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Fish in Research – The Norwegian Perspective

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The Norwegian Reference Centre for Laboratory Animal Science & Alternatives

National platform for alternatives
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Fish in Research - The Norwegian Perspective

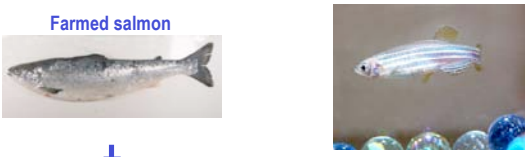
- How many research fish do we use?
- Why do we use so many research fish?
- How can the number of research fish be reduced?



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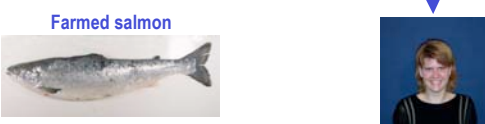
Major difference between Norway and UK

Farmed salmon



↓

Farmed salmon



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Number of fish in Norway

- Annual production of 500 000 tons farmed fish
- About 500 million farmed salmon
- The mortality rate for farmed salmon in seawater is estimated to be 7% a year
 - About 50,000 fish die each day
- **1 million research fish**

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Winter Ulcer Disease

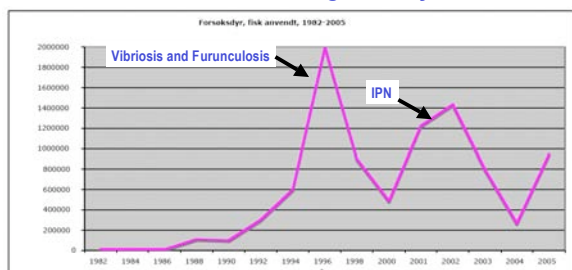


Photo: Brit Tørud

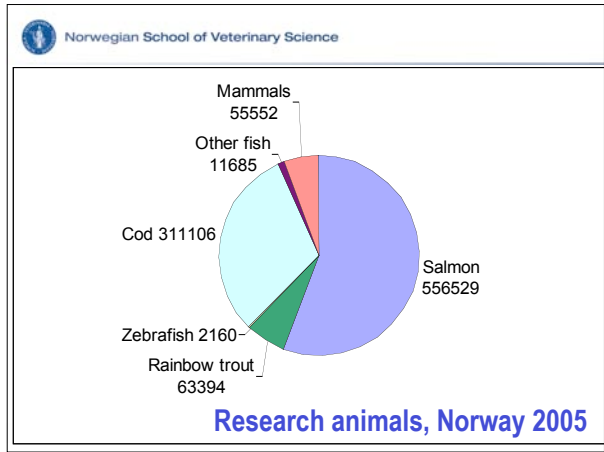
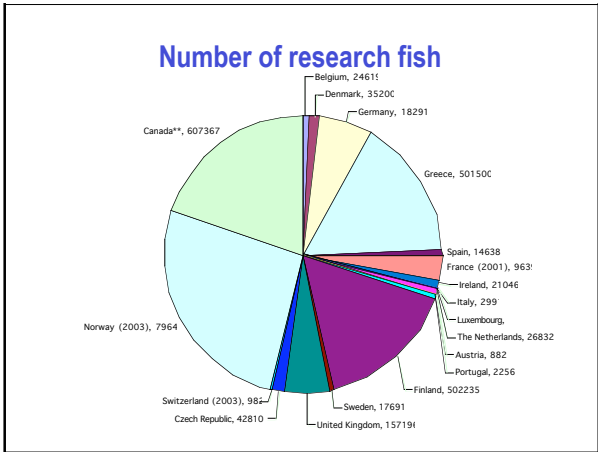
Several million fish suffer from this disease each year

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The large variation in the number of research fish is due to the health situation and economy of the fish farming industry



Year	Number of research fish
1982	0
1984	0
1986	0
1988	100,000
1990	150,000
1992	200,000
1994	400,000
1996	1,900,000
1998	1,000,000
2000	500,000
2002	1,400,000
2004	300,000
2005	1,000,000



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Research fish
944.874

+

"Fish used in research that are not defined as research fish"
1.659.051

=

Total number of fish used for research
2.6 million

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"Fish used for research that are not defined as research fish"

Fish used for research that are not defined as research fish, 2004	
Simple marking of animals, withdrawal of blood samples and collection of natural secretions or excretions only causing slight pain or discomfort of a highly temporary nature	61665
Experiments having to do with breeding/rearing, feeding and environment without producing a non-physiological state in the fish	1205366
Fish killed before the start of the experiment	14179
Fish killed for educational purposes etc.	820
Fish at research stations not used	377000
Total	1659051

Observational studies, slaughterhouse data etc. on farmed fish are not counted in the statistics.

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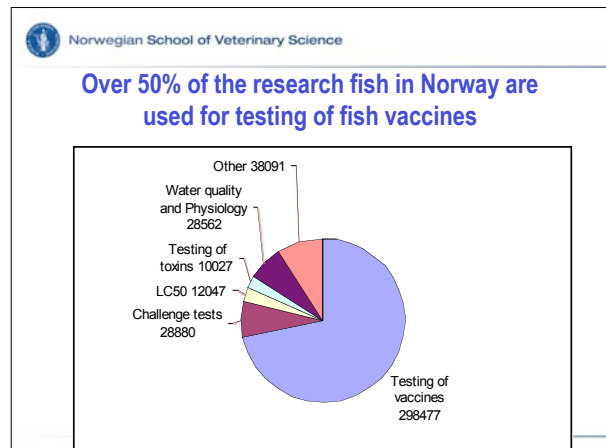
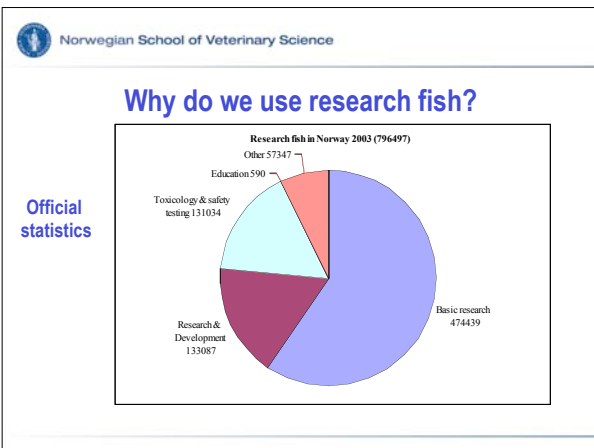
Lack of international harmonisation of how a "research fish" is defined leads to problems when statistical data from different countries are compared.

Lack of international harmonisation on ethical norms for the use of fish in research could lead to movement of research from one country to another.

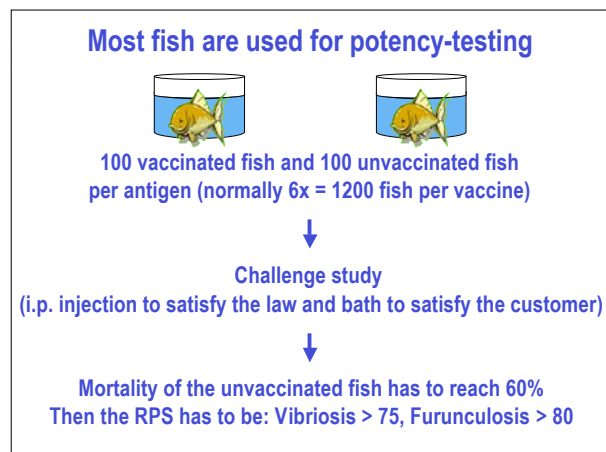
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How do we define suffering in research fish when we are still discussing whether fish have the ability to suffer or not?

- In Norway only a few studies such as surgical insertion of radio transmitters into the abdomen of fish are reported as painful experiments.
- Studies where fish are killed with high doses of bacteria or virus to show the effect of vaccines are not reported as painful experiments.

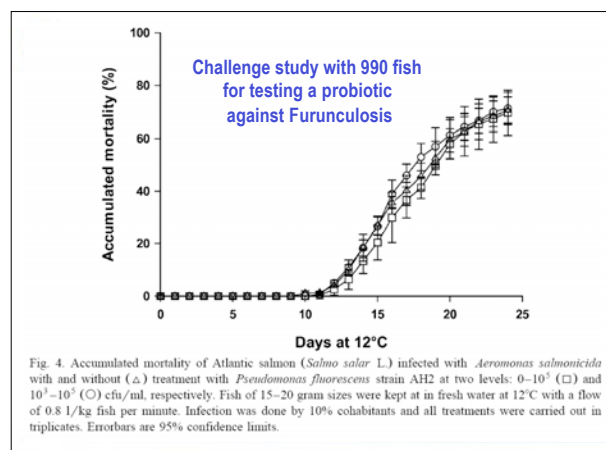


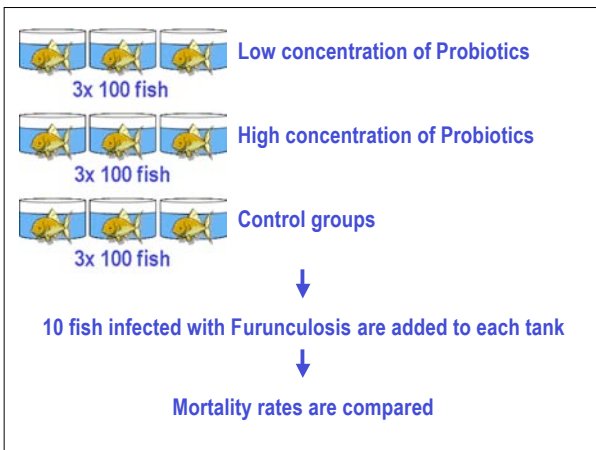
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- ### Why are so many fish used for testing of fish vaccines?
1. There is a continuous need for new and better vaccines
 2. The European pharmacopoeia
 - States how vaccines have to be tested
 - Few possibilities to use alternatives
 - No alternatives methods available



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How can we reduce the number of research fish?





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How can we reduce the number of research fish?

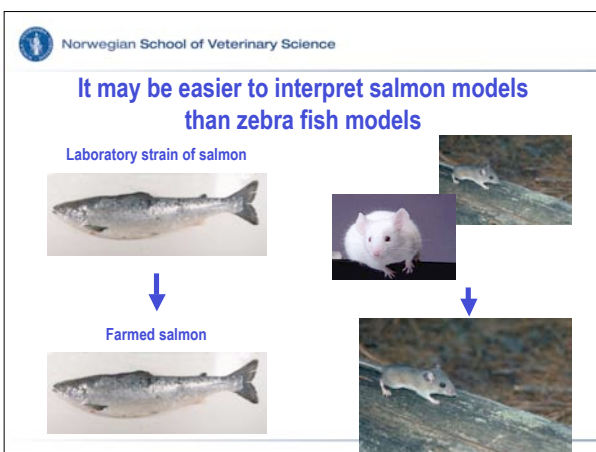
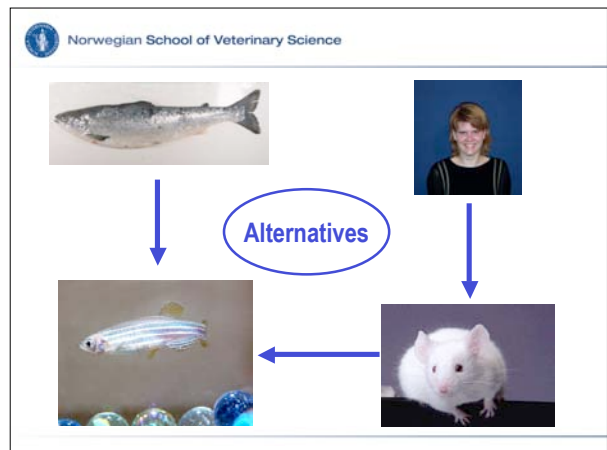
- *In vitro* studies
- Pilot studies
- Standardise the fish used
 - Age, size, health
 - Genes
- Standardise the conditions
 - Water quality and tank facilities
 - Care and handling
 - Methods for blood sampling, anaesthesia etc.
 - Feeding systems, tagging etc.

Best Fishes

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Alternatives

- The 3 R's
 - Reduce the number of fish used
 - Replace live fish with *in vitro* methods
 - Refine methods to reduce the number of fish and/or the amount of suffering



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The lack of standardisation of research methods leads to the fact that all parameters have to be tested on the **same fish group at the same time under the same conditions.**

This leads to **LARGE** experimental studies and the results from one study are difficult to compare with other studies.

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Conclusion:

There is great potential for optimising research methods leading to **more and better research results per fish used in research**

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Do we need more or less research fish?

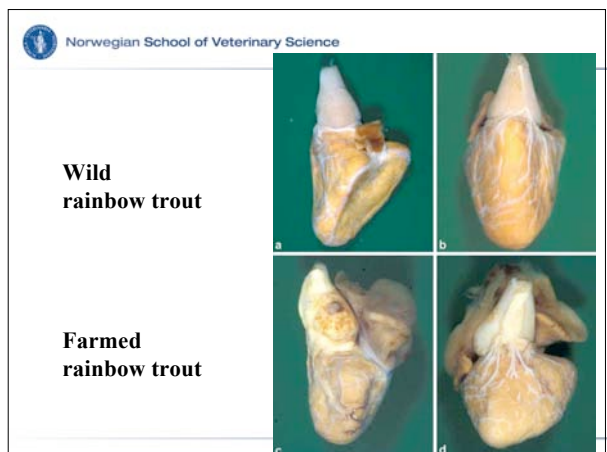
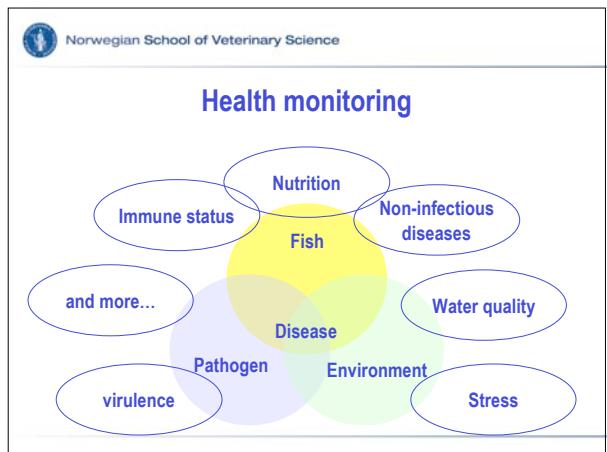
Yes, we need more research fish to solve the major problems in the fish farming industry

Yes, we should use less research fish because it is an ethical problem and the number needs to be reduced to a minimum.

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Health monitoring of fish used in research

What's the point?
We use only healthy fish in our research, don't we?



Conclusions on how to reduce the number of research fish

- The statistical data of the number of fish used in research need to be based on better definitions
- Laws and regulations should allow alternatives
- There is a great need for more research to develop *in vitro* methods and refine experimental methods
- Standardisation of research models
 - Including health and genetic status of the fish



Acts and Regulations concerning the Care and Use of Fish in Norwegian Research

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A report from
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Laboratory Animal Science & Alternatives,
Norwegian School of Veterinary Science,
Oslo, Norway

Report available on our website

www.oslovet.veths.no/fish



Thanks to Gunvor Knudsen
for the 2003 data.

Thank you for your attention!



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