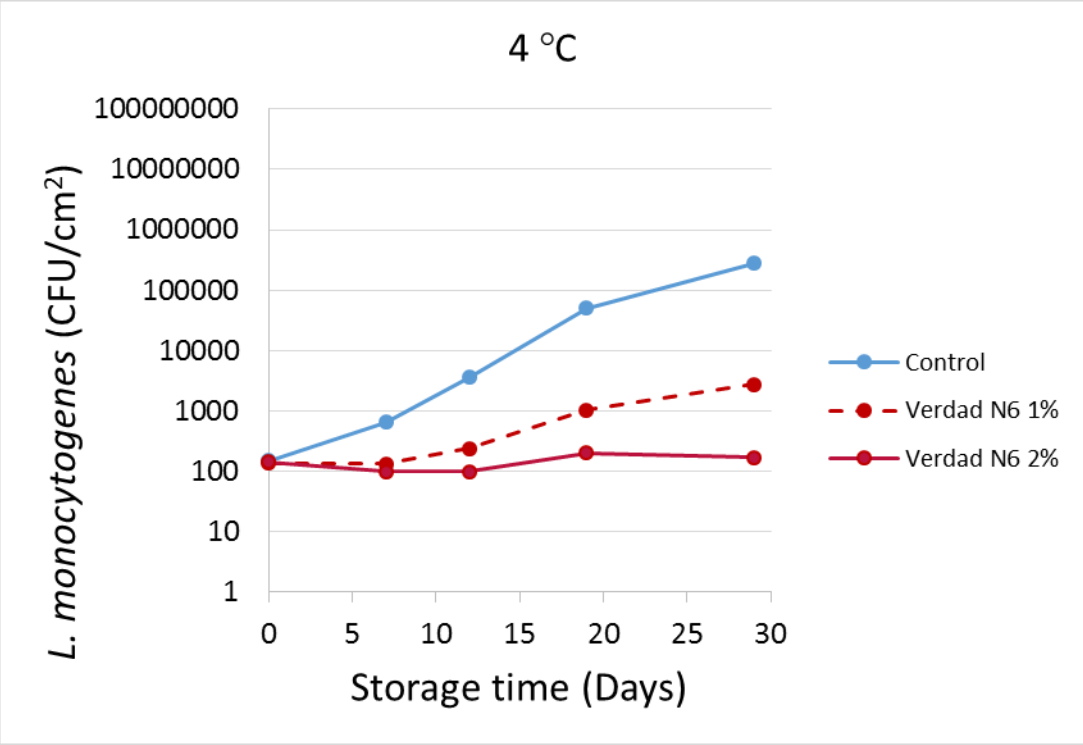
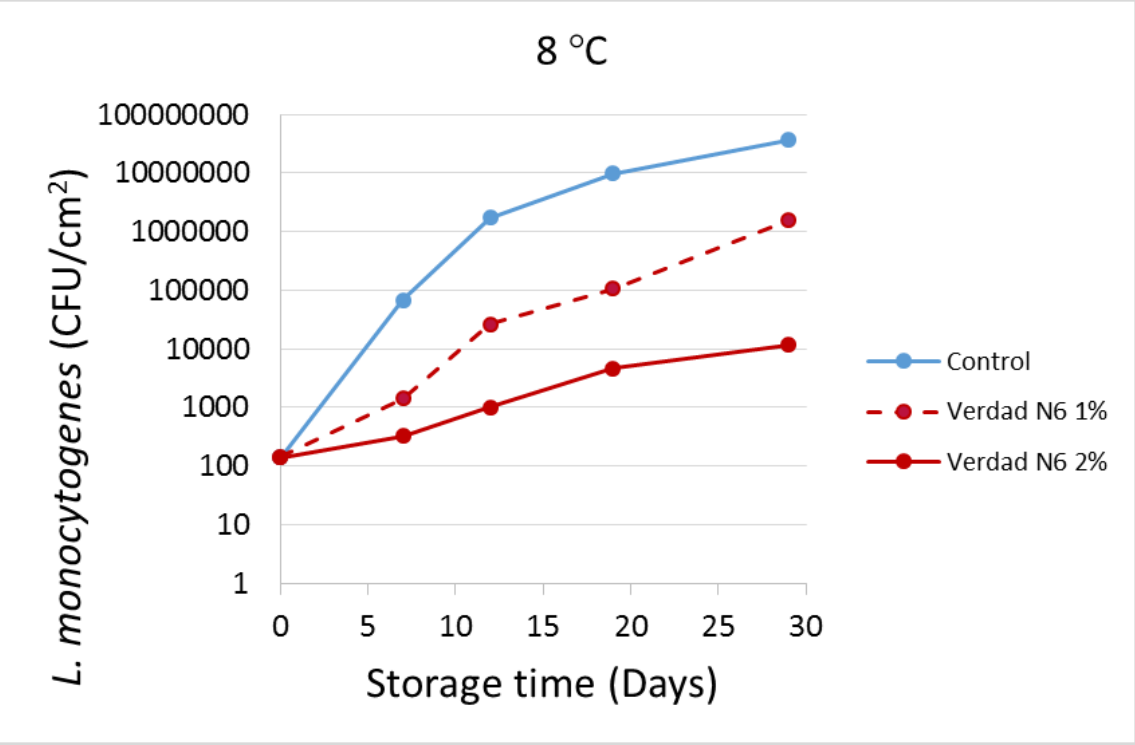
Sliced cold-smoked salmon: Organic acid salts reduce growth of *L. monocytogenes*





- Complete growth inhibition can be obtained
- No killing of Listeria
- Temperature control is essential

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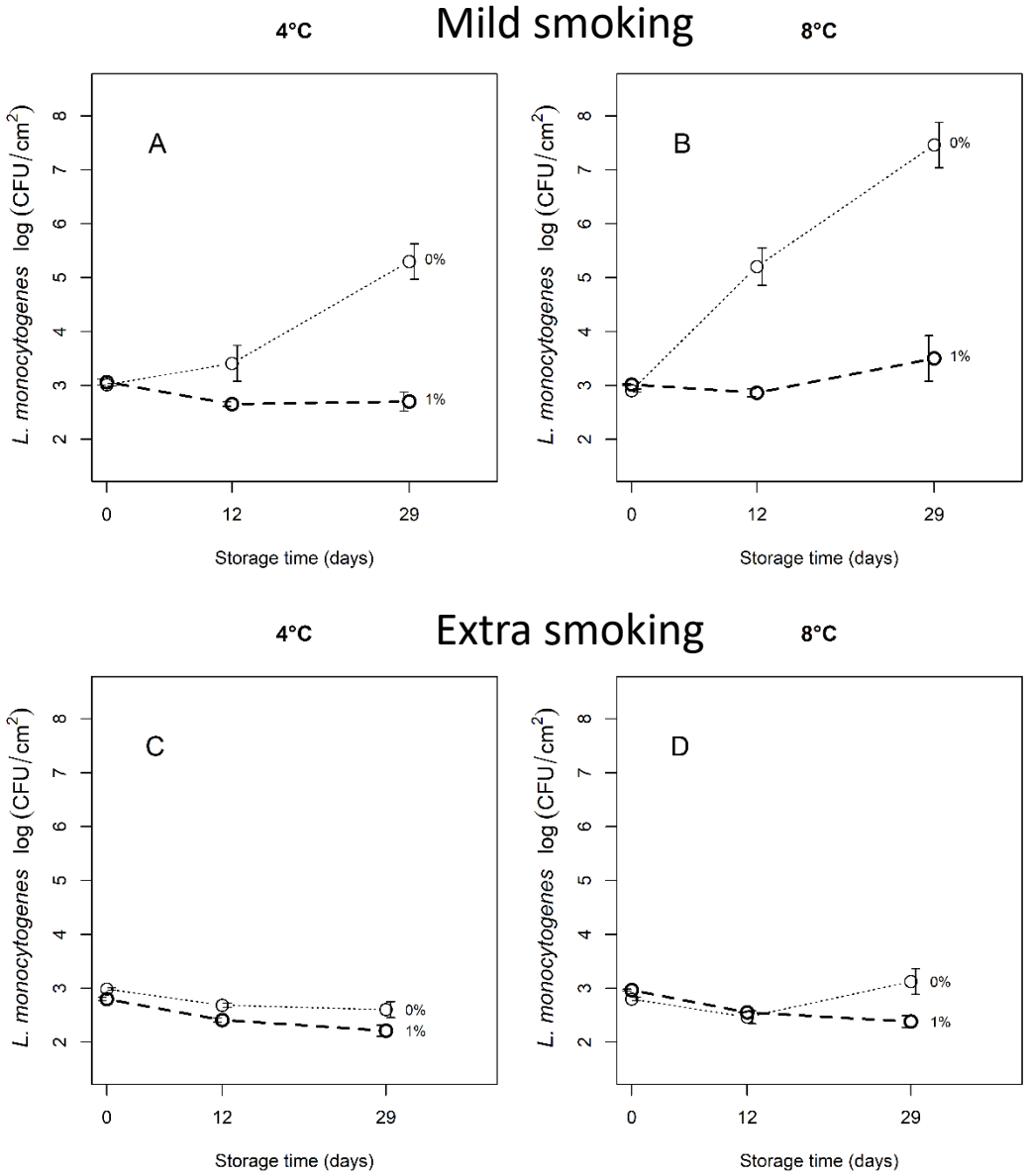
Unsliced CS salmon: Growth of Listeria and effects of smoking

Verdad N6 as ingredient in CS salmon

- No killing of Listeria obtained
- Complete growth inhibition is possible
- Inhibitory effects depend on:
  - Conc. of Verdad N6
  - Storage temperature
  - Degree of smoking
  - Sliced or unsliced product
  - No increased Listeria growth in salmon added 1% sugar (not shown)



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Is cold-smoked salmon with Verdad sensory acceptable?

1. Consumer test (50 consumers)

Did not like at all				Neither liked nor disliked				Liked it very well

2. Trained sensory panel

- No significant difference in liking between control salmon and salmon with Verdad (1% and 2%)
- Cold-smoked salmon with Verdad N6 appeared significantly less faded and more red in colour

Listeria mitigation activities on raw salmon

- Acidified sodium chlorite (ASC)
- Verdad N6
- Nisin
- Bacteriophages (PhageGuard (Listex))
- Combined strategies

} Raw + smoked salmon

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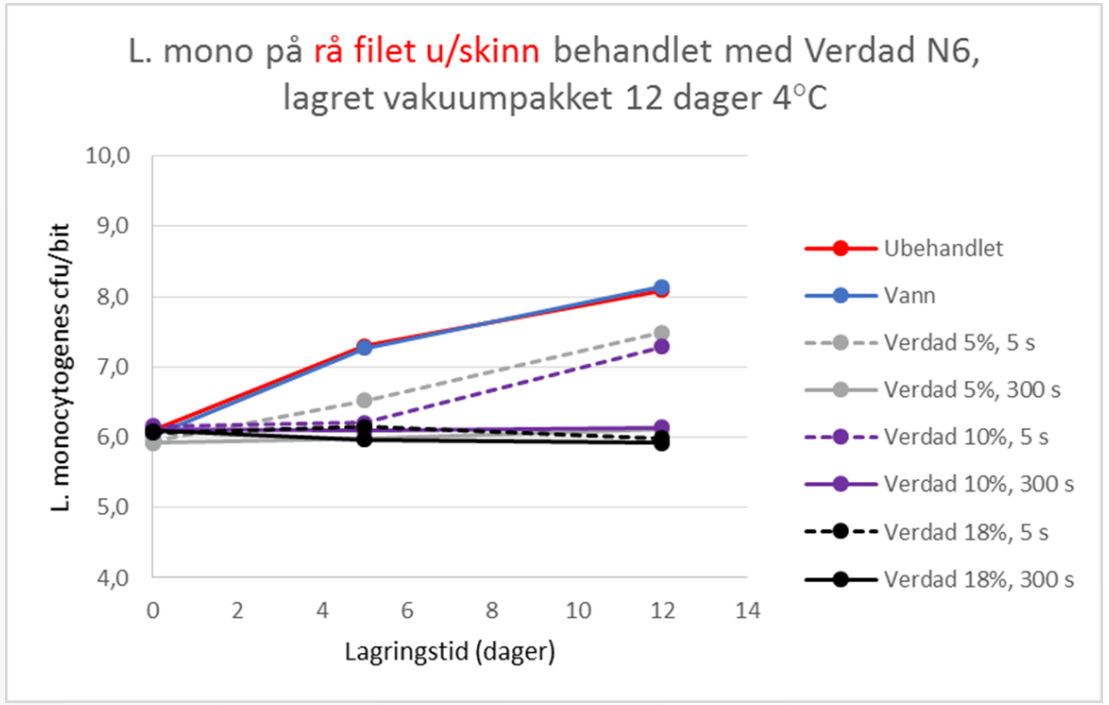
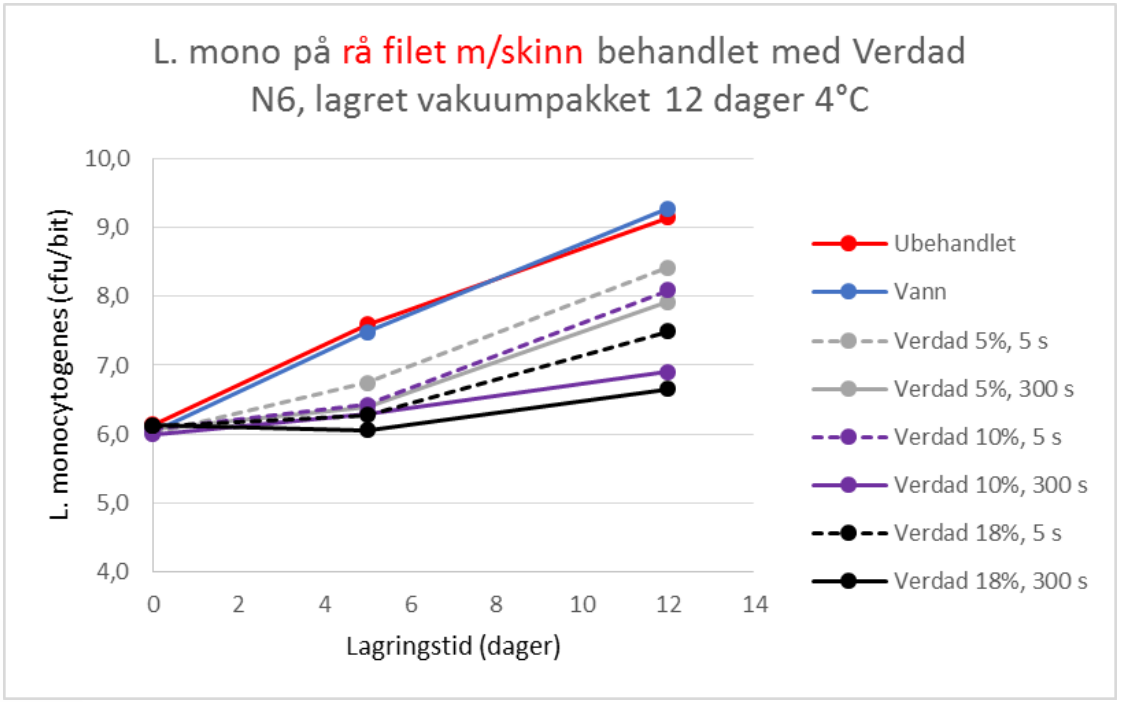
Verdad N6 on raw salmon: Effect on fillet vs. skin side





- Short time treatment (dip) of salmon in Verdad solutions provide L. mono growth inhibition
- Near complete growth inhibition can be obtained also on skin side

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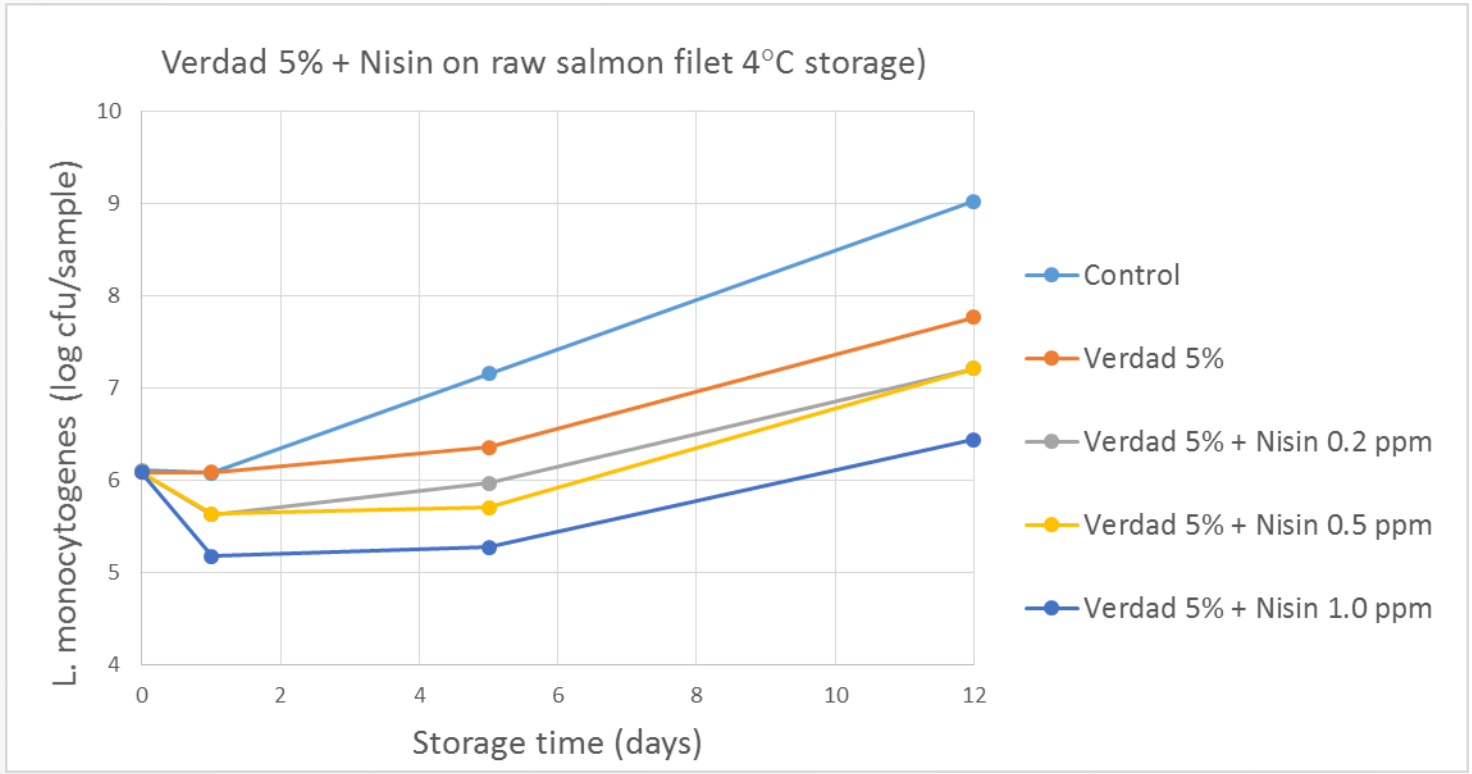
Can we obtain kill and growth inhibtion by combining strategies?



Combinations of Nisin (bacteriocin) and Verdad N6 provide kill and growth inhibition of L. monocytogenes

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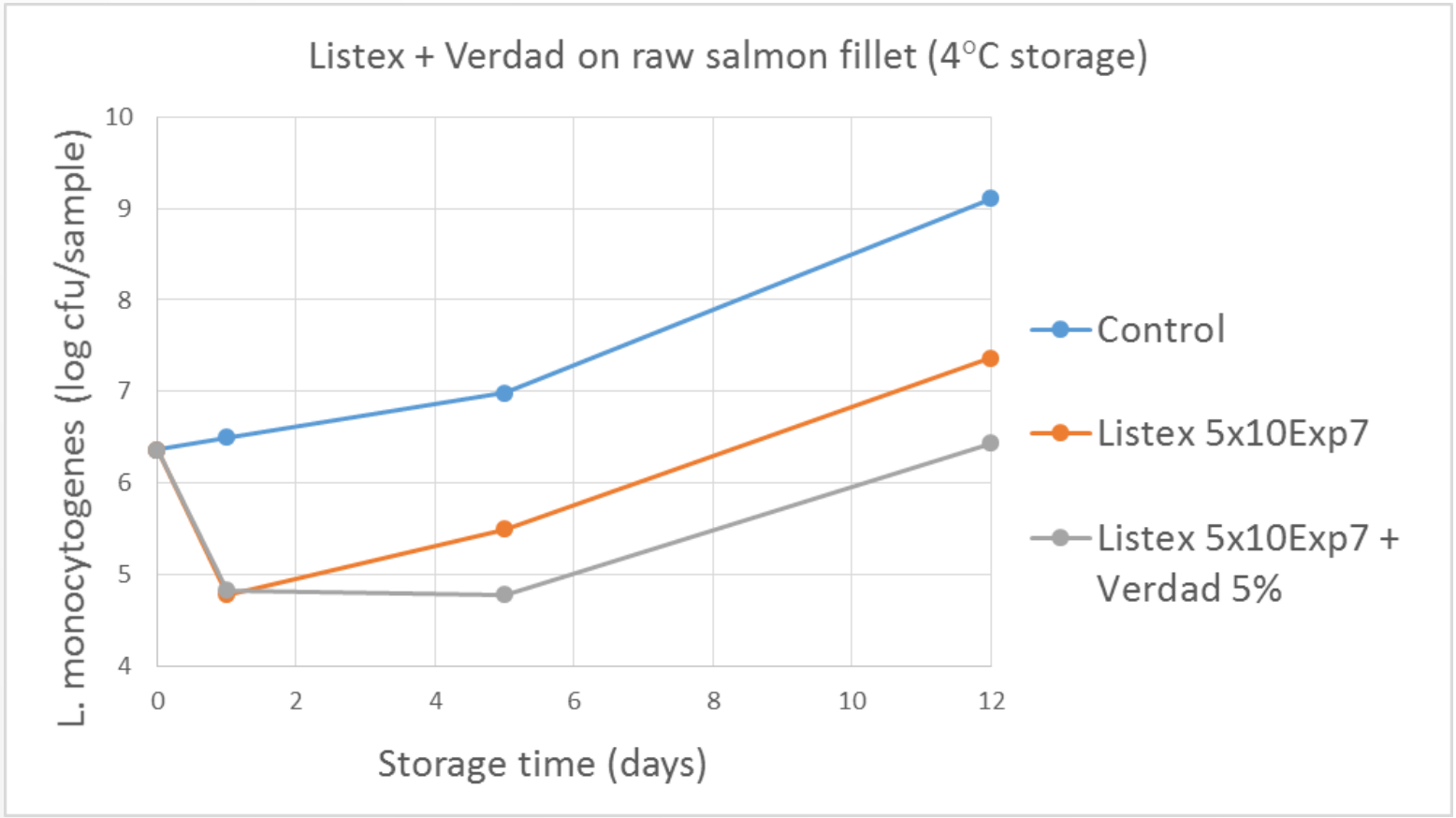
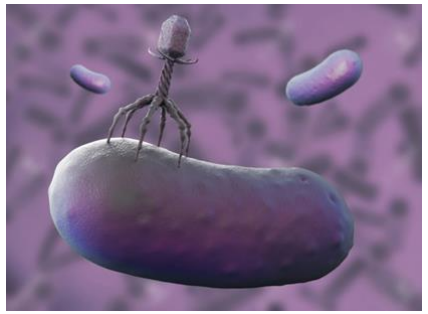
Can we obtain kill and growth inhibtion by combining strategies?



Combinations of PhageGuard (Listex) and Verdad N6 provide kill and growth inhibition of L. monocytogenes



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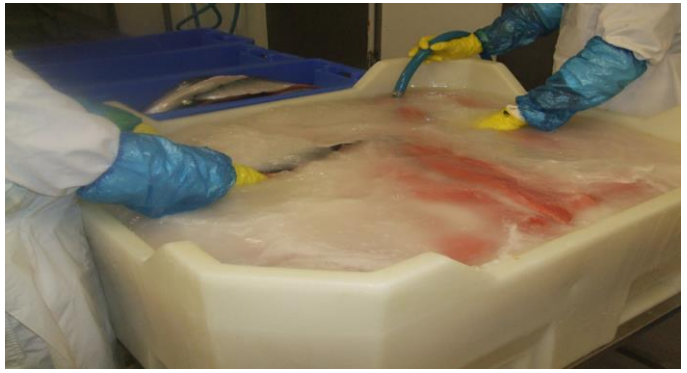
Conclusions

- Several strategies must be employed to prevent *Listeria* in risk foods
- Fermentates/organic acid salts inhibit *Listeria* growth
- Fermentates/organic acid salts can reduce microbial spoilage
- Combined strategies can be used for effective killing and growth inhibition of microorganisms in foods
- “Label friendly” alternatives exist
  - ➢Extended shelf life
  - ➢Reduced food safety risks
- Testing and optimisation under industry relevant conditions are needed



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Reduction and inhibition of *Listeria monocytogenes* in cold-smoked salmon by Verdad N6, a buffered vinegar fermentate, and UV-C treatments

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Reductions of *Listeria monocytogenes* on cold-smoked and raw salmon fillets by UV-C and pulsed UV light

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Ny teknologi viser lovende resultater for

LISTERIABEKJEMPELSE

Bakterien Listeria monocytogenes er den største mattrygghetsutfordringen for norsk laksenæring, og kan få store og alvorlige konsekvenser for både forbrukerne og næringen. Både god produksjonshygiene og tiltak på råvarer og produkter er viktig for å sikre optimal kontroll. Nofima-forskerne Even Heir og Askild Holck utvikler teknikker og teknologier som egner seg for direkte anvendelse på fisken.

TEKST: EVEN HEIR OG ASKILD HOLCK, BEGGE SENIORFORSKERE VED NOFIMA

Norsk Sjømat 2/2019

FISKERI- OG HAVBRUKSNÆRINGENS FORSKNINGSFINANSIERING

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Guide for the prevention, monitoring and elimination of listeria in the salmon industry

A delivery in the project "Measures for increased control of listeria in the salmon industry"
FHF # 900521 - January 2015

Even Heir, Solveig Langsrud and Therese Hagtvedt

FHF.no

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