

LAB versus FARM

What differences are there between lab and farm observations?

very little except higher concentrations always see more efficacious
Concentration levels/exposure time can be variable due to fish response, tarp, O2

Why might these differences arise?

No laboratory/controlled conditions. Effect tide, wind, fish response

What are the practical implications?

Be able to remove dislodged lice from tarp/boat - filters

Remaining knowledge gaps – and how best to fill them?

complex gill pathology
Peroxide efficiency to partially resistant/resistant lice
Time – when treat
How to remove lice post treatment? Before tarp is removed
Combination treatment – in feed prior to bath to prevent re-attachment

Our questions

<p>Environmental parameters: - what measurements are taken - is there information on what is important in terms of successful treatments - how quickly does hydrogen peroxide fall off in 'dirty' water - secchi disc readings before treatments?</p>	<p>Water temp, secchi, DO Secchi done daily Temperature Max 14°C? Biological loading – dirty nets Titration after tarp is removed to check flushing O2 readings, water quality, phytoplankton? Oxygen and temperature readings prior to, during and after treatment. Salinity readings not routine. This issue not observed; titration at 15-20 min indicates dose sustained. Secchi disc reading taken once daily for a site (?? Prior to treatment)</p>
<p>What parameters are recorded <u>during</u> treatment: temperature, salinity, organic load, time points during treatment when H2O2 levels recorded?</p>	<p>DO, hydrogen peroxide concs at 5 and 10 min temp, titration at 5 and 10 min Oxygen pre/during/post, O2 levels indicate presence of H2O2 Titrations 8-10 min after full dose then each 3-5 min of treatment. Temperature and DO. Standard titration time 4 min post-dosing; additional may be taken is concern over dose/flushing.</p>
<p>Is there information for shorter /longer treatments? <i>(shorter: without emergency stops, longer: at which conc. and what temp.?)</i> Information on additional temperature and dose outcomes?</p>	<p>As a rule stick to 20 min unless unintentional high >= 2000 ppm then usually reduce to 15 min. Usually shorter if the titration is 'hot', often due to tarp poor filling or possibly biomass (?). Have still seen effect at shorter times. No real evidence but lower than expected dose and good fish behaviour good increase treatment time. Longer time has been used previously in wellboat treatments.</p>
<p>Lice stages – how is the information on life stages used?</p>	<p>Aim to treat when pre-adult numbers on the increase Try to avoid H2O2 if high gravid numbers due to settlement post-treatment.</p>
<p>Trigger points? Decision making?</p>	<p>CoGP max level. Pre/post counts – efficacy. Males (?) could indicate resistance. Aim to prevent maturation of stages through to adult through treatment; acts as decision point per treatment.</p>
<p>Implications for resistance and/or AGD treatments</p>	<p>No experience Gill pathology has to be considered for welfare reasons. Lice situation considered in planning of AGD treatment (eg avoiding low dose if possible)</p>
<p>Are there any unusual infection patterns after treatments which might indicate reinfection – e.g.</p>	<p>Not consistent but may see increased settlement of chalimus (is this a result of skin changes/mucus production on fish) Resettlement of all stages (mobiles)</p>

<p>unusually high adult numbers observed, higher numbers of copepodid/chalimus – i.e. higher than normal rate of increase.</p>	<p>High chalimus settlement after treatment If high levels of gravid females present then H2O2 treatment can cause high juvenile settlement. Sudden infestation of all stages from neighbouring farm treatment. ‘Uneven’ distribution of lice may be observed (eg. some fish with high burdens). Increase in juvenile stages may also be observed post-treatment.</p>
<p>How synchronised is egg string development on farms – are all stages of egg maturity observed?</p>	<p>Not obvious, various stages At ‘initial’ infection can be synchronised however later in cycle of higher lice burden not synch Varied, can be all stages. Not synchronous.</p>
<p>Are detached sea lice observed floating to surface layers in treatment tarps?</p>	<p>yes yes yes yes</p>

<p>Gill scoring for AGD What system being used How reliable Rate of checking What other samples are taken Earliest detection?</p>	<p>N/A System – visual score for AGD and PGD. Reliable as standardised and comprehensive site training however still sensitive to subjective nature. Small fish (x) (checks twice weekly 10 fish) larger fish (5 per cage) 0-5 system – visual, wet preps, histology, PCR, all cages once per week AGD and PGD scores used, based on ‘worst arch’ for routine monitoring. Can be variable between staff.</p>
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	<p>Weekly checks, at least 25 fish per site. Histo and wet prepr samples also. Detection of very low level amoebae presence (not clinical AGD).</p> <p>Room for improvement – need for simple classification method.</p>
<p>What is treatment trigger? - constraining factors - decision strategy - implications for lice/resistance etc.</p>	<p>N/A Gill scores, histo and wet preps for treatment decision. Early interventions. If lice pop present consideration of this, may increase dose to 1500 ppm if deemed gills can handle it (x) Gill score increasing rapidly, abundant amoeba Low dose < 1300 ppm is not effective on sea lice Decreased feed rate. Fish size, water temps, other gill conditions. Case by case decision factors as above, aiming for earliest possible treatment. Lice dose used as preference if possible (fish size, water temps etc.)</p>
<p>General gill health - monitoring? - post-treatment - retreatment levels - other treatment approaches?</p>	<p>Monitoring carried out as part of weekly lice sampling routine Weekly gill visual scoring, also histology and wet prep for amoeba Histopathology post-treatment Monitoring of scores post-treatment. Weekly monitoring with AGD checks; may increase frequency/numbers if concern. Max frequency 2 per cycle at present (AGD treatment) Have seen added benefit of H₂O₂ treatment at low salinity sites (better/longer term effect)</p>
<p>Cleaner fish?</p>	<p>In use Using some wrasse Yes, wrasse used Use on some sites, AGD not identified.</p>

Development of code of practice

What do you think are important things to consider?