Towards an improved image of North European aquaculture products regarding food safety

ParaFishControl Workshop “North European Fish Parasite Management Strategies in Aquaculture Farms”

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Challenge and Impact

➢ Challenge
• It is generally assumed that farmed fish products have a very low or null prevalence of these helminths
• However, this assumption has not been demonstrated scientifically

➢ Impact
• Improve image and competitiveness of European aquaculture sector
• Increase the commercial value of fish products
• To avoid costs for control (freezing) of zoonotic parasites in farmed fish products to be consumed raw or undercooked
Our approach and our team

Food Risk Analysis

To reduce the undesirable presence of zoonotic helminths in aquaculture fish products

RISK ASSESSMENT

Parasite infection: Marine and freshwater surveys
Allergy: Allergenicity tests (*in vivo, in vitro* and *ex-vivo*)

RISK MANAGEMENT

Identification of Critical Points with HACCP risk tool
Recommended appropriate prevention and systematic control solutions

RISK COMMUNICATION

Exchanging information throughout interested parties
Propose a “Parasite Low label”
Produce a “Good Practice Handbook for Minimum Parasite Infection”
Comprehensible and translational Visual Thinking Strategy
No zoonotic helminths were detected in marine and freshwater samples

Runts

$n = 1480$

CL 99 %

MoE 4-8 %

$\text{n = 10813}$
## Our proposed solution (II)

<table>
<thead>
<tr>
<th>Fish species</th>
<th>Production system (*)</th>
<th>Adult feeding (*)</th>
<th>Susceptible for parasitic infection in wild environments (*)</th>
<th>Zoonotic parasites found [Monitoring data available]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gilthead sea bream</td>
<td>Cages/ponds</td>
<td>Pellets</td>
<td>A. <em>simplex</em>, <em>A. pegreffii</em>, <em>P. decipiens</em>, <em>Hysterothylacium</em> spp.</td>
<td><em>None</em>: this work, Apromar 2015</td>
</tr>
<tr>
<td>European sea bass</td>
<td>Cages/ponds</td>
<td>Pellets</td>
<td>A. <em>simplex</em>, <em>A. pegreffii</em>, <em>P. decipiens</em>, <em>Hysterothylacium</em> spp.</td>
<td><em>None</em>: this work, Apromar 2015, <em>A. pegreffii</em>: Camilleri 2018</td>
</tr>
<tr>
<td>Turbot</td>
<td>Indoor tanks</td>
<td>Pellets</td>
<td>A. <em>simplex</em>, <em>P. decipiens</em></td>
<td><em>None</em>: this work, Apromar 2015</td>
</tr>
<tr>
<td>Rainbow trout(**)</td>
<td>Cages/ponds</td>
<td>Pellets</td>
<td>Diphyllobothriid, Opisthorchioidea</td>
<td><em>None</em>: this work</td>
</tr>
<tr>
<td>Common carp</td>
<td>Ponds</td>
<td>Pellets</td>
<td><em>C. sinensis</em>, <em>O. felineus</em>, <em>M. takahashii</em>, <em>H. taichui</em></td>
<td><em>None</em>: this work</td>
</tr>
</tbody>
</table>

**THE OVERALL RISK OF PARASITE INFECTION IN THE SELECTED FARMED FISH SPECIES IS NEGLIGIBLE**

(*) source EFSA Report; (**) including marine rainbow trout
THE OVERALL RISK OF PARASITE INFECTION IN THE SELECTED FARMED FISH SPECIES IS NEGLIGIBLE

- Although the examination of all the runts in the current survey has been negative for zoonotic helminths, we recommend to discard runts (as already is done in many farms) from the processing line to the market.

- Fish feed could be a potential source of allergenic peptides from zoonotic fish parasites. Although this risk is beyond the scope of this study, it is interesting to point that future studies are needed to evaluate if these parasite allergens can really pass from feeds to fillets and induce allergenic reactions in consumers, and if the potential can be decreased by the replacement of fish meal by other protein alternative sources.
Expected benefits for the industry

• Improvement of image of European Aquaculture after assessing the negligible the zoonotic risk due to these parasites (as already done for Atlantic salmon)
• Increasing the commercial value of fish products from aquaculture
• Possible exemption from the freezing treatment which is mandatory for fish products intended to be consumed raw/undercooked (as already done for Atlantic salmon) following the Commission regulation (EU) No 1276/2011
Current status and next steps

**A VOLUNTARY CONTROL SYSTEM (VCS) IS UNDERGOING**

**VCS**: based on a certification aimed at the aquaculture sector, improves the profile of aquafarming businesses which, in addition to implementing measures to prevent the presence of anisakis, implement an exhaustive analytical control plan that allows them **to confirm that aquaculture products do not represent a health hazard regarding to the presence of zoonotic parasites**

This **certification** includes:

- Sampling plan
- Externals (single annual) and internal audits (conducted throughout the year)
- Exhaustive analytical plan (by Real Time PCR)
- Auditing documental control (registers, batch control, claims management)
- Etc...

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Current status and next steps

A VOLUNTARY CONTROL SYSTEM (VCS) IS UNDERGOING

Under this future scenario and to enforce the certification of aquaculture products we have developed...

...a portable kit to identify the presence of *Anisakis simplex*
Challenge and Impact

➢ **Challenge**

- *A. simplex* is the second most predominant biological hazard
- A portable and rapid method to identify/manage the presence of Anisakis as “a point of care” solution
- This solution could become a valuable tool in a certification system (VCS)

➢ **Impact**

- Identify the contamination with *Anisakis in the field* (feeds, water income, runts, sneakers, etc.)
- To reduce the costs linked to fish inspections
- Make decisions quickly
Our approach and our team

Test kit for the qualitative detection of Anisakids DNA by PCR Real time
Product code: IC-02-1205 (25 tests) / IC-02-1207 (50 tests)

Available: Neither user friendly nor portable
Our approach and our team

In contrast to the PCR technology, in which the reaction is carried out with a series of alternating temperature steps or cycles, ISOTHERMAL AMPLIFICATION is carried out at a constant temperature, and does not require a thermal cycler.

Simply, low cost & portable
IN THE FIELD

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Our proposed solution (I)

RECOMBINASE POLYMERASE AMPLIFICATION (RPA)

- Isothermal amplification
- Fast
- User friendly
- Low cost
- Portable
- On site

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Our proposed solution (III)

RAPID AND PORTABLE KIT BASED ON RPA TECHNOLOGY

LF RPA Assay for the detection of *Anisakis simplex*: Test line (T); Internal Control line (C). Negative Template control (NTC)

15 min
39°C
Expected benefits for the industry

- Identify the contamination with *Anisakis* in the field (feed, water, runts, sneakers, etc...)
- Reduce the costs linked to fish inspections
- Make decisions quickly
Current status and next steps

- **TRL 9**: System proven in operational environment
- **TRL 8**: System complete and qualified
- **TRL 7**: Integrated pilot system demonstrated
- **TRL 6**: Prototype system verified
- **TRL 5**: Laboratory testing of integrated system
- **TRL 4**: Laboratory testing of prototype component or process
- **TRL 3**: Critical function, proof of concept established
- **TRL 2**: Technology concept and/or application formulated
- **TRL 1**: Basic principles are observed and reported
Thank You

ParaFishControl

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