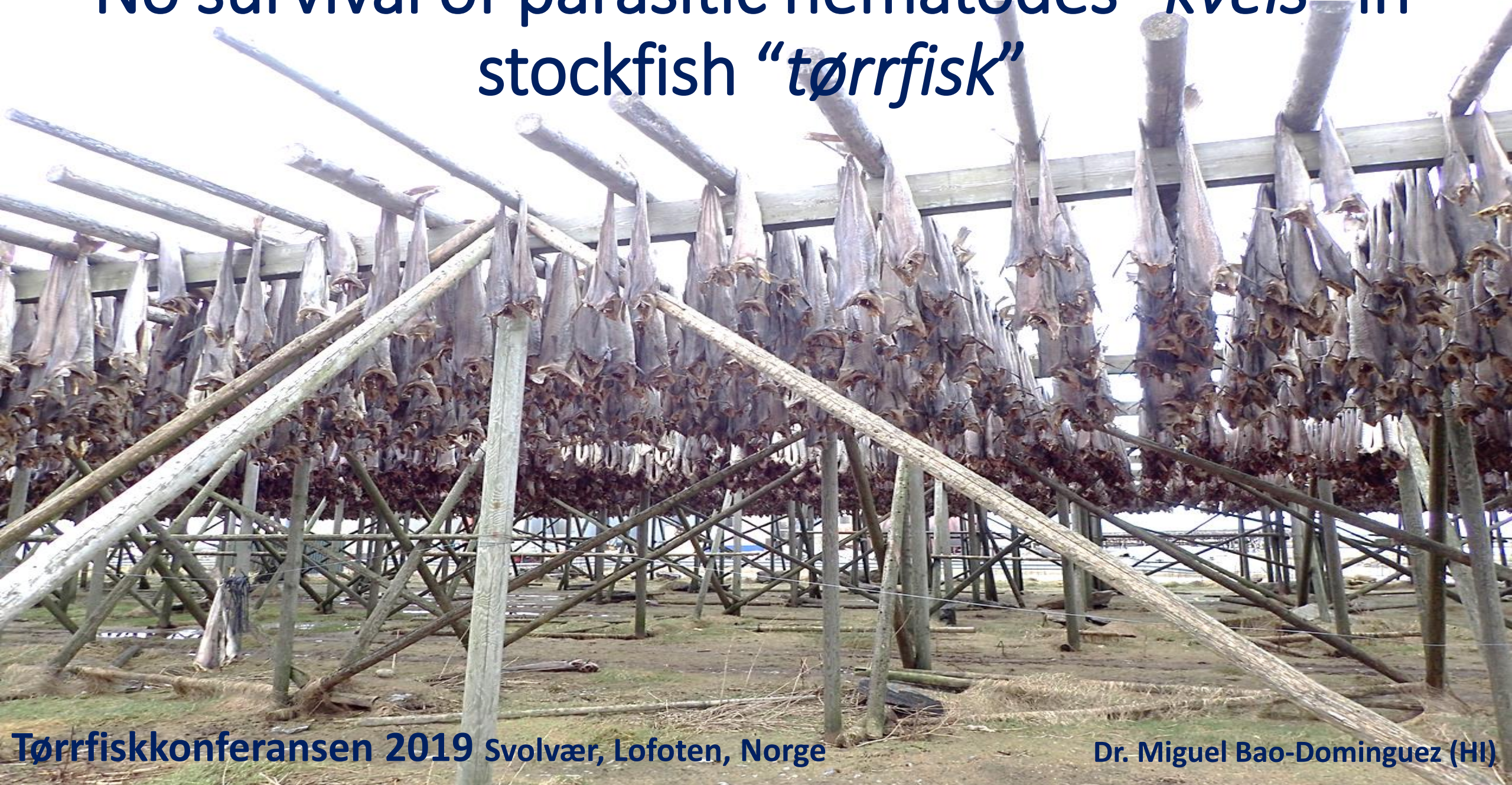


# No survival of parasitic nematodes “*kveis*” in stockfish “*tørrfisk*”



## Objective

# FHF prosjekt nr. 901332 - Overlevelse av kveis (*Anisakis*) i tørrfisk

Financed by:



carried out by

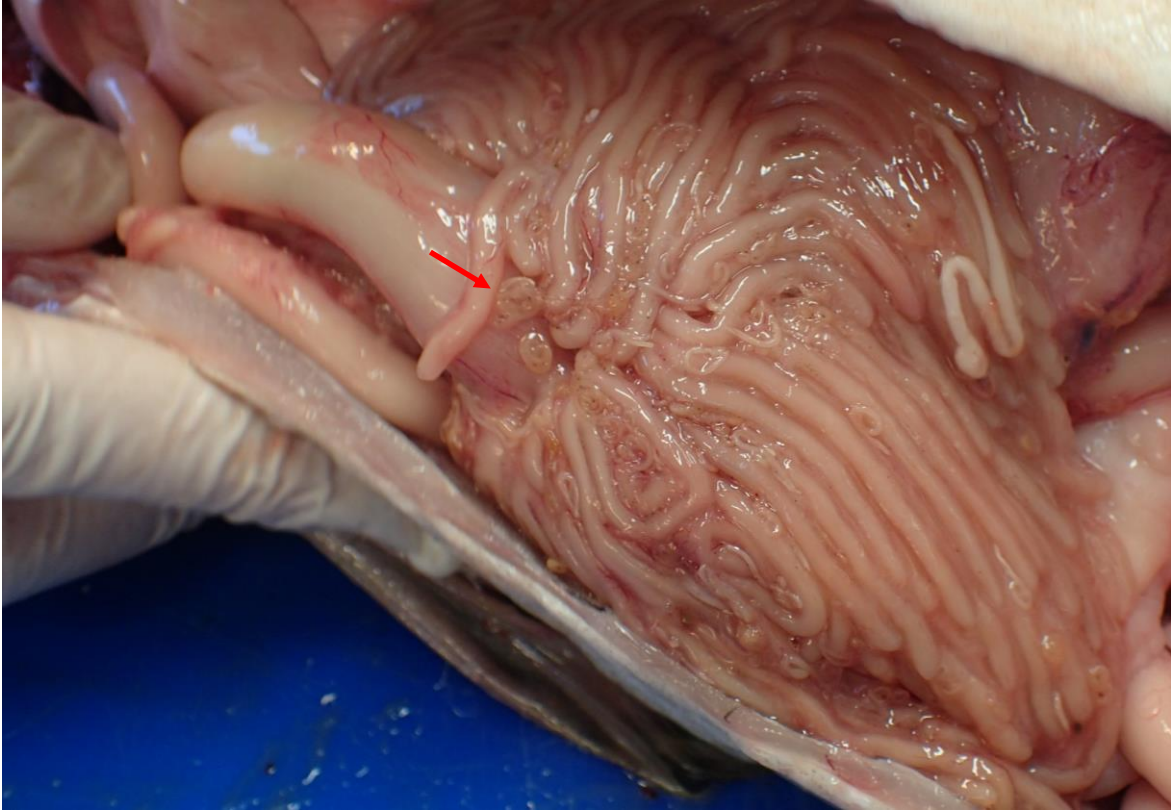


The main objectives of the project were:

1. To determine the level of infection of parasitic nematodes (*kveis*) in fresh cod used for production of stockfish (*tørrfisk*).
2. To determine the survival of nematodes present in the traditionally produced *tørrfisk*, including re-hydration of fillets before consumer consumption.

## Introduction

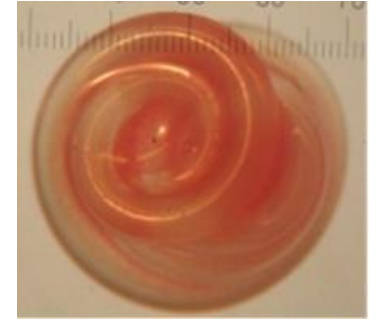
Parasitic nematodes of the family Anisakidae  
(genera *Anisakis*, *Pseudoterranova*, *Contracaecum*)



Pyloric caeca of cod infected with parasitic nematodes

Very difficult to identify by naked eye.  
Needs microscopy and training!

*Anisakis* (whale or herring worm)



*Pseudoterranova*  
(seal or cod worm)

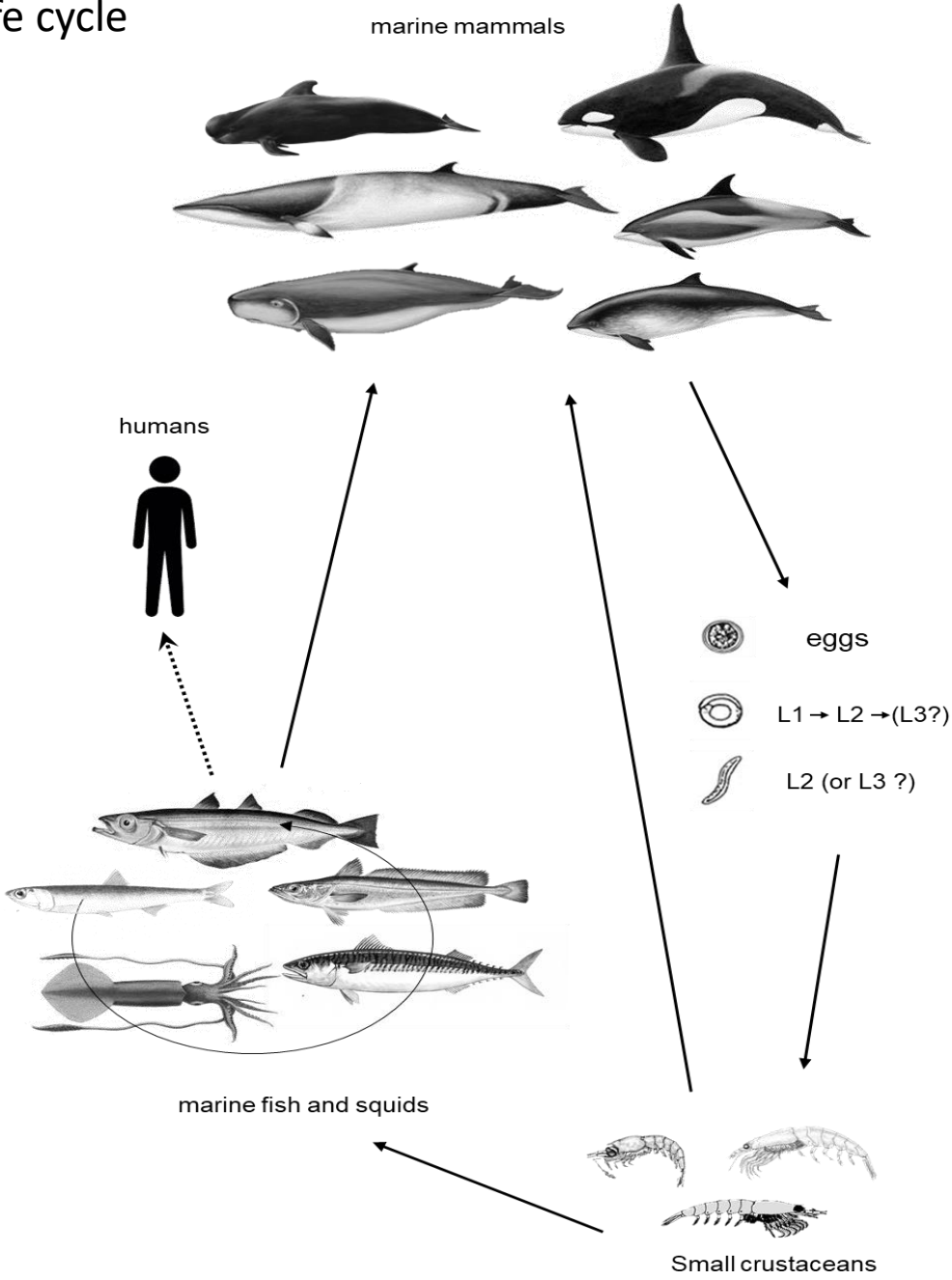
*Contracaecum*



# Introduction

## The basic *Anisakis* life cycle

Complex life cycles in the marine environment



## Introduction

# Why are these parasites important?

## Fish-borne zoonotic parasites

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graph TD; A[Fish-borne zoonotic parasites] --> B[Public health implications (food safety issue)]; A --> C[Socioeconomic implications (food quality issue)];
```

### Public health implications (food safety issue)

- Human disease called **anisakidosis** due to consumption of parasitized fish as raw, marinated or lightly cooked.

### BUT REMEMBER!

- The European Food Safety Authority (EFSA) has concluded that **freezing to -20°C** for not less than 24 hours or **heat treatment at ≥60°C** for at least 1 minute in all parts of the product kill the nematodes.

### Socioeconomic implications (food quality issue)

- Consumer distrust in fishery products.
- Economic losses to the fishing industry.

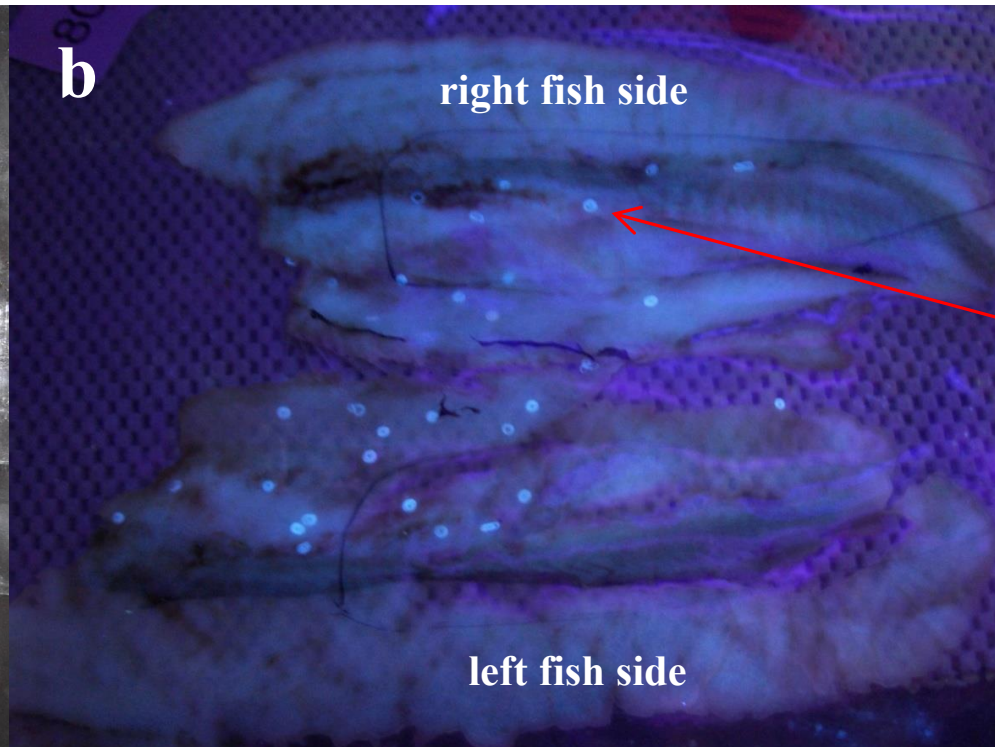
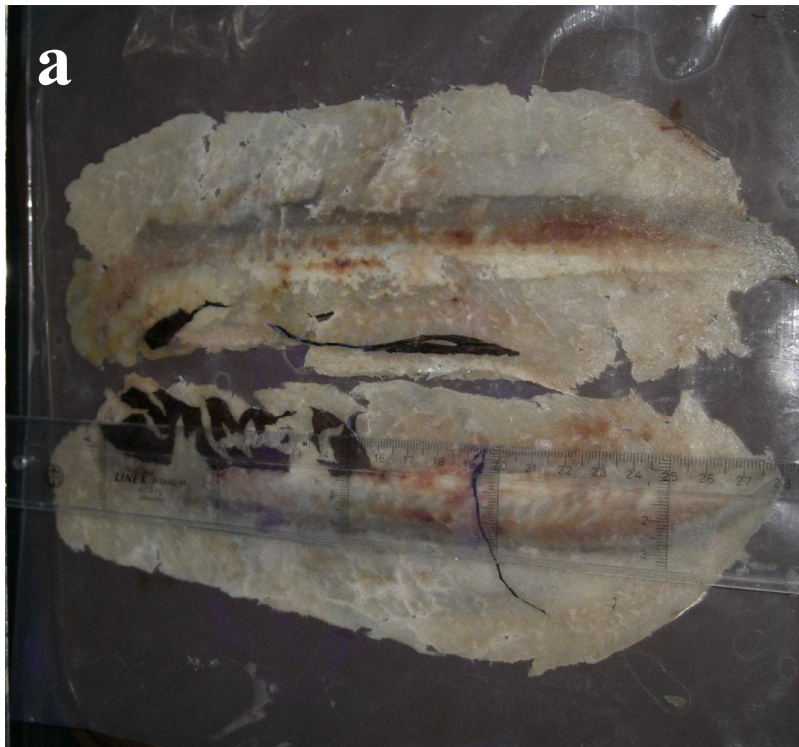
## Methods

FRESH COD (n=50 fish studied)

### The UV-press method

- Nematode detection is based on screening under UV-light of flattened and frozen fillets and viscera

*Anisakis* detection in flattened fish fillets : a) without UV, b) with UV



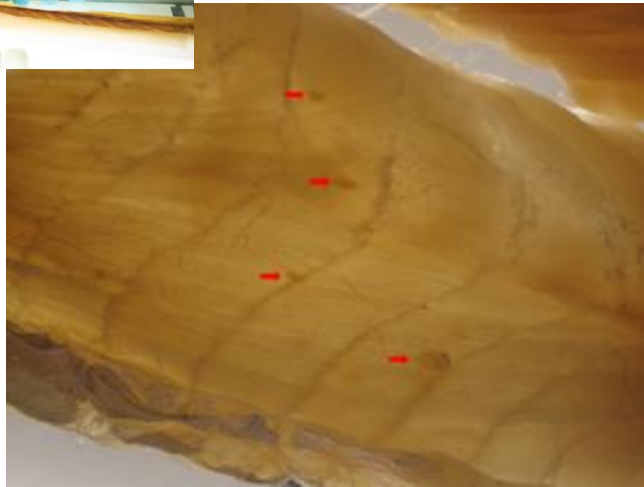
Larvae of *Anisakis* emerge as brightly fluorescent spots

## Methods

*TØRRFISK (n=80 dried cod fillets)*

Candling

Artificial pepsin digestion



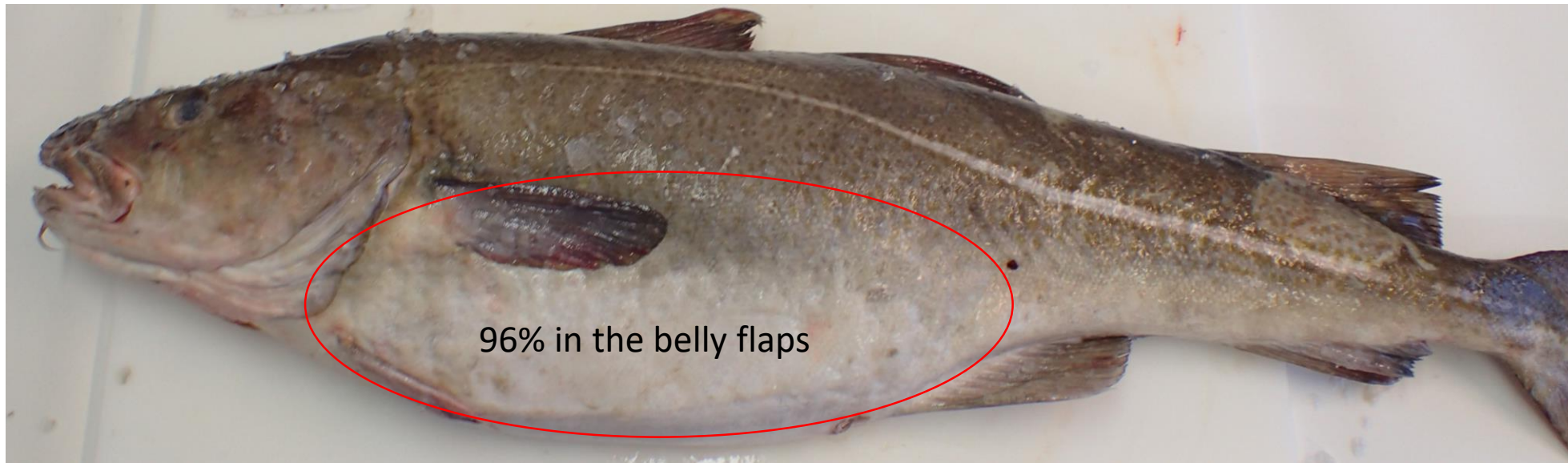
Candling consists in exposing the fillets to a bright light in a darkened room using a retro-illuminated panel in order to detect visible parasites

- ✓ Mimics the conditions of whale stomach.
- ✓ It can be used to assess viability & quantification of anisakids.

## Results

### FRESH COD

- ✓ Every cod examined (n=50) had at least 1 *Anisakis* in their fillets (**100% of occurrence; 13 *Anisakis* on average per fish**).
- ✓ Almost all *Anisakis* (96%) were located in the belly flaps (see figure below).





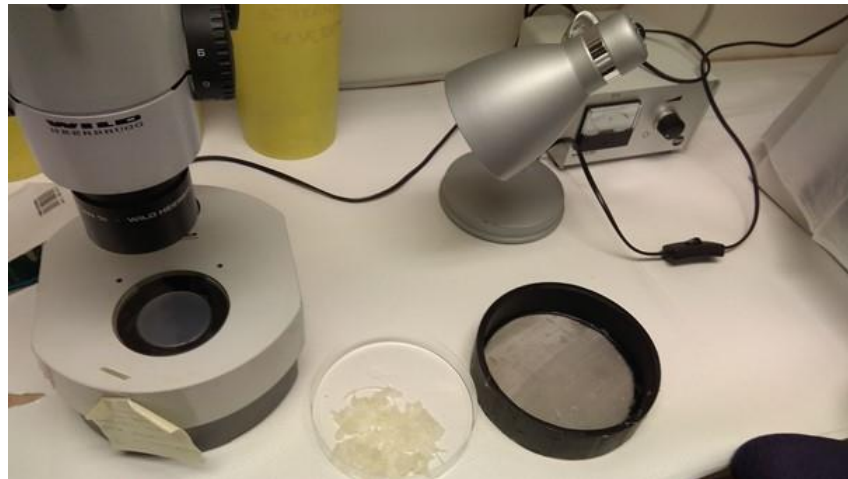
# Results

## TØRRFISK

81% of the rehydrated stockfish fillets (n=80) had *Anisakis*.



**All the *Anisakis* found were dead.**



Dead *Anisakis* larvae examined under stereomicroscope.

## Conclusions

1. **100% *Anisakis* occurrence** in fresh cod fillets, the majority occurring in the **belly flaps**.
2. Results suggest that all nematodes present in rehydrated stockfish are **dead**.
3. The **risk of anisakidosis** from consumption of rehydrated stockfish is **considered zero**.
4. Trimming the belly flaps can strongly reduce the number of *Anisakis* in stockfish.
5. Candling may be used to remove some visible nematodes in the fillets.



Trimming





**TUSEN TAKK**

