# Current use, and need for new vaccines for finfish aquaculture

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# Today's presentation

**FOCUS ON:**

Products aiming to induce specific immunity

Product for use in finfish

Species being cultured in Europe

**NOT COVERED:**

Products aiming to improve non-specific defenses

Products for use in crayfish

Species being cultured in the Americas, Austalsia, Africa

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# Vaccination=disease prophylaxis and -control

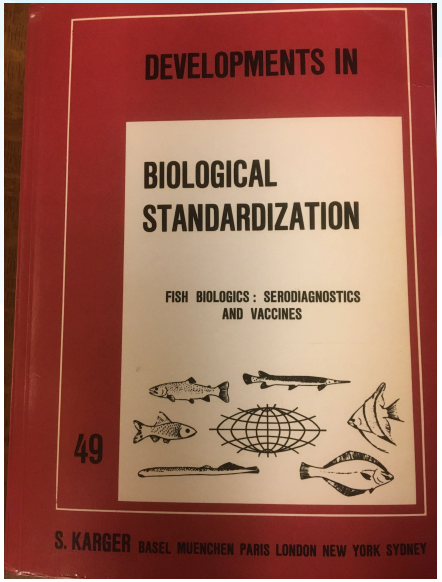
- Using the outcome of immunology research
- Optimized and documented *in vivo*: experimental and field studies

Tools to:

- prevent clinical disease or infection
- reduce spread and control epizootics
- powerful also in the short term (weeks to months)

# KEY EVENTS IN FISH VACCINOLOGY

- 1981 IABS international symposium (1993, 2003)
- Mass vaccination against bacterial diseases in A. salmon farming 1991-1995
- DNA technologies licensed for fish virus vaccines in North America (2005) and Europe (2017)

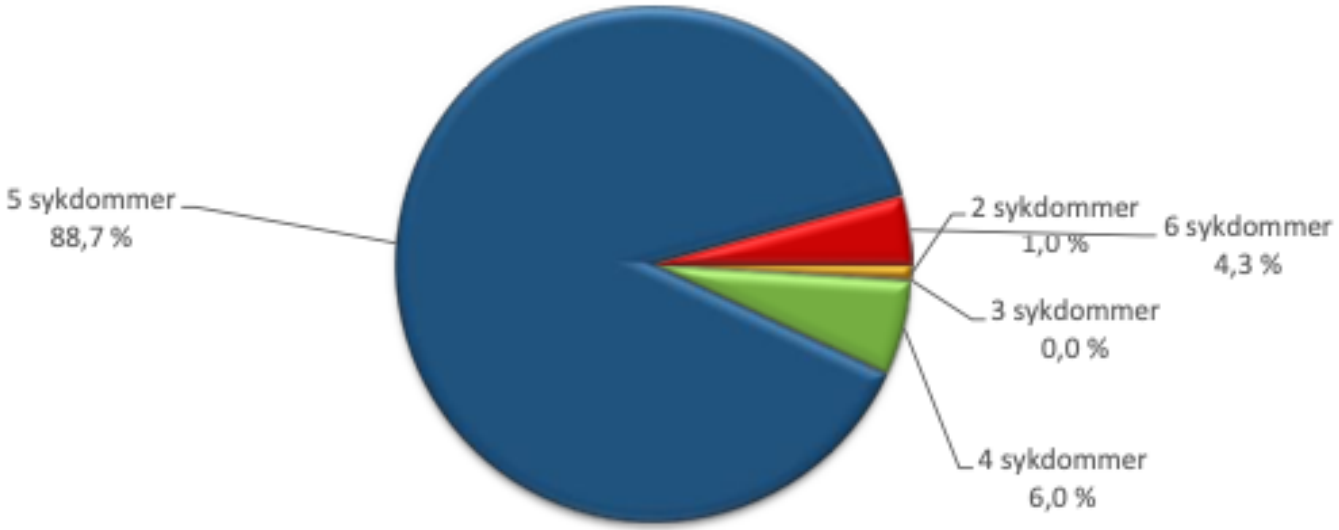



# Use of licensed vaccines in European farming of salmonids

| Country | Quantity |
|---|---|
| Norway | 413 mill (+ 99 mill monovalent PD) |
| Scotland | 50 mill (85% including PD) |
| Faroe Islands | 22 mill (including ISA) |
| Iceland | 15 mill |
| Ireland | 6 mill |
| **Total Europe** | **> 620 million doses** |

# Salmonids: multivalent, adjuvanted vaccines

Antigenic composition,
Norway 2019-2020:




Exceptions:

- PD mono vaccines for injection
- Yersiniosis vaccines (inj., immersion)

# Vaccine administration in farmed salmon

Automated injection machines


https://www.skalamaskon.no/aquakultur/vaksinering

Manual injection (1000-2000 fish per man-hour) in teamwork

Administration by immersion or bath (fry and fingerlings only)

Oral administration  (very uncommon)

# Cleanerfish species

**Multivalent, oil adjuvanted vaccines**

- Atypical *A. salmonicida* + *V. anguillarum*
- Autogenous vaccines with additional bacterial antigens *(V. splendidus, M. viscosa, etc.)*

**Immersion vaccines for fry**

Autogenous or licenced monovalent bacterins

# Mediterranean mariculture

| Infection | Quantities (guesstimates) |
|---|---|
| Vibriosis + pasteurellosis | Sea bass: > 400 mill fish injected<br>Immersion vaccination of fry |
| VNN (Nodavirus) | 30-40 mill, injectable |
| *Aeromonas veronii* | Injectable bacterin |
| *Tenacibaculum maritimum* | Injectable bacterin |
| Streptococcosis | Turbot, injectable bacterin |
| **Total Mediterranean** | **> 600 mill doses?** |

# Freshwater grow-out of salmonids, cyprinids and percids

| Infection/disease | Relevant for |
|---|---|
| Classical furunculosis | All of EU /EEA |
| Yersiniosis | All of EU /EEA |
| Herpesvirosis of carp | Germany, Eastern EU states? |
| Lactococcosis | Italy |
| Streptococcosis | Spain? |

# Suggested new fish vaccines for Europe

## Endemic viral infections of salmonids

- Piscine reovirus induced diseases (HSMI,  heart inflamm. in RT)
- Cardiomyopathy syndrome of A. salmon (PMC virus)
- Sleeping disease of rainbow trout

## Atypical furunculosis vaccines for several species

- Likely specific antigenic strains for each value chain or region
- Multi-species vaccines are unlikely

## Flavobacterioses

- RTFS and columnaris disease in rainbow trout
- Tenacibaculum ulcers in several species

## Herpesvirus 3- vaccines for cyprinids

# How to make new fish vaccines happen (1)

Use of existing vaccines (cascade prescriptions, specific authorisation by national Medicinal Authority)
Examples:

- PD vaccines to control sleeping disease in rainbow trout
- Use of IHN vaccine licensed in Canada/USA

Build documentation (safety, efficacy) alongside and during field use

Extend SPC indications to new (European) disease control purposes

# How to make new fish vaccines happen (2)

## No need to be afraid of autogenous vaccines

- «Autogenous» should mean antigen strains that are shared in a production chain or by natural distribution mechanisms within a defined geography
- No need for new isolates every 6 months in manufacturing, if the antigen proves similar

Build documentation (safety, efficacy) alongside and during field use.

In animal (including fish health) there are some minor species, but numerous minor uses

# *De novo* fish vaccine development

Big Pharma will only start the development of fish vaccines that promise major turnover and profit

Fish vaccine development driven by research findings or by specific (but volume limited) user needs will be carried out by innovative startup companies

- or veterinary vaccine SME´s wishing to expand into the aquaculture market

The ability to generate income through supply of autogenous vaccines is essential to allow the latter

# Fish vaccine users, unite!

Document and communicate the need for new fish vaccines

Engage in raising financial support for vaccine development projects

Endorse mass vaccination to prove the benefits

Thank you for

Your attention!

See you in

Munich?