Veterinærinstituttet
Norwegian Veterinary Institute

Norwegian University of Life Sciences

Hva er verdien av en død fisk?

Den biologiske og økonomiske betydningen av avlusning

Veterinærinstituttet
Norwegian Veterinary Institute

Norwegian University of Life Sciences

Hvor mye kan vi bruke på å forebygge eller forbedre ikke-medikamentell avlusning?

Biologiske tap

Dødelighet

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RESEARCH ARTICLE

Journal of Fish Diseases
WILEY

Estimating cage-level mortality distributions following different delousing treatments of Atlantic salmon (*salmo salar*) in Norway

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Abstract

This retrospective descriptive study estimates cage-level mortality distributions after six immediate delousing methods: thermal, mechanical, hydrogen peroxide, medicinal, freshwater and combination of medicinal treatments. We investigated mortality patterns associated with 4 644 delousing treatment of 1 837 cohorts of farmed Atlantic salmon (*Salmo salar*) stocked in sea along the Norwegian coast between 2014 and 2017. The mortality is expressed as mortality rates. We found distributions of delta mortality rate within 1, 7 and 14 days after all six delousing treatments, using mortality rate within 7 days before treatments as baseline. The results show that we can expect increased mortality rates after all six delousing methods. The median delta mortality rates after thermal and mechanical delousing are 5.4 and 6.3 times higher than medicinal treat-ment, respectively, for the 2017 year-class. There is a reduction in the delta median

+ Tilvekst

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ELSEVIER

How delousing affects the short-term growth of Atlantic salmon (*Salmo salar*)

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ARTICLE INFO

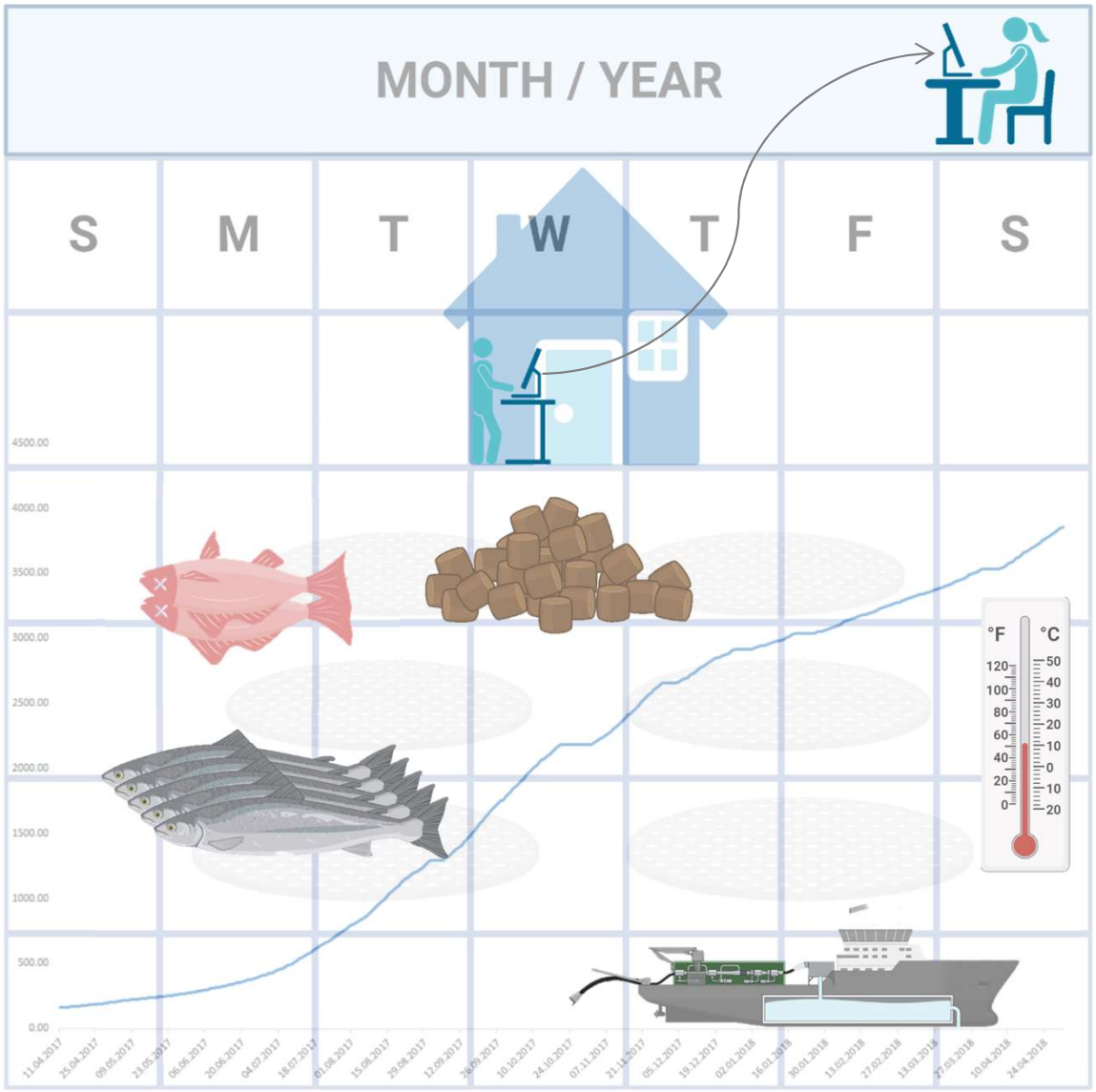
Keywords:
Atlantic salmon
Growth
Delousing
Salmon lice
Thermal growth coefficient
Salmon lice treatments

ABSTRACT

Infestations with salmon lice and subsequent salmon lice management is one of the most challenging and costly aspects of marine salmonid aquaculture. Both the handling and treatment, specifically non-medicinal treatment, against salmon lice cause stress and physical injuries to the host, the Atlantic salmon (*Salmo salar*). This in turn leads to reduced appetite and increased mortality. In this study, we have estimated the short-term growth loss of Atlantic salmon related to treatments (thermal, mechanical, hydrogen peroxide bath, freshwater bath and combination medicinal baths) for removal of salmon lice. To achieve this, we have obtained daily production data at cage-level from 2014 to 2019 from three large Norwegian aquaculture companies. We have used the registered feed-amount, number of fish and seawater temperature at cage level to calculate the thermal growth coefficient (TGC) of 635 fish-groups the week before a pre-treatment starvation period and the week after 2530 different treatments to estimate the reduction in TGC. We modelled this outcome using a mixed effect linear

+ Slaktekvalitet

?



Produksjonsdata
3 store oppdrettsselskap

2014-2019

	Mortality	Growth
Total no. treatments	**4 644**	**2 530**
Thermal	**2692**	**1059**
Mechanical	619	354
Hydrogen peroxide	172	48
Medicinal bath	445	308
Freshwater bath	198	156
Combination	518	361
Freshwater bath AGD	Not incl.	177
Hydrogen peroxide bath AGD	Not incl.	67

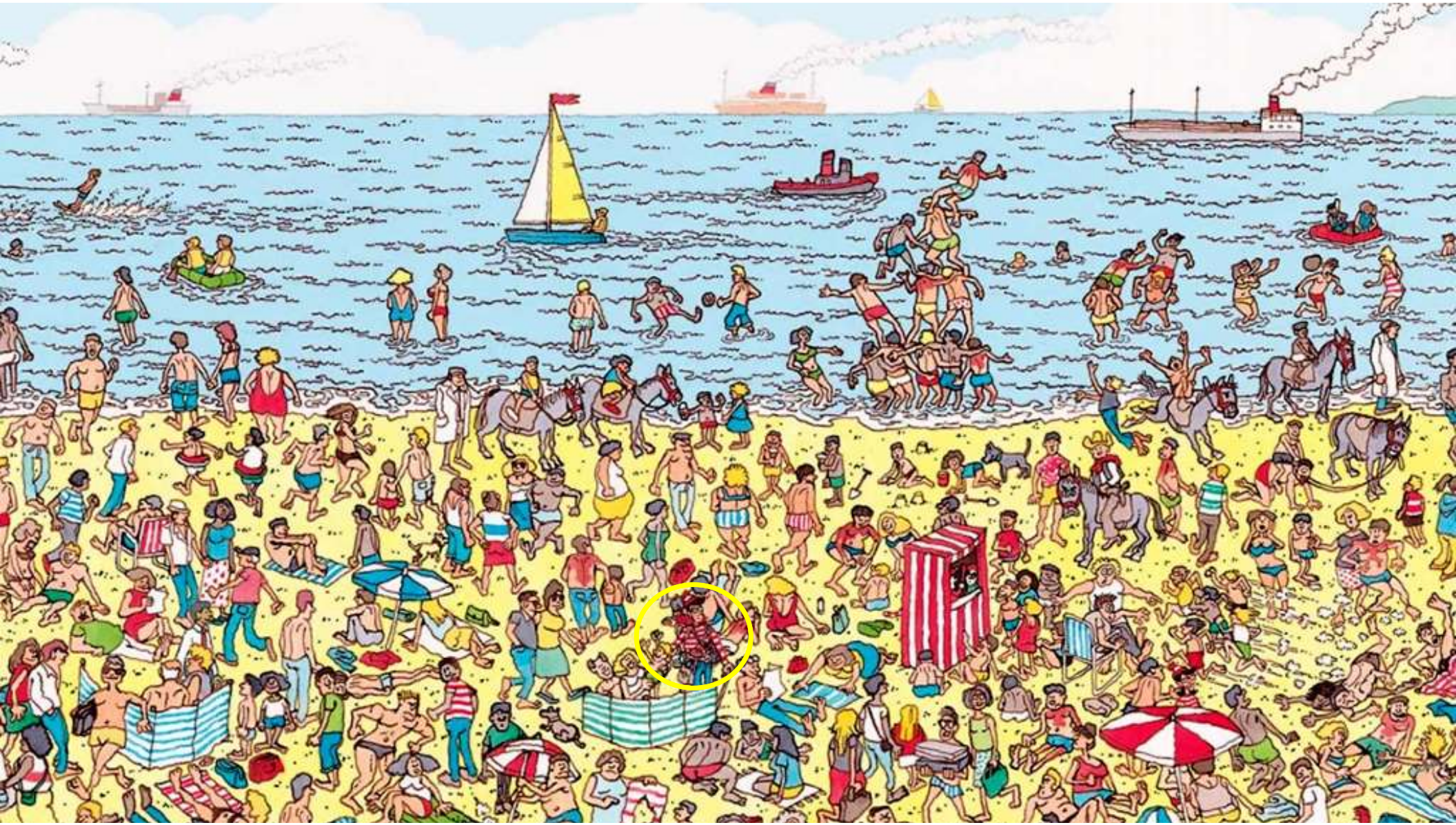
29% av alle lokalitetene

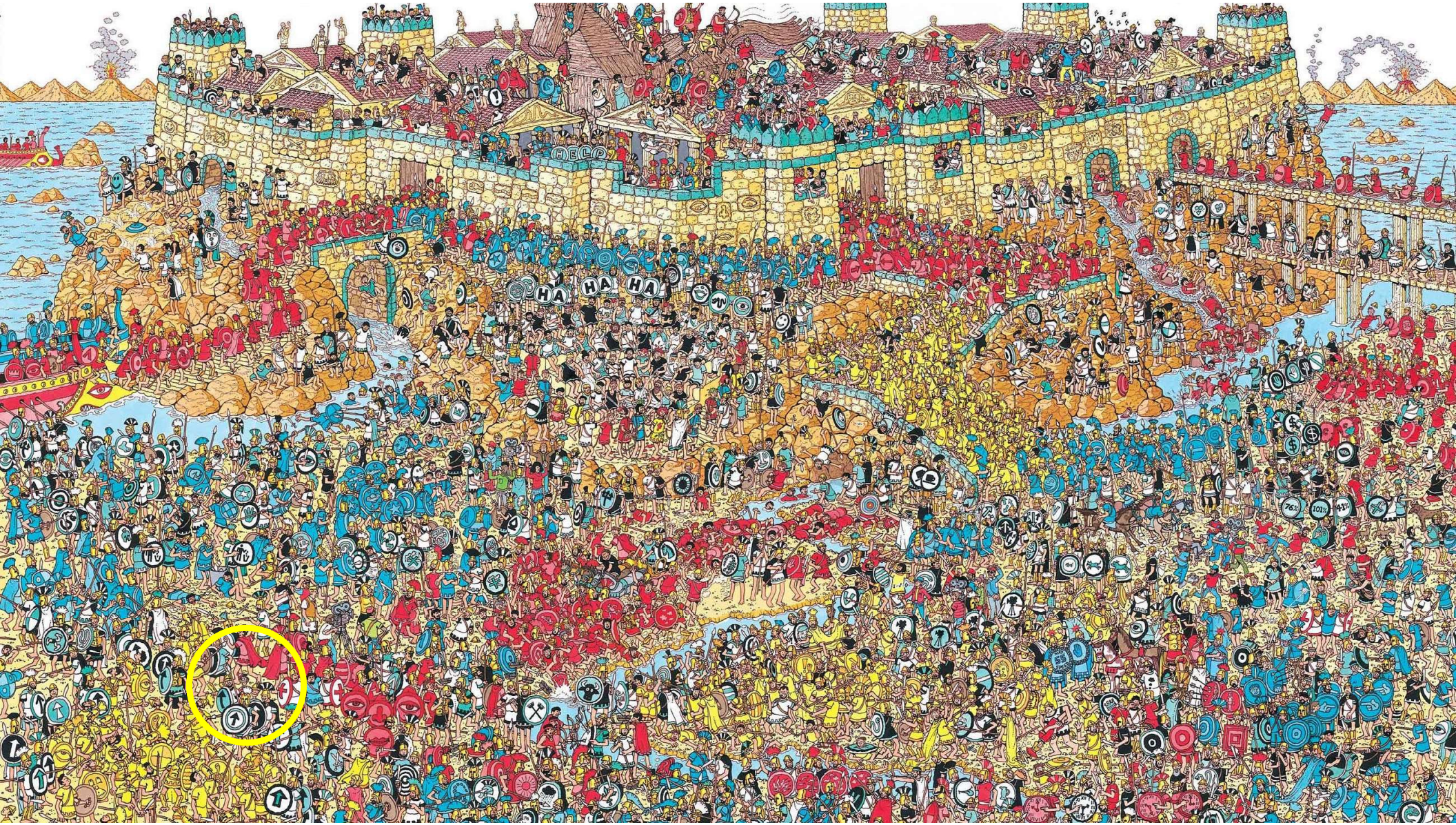
I hovedsak PO 3-7

Map: Norwegian Veterinary Institute

Problem I

Hvor er fiskegruppen?

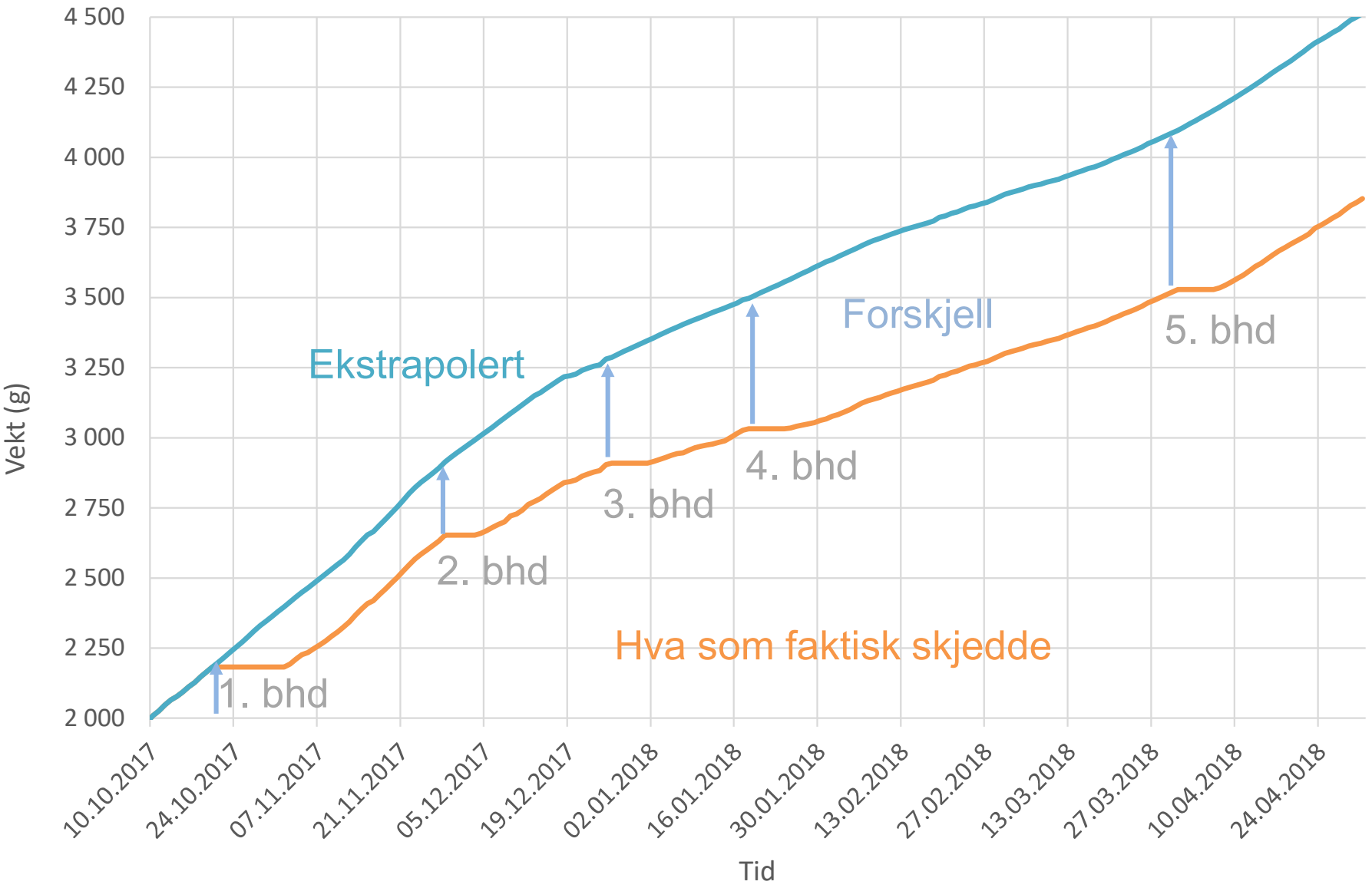



HELP
HA HA HA

Problem II

Ukjente faktorer

Gordon Johnson, Pixabay

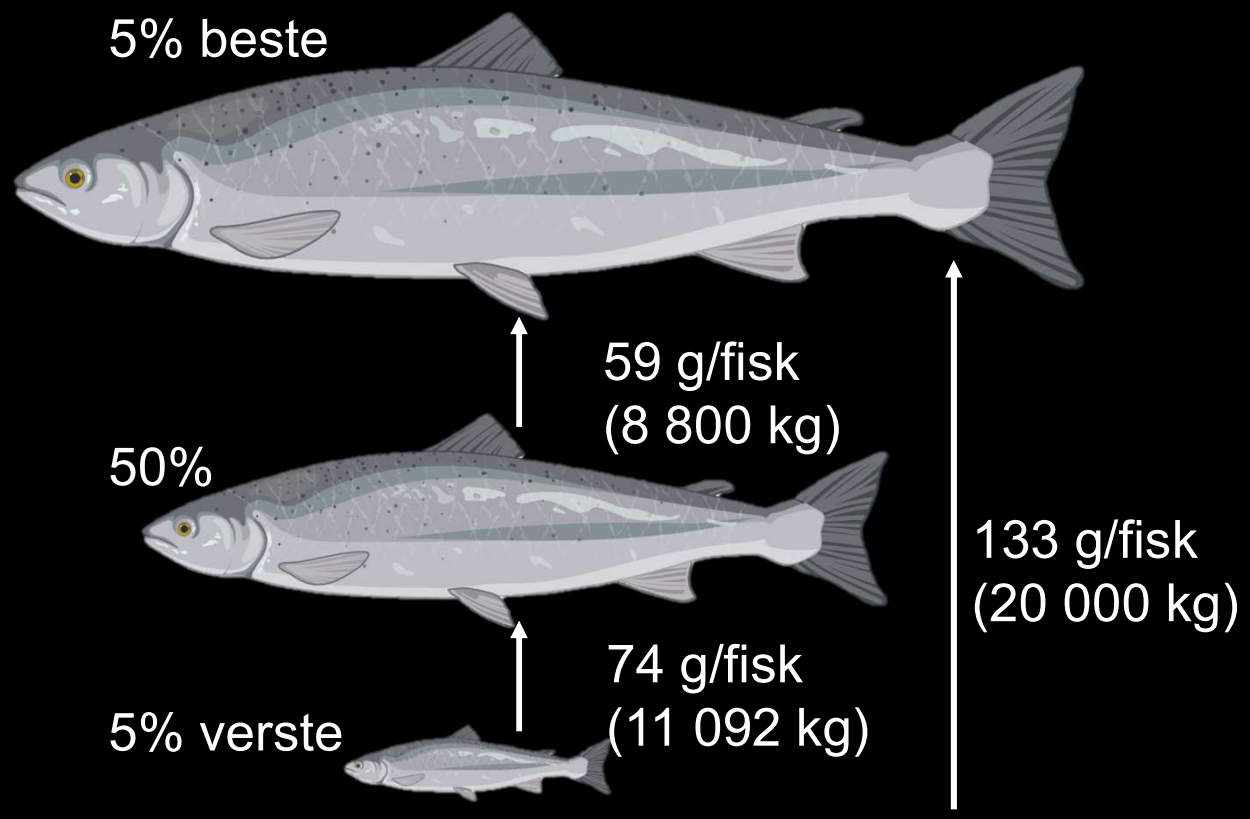

4 500
4 250
4 000
3 750
3 500
3 250
3 000
2 750
2 500
2 250
2 000
Vekt (g)
10.10.2017
24.10.2017
07.11.2017
21.11.2017
05.12.2017
19.12.2017
02.01.2018
16.01.2018
30.01.2018
13.02.2018
27.02.2018
13.03.2018
27.03.2018
10.04.2018
24.04.2018
Tid
Ekstrapolert
Forskjell
Hva som faktisk skjedde
1. bhd
2. bhd
3. bhd
4. bhd
5. bhd

Resultat

Dødelighet 5-6 ganger høyere for IMM vs medikamentell

Tilvekst signifikant verre effekt for IMM vs medikamentelle

Stor variasjon!



Økonomisk konsekvens

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The economic impact of decreased mortality and increased growth associated with preventing, replacing or improving current methods for delousing farmed Atlantic salmon in Norway

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Partiell budsjettering

Ingen behandling

Behandling

Positive konsekvensene
Økt biomasse og størrelse
Redusert behandlingskost

–

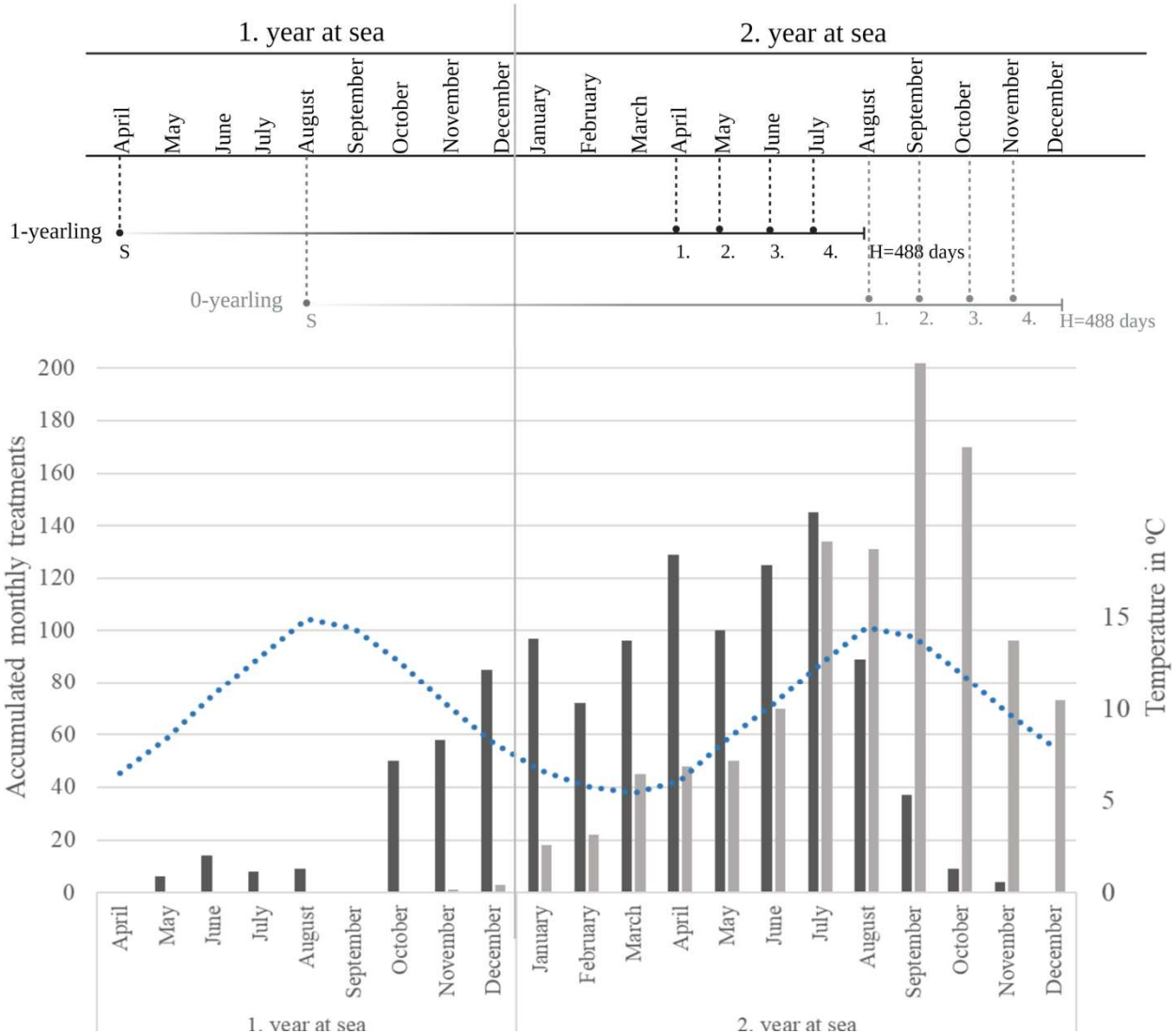
Negative konsekvensene
Økt fôrkost/slaktekost
~~Økt kost ved forebyggende tiltak og forbedring~~

= break even

Background photo: Pixabay

Forebygge	Ingen termiske behandlinger (4/4)
	Ingen mekaniske behandlinger (4/4)
	To første (2/4) termiske behandlinger forebygget
	To siste (2/4) termiske behandlinger forebygget
	Første (1/4) termiske behandlinger forebygget
	Første (1/4) termiske behandlinger forebygget
Erstatte	Første (1/4) termiske behandlinger erstattet med mekanisk behandling
	Første (1/4) termiske behandlinger erstattet med H2O2 bad
	Første (1/4) termiske behandlinger erstattet med ferskvannsbad
	Første (1/4) termiske behandlinger erstattet med medikamentell beh.
Forbedre	4/4 termiske behandlinger forbedret fra 5% verste til forventet
	4/4 termiske behandlinger forbedret fra forventet til 5%
	4/4 termiske behandlinger forbedret fra 5% verste til 5% beste

Simulert produksjon av én merd med 150 000 laks



Output->input øk.m.

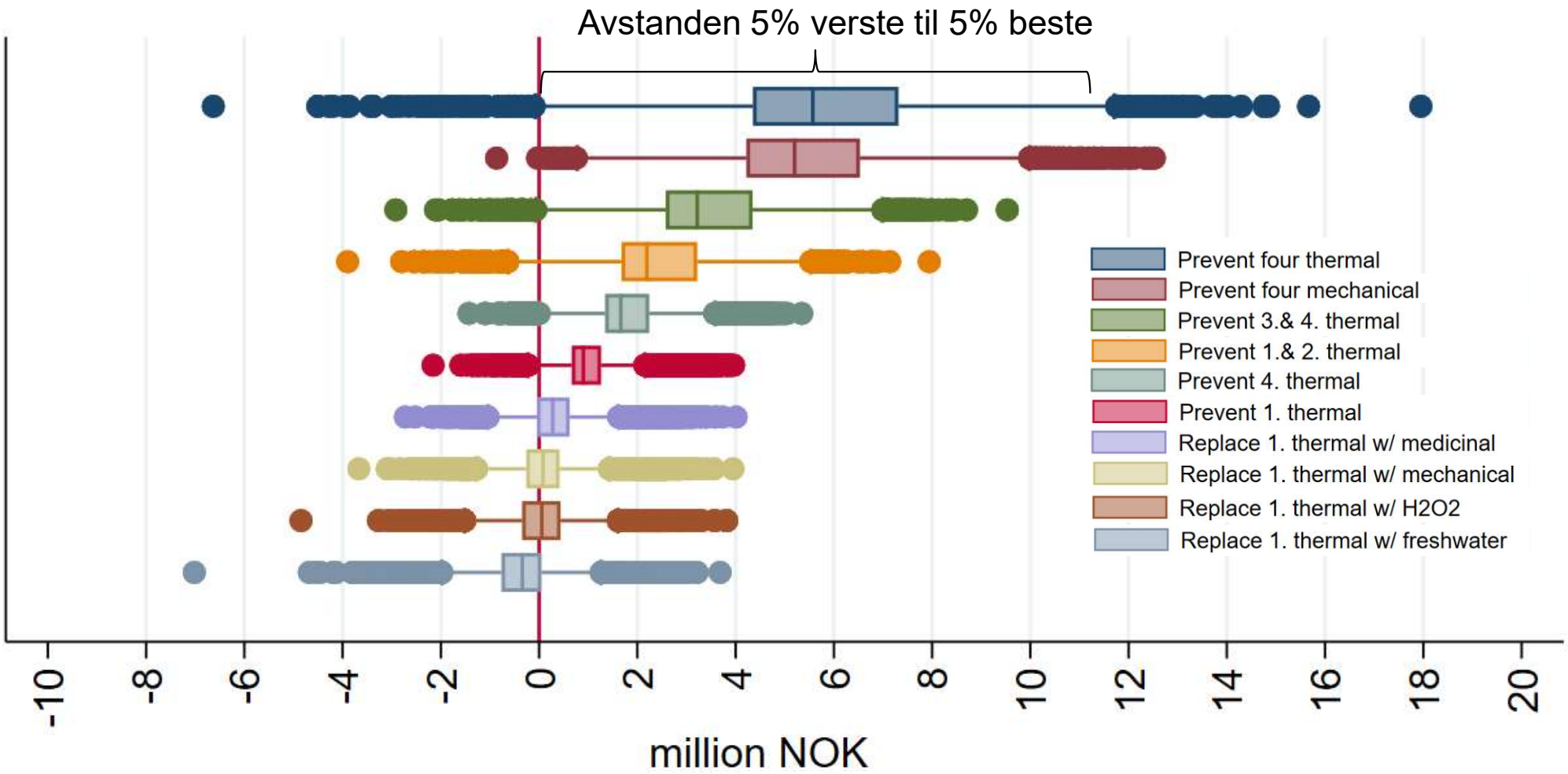
Biomasse

Vekt

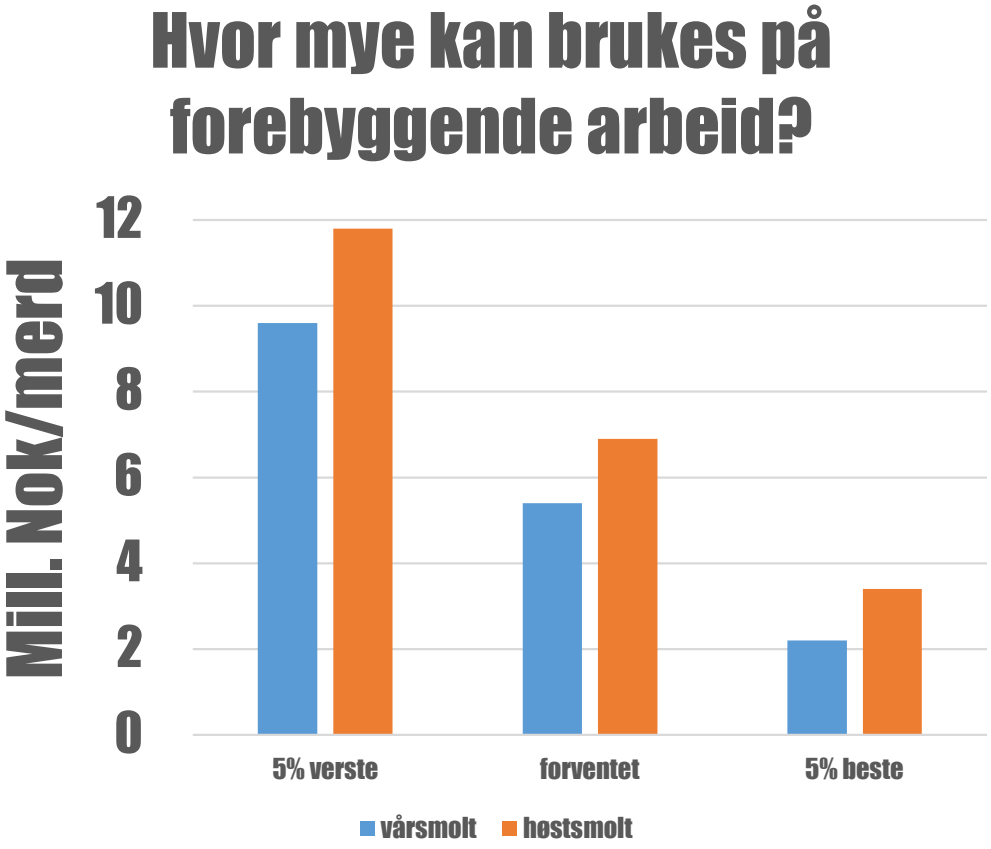
Fôrmengde

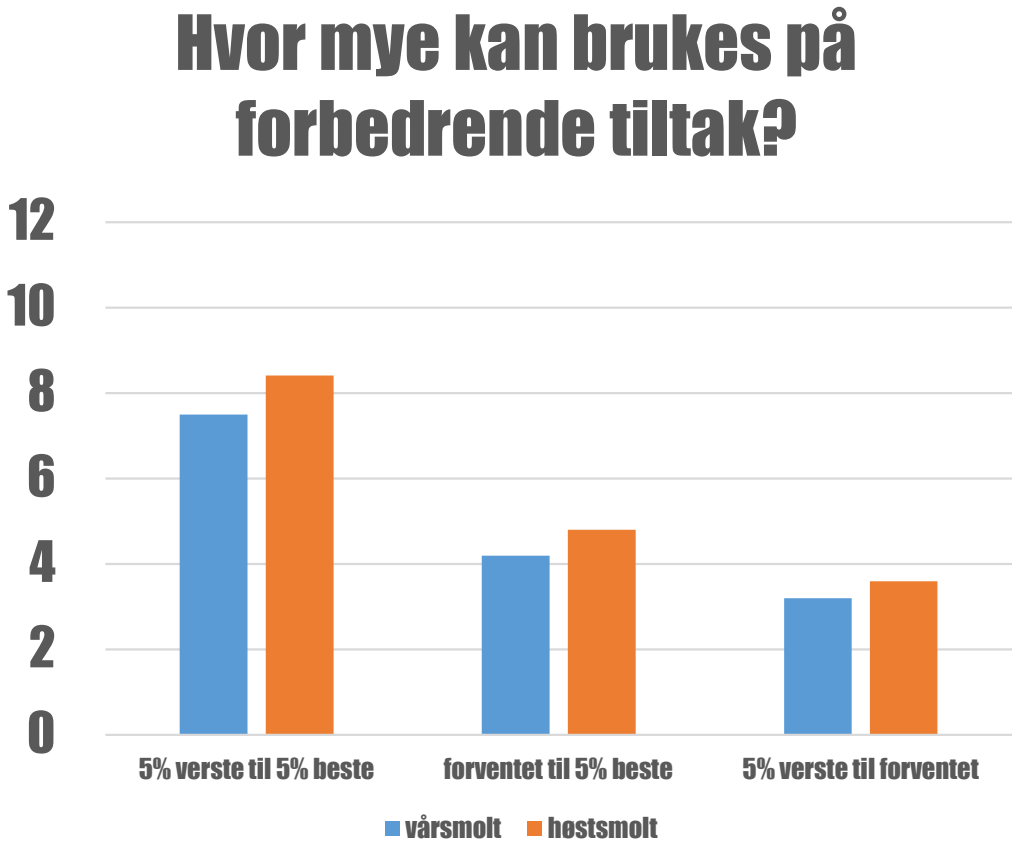
Behandlet biomasse

Per merd (vårsmolt)



4 termiske behandlinger

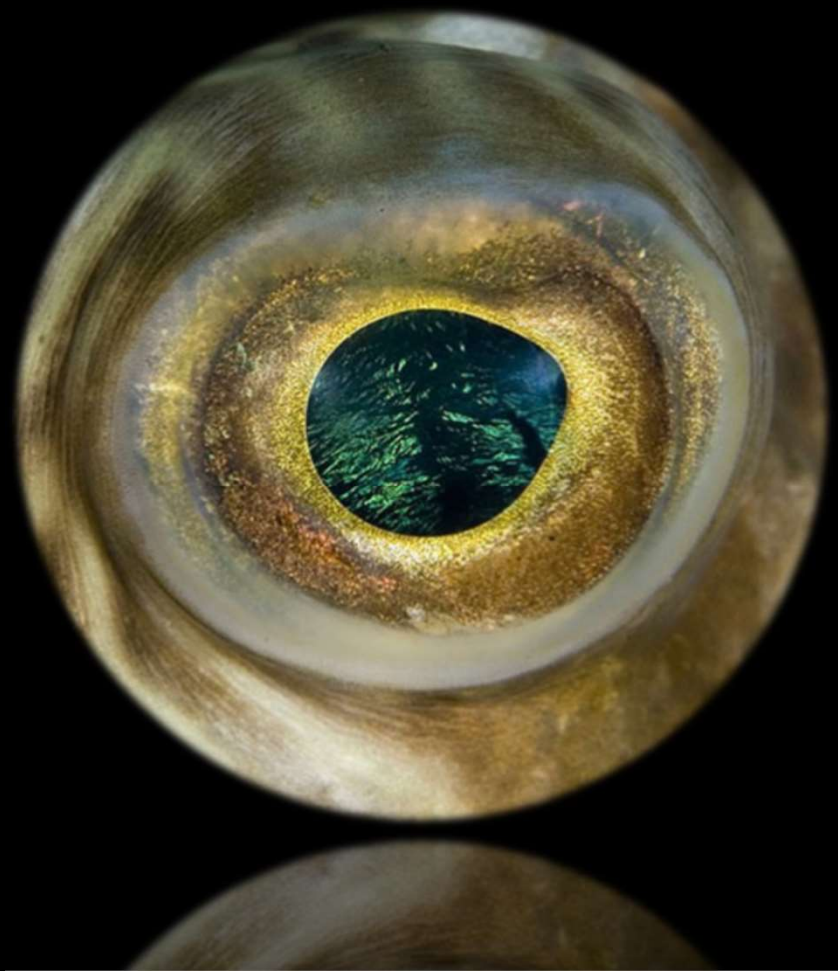




Begrensninger i modellen

Total effekt vs. direkte effekt

- Effekt av gjentatte behandlinger
- Kompensatorisk vekst
- Effekt på slaktekvalitet

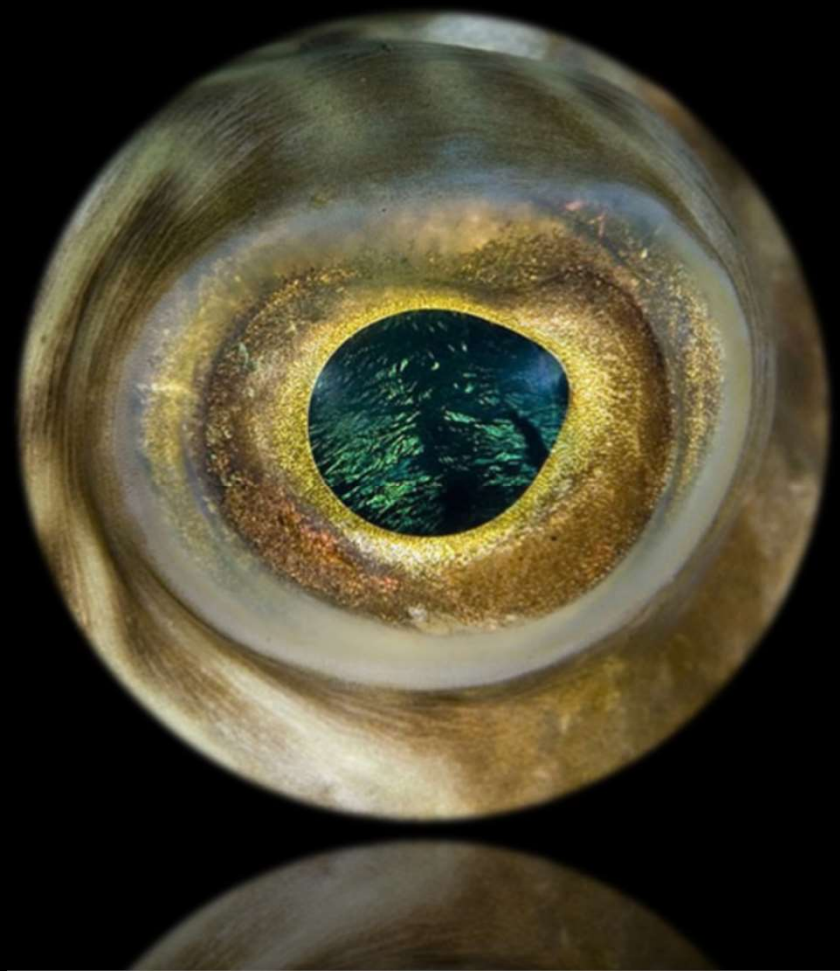


Rom for forbedring

Risikofaktorer

Dokumentasjon

Harmonisering og standardisering



Takk for oppmerksomheten