Health monitoring of fish used in research

Progress?

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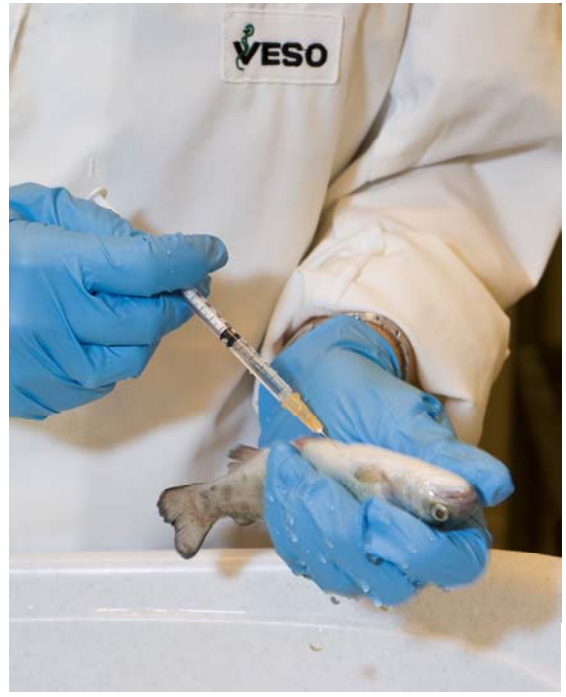
- Cand.med.vet. 1986, Norwegian school of Veterinary Science, Oslo
- Since 1988: Site veterinarian and project manager at VESO Vikan clinical fish trials facility in Namsos, Norway
- Responsible for training of own technicians in Laboratory Animal Science
- Site veterinarian; VESO Vikan hatchery
- Contract research for the main aquaculture supply industries (pharmaceutical- , breeding-, feed-), for the National Veterinary Institute, and other research institutions
- Specific field of interest: IPN challenge models in Atlantic salmon, scientific work published 2007/2008

VESO Vikan

- **Experimental laboratory specialised in biomedical and pharmaceutical research in fish and other aquatic organisms**
- **Built to conduct experiments with infectious diseases**
- **R&D field sites**

VESO Vikan



- Full range of water qualities
- Several challenge models for Atlantic salmon, Cod, Sea bass, Rainbow trout etc.
- Operating according to OECD`s principles for Good Laboratory Practice
- SOP`s
- Good Manufacturing practice (GMP)
- Good Clinical Practice (GCP)

Introduction

- Health monitoring was a subject at the last meeting in 2005
- Papers was presented and group work performed on the subject
- The conclusions from the meeting were:
- Health monitoring is important to assure that we put healthy fish into research and to keep the fish healthy during the research period
- An important factor to assure fish welfare and contribute to the three R`s
- We need guidelines and harmonization between labs. to get the same results in different labs

Health monitoring

- Health status of the fish is influenced by genetics, source of fish, disease status, water quality, tank environment, nutrition etc.
- In the ”practical research world” fish used in research are produced in commercial hatcheries
- Specific pathogen free fish (spf) have been suggested, possible?

How do we monitor fish health

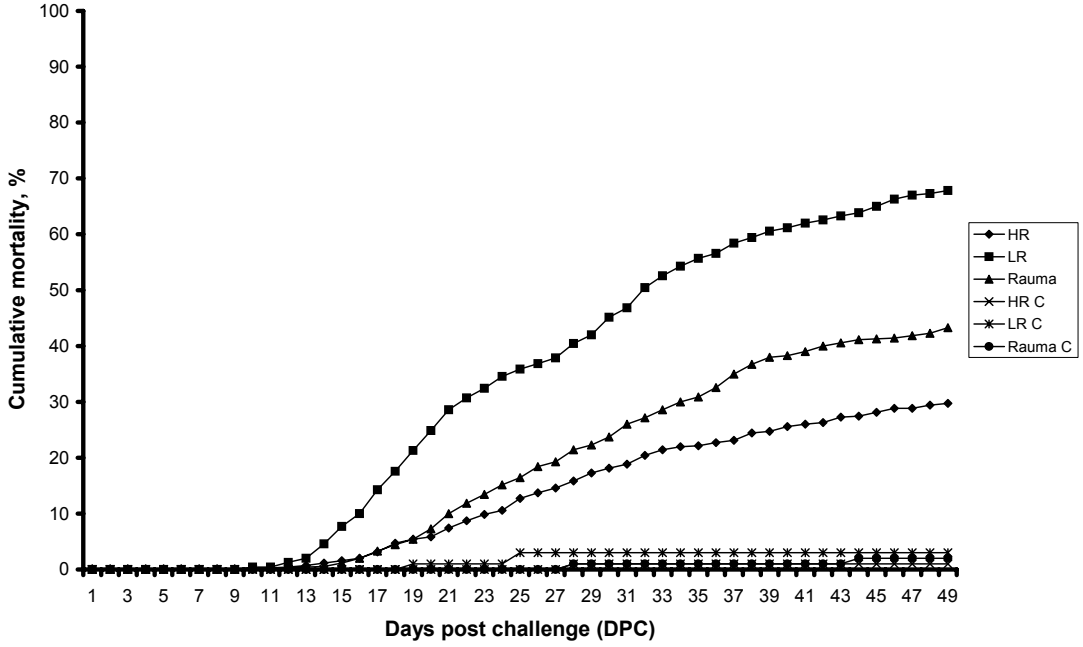
- **VESO Vikan has since 2000 an own hatchery dedicated production of Atlantic salmon for research activity at the experimental facility and for the R&D unit in sea**

- **More than 95% of the test fish are Atlantic salmon**

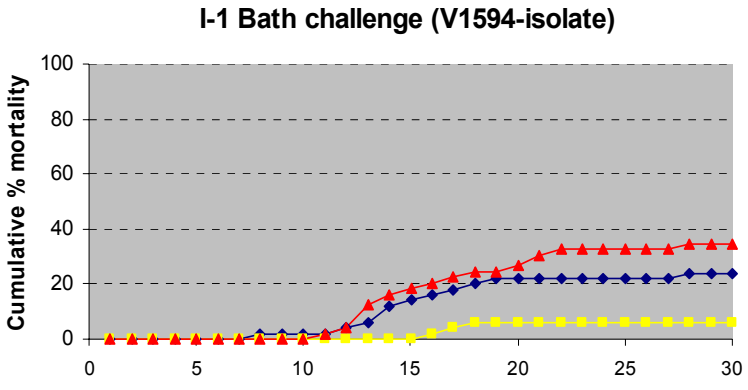
Health monitoring

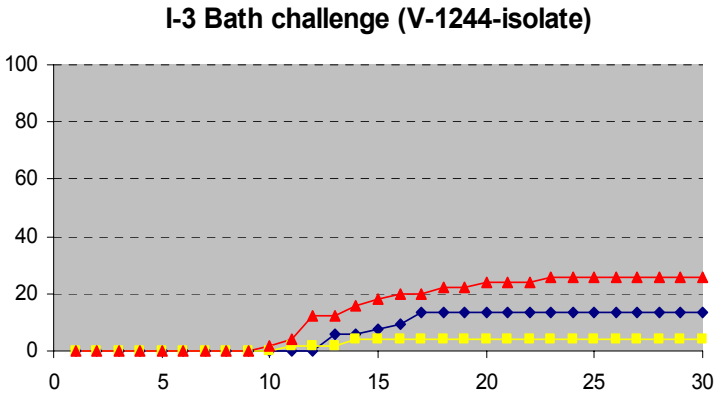
- The responsible veterinarian at the experimental facility and at the hatchery is the same person
- Eggs from the same breeding company used for 10 years
- Known health status of the brood stock and little change in genetics
- Two strains of Atlantic salmon are used with respect to susceptibility to IPN
- IPN susceptibility used as an example to demonstrate how genetics may influence on RPS in a vaccine test

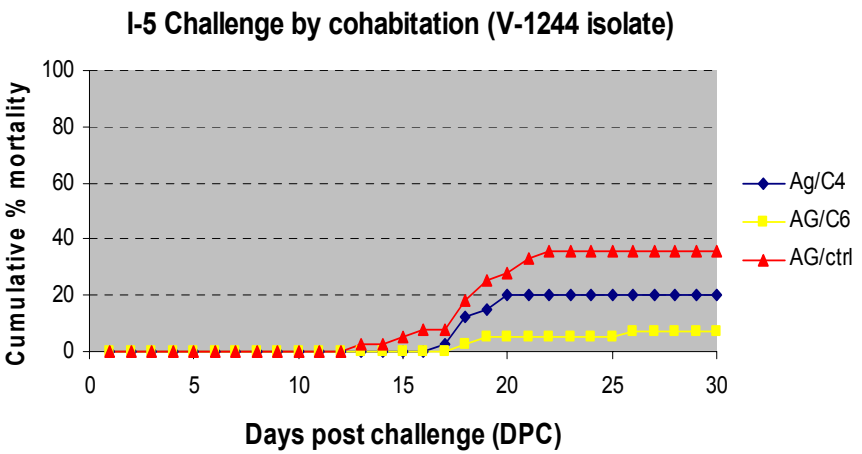
Different genetic susceptibility to IPN in 3 strains of Atlantic salmon fry



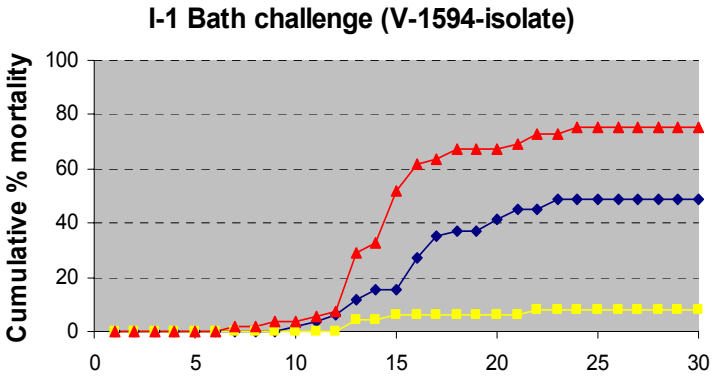
HR (high resistant)-fish: Low control mortality

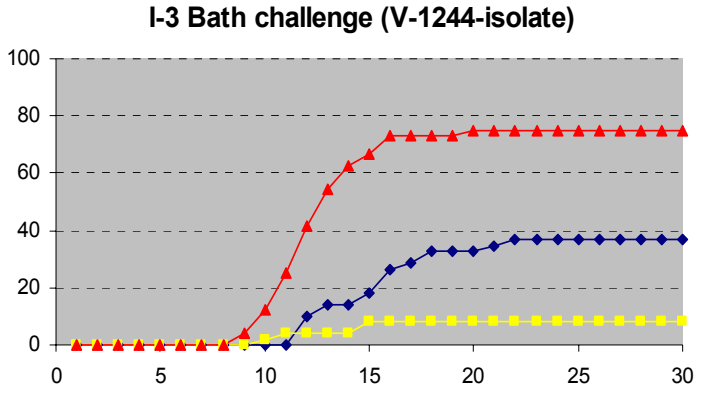


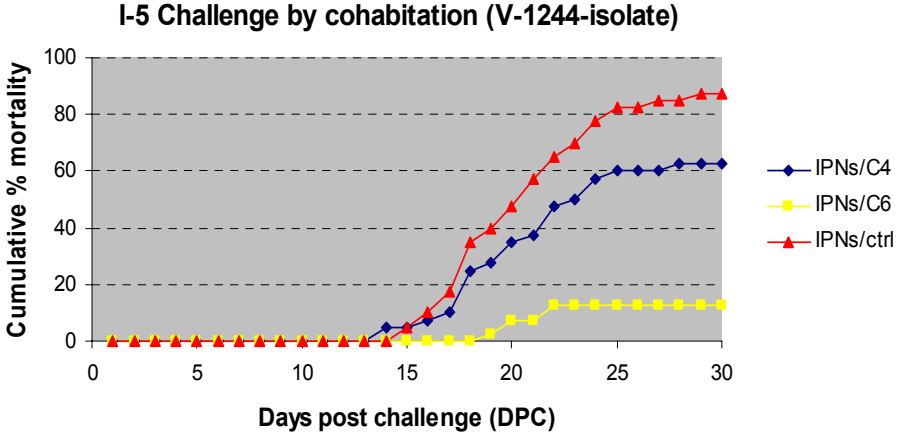




LR (low resistant) fish: High control mortality







We need IPN succeptible test fish to demonstrate IPN specific protection

RPS / Strain	RPS in average	Variation
Aquagen HR	43,4%	10,0-75,0%
Aquagen LR	76,3%	68,0-83,3%

Average and variation in estimated protection (RPS) in AG HR versus AG -LR

Health monitoring

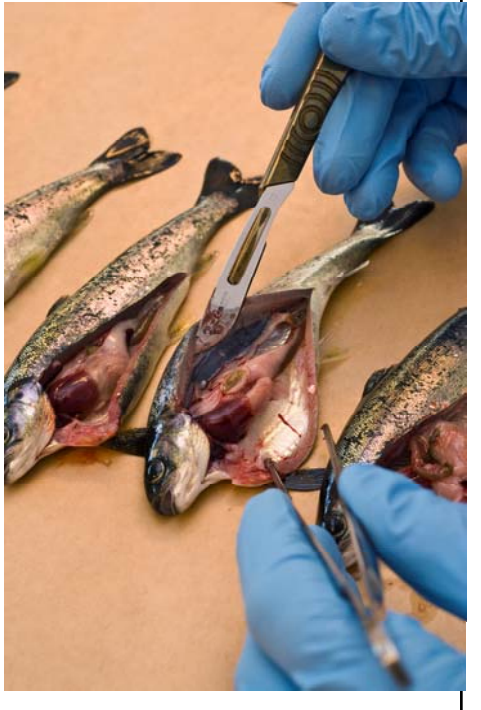
- One challenge in the production of trial fish is to have fish of several sizes/(age) available during the year
- Incubation of eggs 4 times per year
- Warm and cold water
- Identification of eggs/fish in the hatchery
- The identification follows all fish batches from eggs to test fish and is included in a certificate of health and origin for trial fish

Health monitoring in the hatchery

- Every year class of fish in the hatchery are identified as roe at arrival:
- ID – 09AgTi01-V
- Date of incubation
- Date of hatching
- Date of start feeding

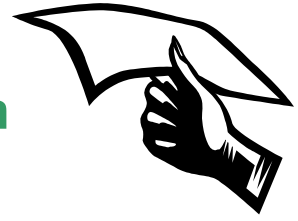
Health monitoring in the hatchery

- In accordance with Norwegian regulations for operation of hatcheries
- 12 visits from veterinarian/fish health biologist
- Supervision of mortalities, water parameters, water source quality, fish welfare, parasites
- Regularly control of individual fish with respect to deformities, damaged gills, situs inversus etc.
- The water source is blocked for migratory anadromous fish



Certificate of health and origin for trial fish

- A form is used for every delivery of fish – both own hatchery and external suppliers
- Name – and address, supplier (fish farm)
- Name of daily manager and site veterinarian
- Date of last visit from veterinarian/remarks
- Fish species
- Strain
- Origin of roe
- Average weight and date for grading
- Total number of fish
- Disease history



Certificate of health and origin

- Previous treatment
- Vaccination
- Comments regarding history and condition
- Information about environment: Light conditions, salinity, temperature
- The ID for eggs in the hatchery
- For internal use: Several information about delivery, transport and reception are documented to be traced if necessary
- Information about temperature in the hatchery and during transport and at arrival are important to give the fish optimal conditions in the experimental facility

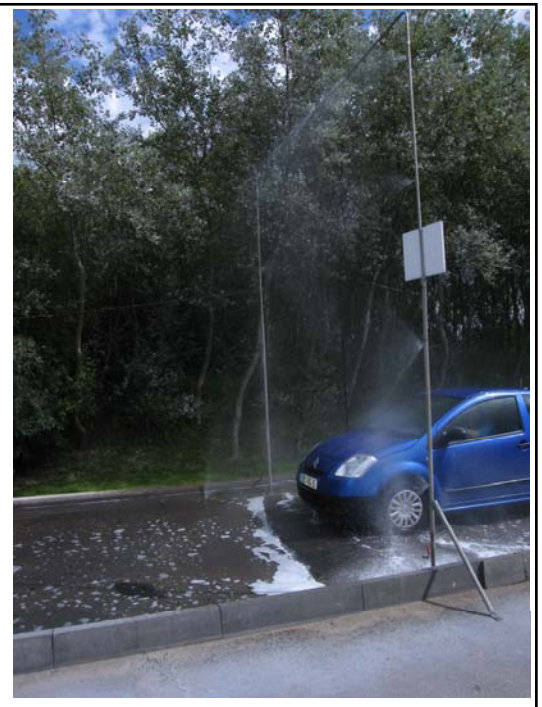
Immune status

- Documentation of the immune status of all roe batches in the hatchery
- Specific antibodies against *Vibrio anguillarum* 01 and 02, *Vibrio salmonicida*, *Aeromonas* subsp. *salmonicida*, *Moritella viscosa*, *Vibrio ordalii* and IPN are documented
- "Within the normal range for unexposed fish"
- Some are included in the European Pharmacopoeia
- Safety/Batch potency test: Use fish from a population that does not have specific antibodies against the bacterial agent in the vaccine
- New emerging diseases will be included in the program: ISA, PD etc.
- A certificate of immune status of the fish identified with the roe ID

External suppliers

- VESO Vikan has ”control” of the production of Atlantic salmon
- But, we have research activity on cod, sea bass, rainbow trout and other species
- These species come from commercial fish farms
- All external suppliers have to be approved by the site veterinarian at VESO Vikan
- Personnel responsible for health monitoring of the fish farm and daily manager are interviewed about disease history- and presence, hygiene routines etc.

External suppliers



- Sea bass are delivered as fingerlings by plane from a hatchery in France
- The hatchery is inspected
- The fish farm are supervised of fish pathologist
- All external suppliers have to use the same ”Certificate of health and origin” as used for internal deliveries
- Conditions during transport are supervised and documented

Health monitoring in the research facility

- SOP`s describe every working operation
- The different species are treated differently according to their specifications
- Knowledge of specific environmental requirements
- 2 fresh water sources
- UV-disinfection of sea water
- Daily feeding and visual observation of fish
- Daily cleaning of tanks

Health monitoring in research facility

- Poor appetite, signs of parasites (twisting movements), adverse mortality is reported to Study Director/Site veterinarian
- Challenges with abbreviated opercula and fin rot, giving opportunists the possibility to establish
- We don`t know the immune status or bacteriological status of salt water species
- Potential weak point with salt water pipes housing a flora of opportunistic bacteria

Health monitoring in research facility

- Adverse mortalities are investigated
- SOPs for treatment of parasites/fungi
- We seldom use AB on fish in research
- Our ”tactic” is to assure that healthy fish arrive at the research facility
- Optimized conditions for the different species
- We have strict hygiene procedures and safe water quality, reliable water parameters
- We work for good health and prevention of disease…..until we challenge the fish

Health monitoring- Can we do more?

- **YES!**
- **Own hatchery for cod**
- **More examination of potential research fish?**
- **More examination during the experiments**
- **More examinations and diagnostics cost money.**
- **The client/project must pay**

- **Production of spf-free fish**
- **Possible, but expensive**
- **Who is going to take the costs?**

Have we made progress?

- Improved documentation
- Improved supervision of Atlantic salmon production
- Documentation of immune status in salmonids
- Scientists are working with this subject on salt water species (cod)
- Increased know - how of new species
- Our procedures are adapted to fish for infectious trials

Have we made progress?

- Guideline: ”Health and welfare monitoring of fish used in research” (Johansen et al, 2005)
- We still need guidelines for health monitoring of each fish species in each type of research
- Each research laboratory has standardised challenge tests
- But, we don`t have harmonisation of challenge models or health monitoring between labs

Thank you for your attention!