

Fish diet and public health



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Main objective

Replace as much as possible of the fish meal and fish oil currently used in fish feeds with sustainable, alternative feed resources that are as free of undesirable contaminants as possible, consistent with maximising the growth performance, feed conversion efficiency, health and welfare of the farmed fish, and maximising the health - promoting properties, safety, quality and acceptability of the final product to the consumer.

14 countries – 32 partners

Sustainable feed



Health benefits



Seafood safety



Public perception of farmed fish



Status and targets

Salmonids, marine fish and cyprinids consume over 60% of fish meal and over 80% of fish oil used for aquaculture

Species	2005 levels		Target levels	
	FM	FO	FM	FO
Salmon	35-47	25-33	12-16	8-12
Trout	30-35	20-25	5	5
Seabream	40-45	15-20	15	10
Carp	20-25	5-10	0	0

Results confirm that in all species no serious issues as regards growth, feed or nutrient utilisation at target levels as tested

A technique for assessing the environmental aspects and potential impacts throughout the life of a product or service, from the raw material extraction through production, use and disposal.

ISO, 1997

The use of Aquamax feeds led to improvements in terms of net **primary production**, whilst the increased use of vegetable sources can induce an increase in land competition as well as other impacts such as **eutrophication and terrestrial ecotoxicity**



Impact for the industry

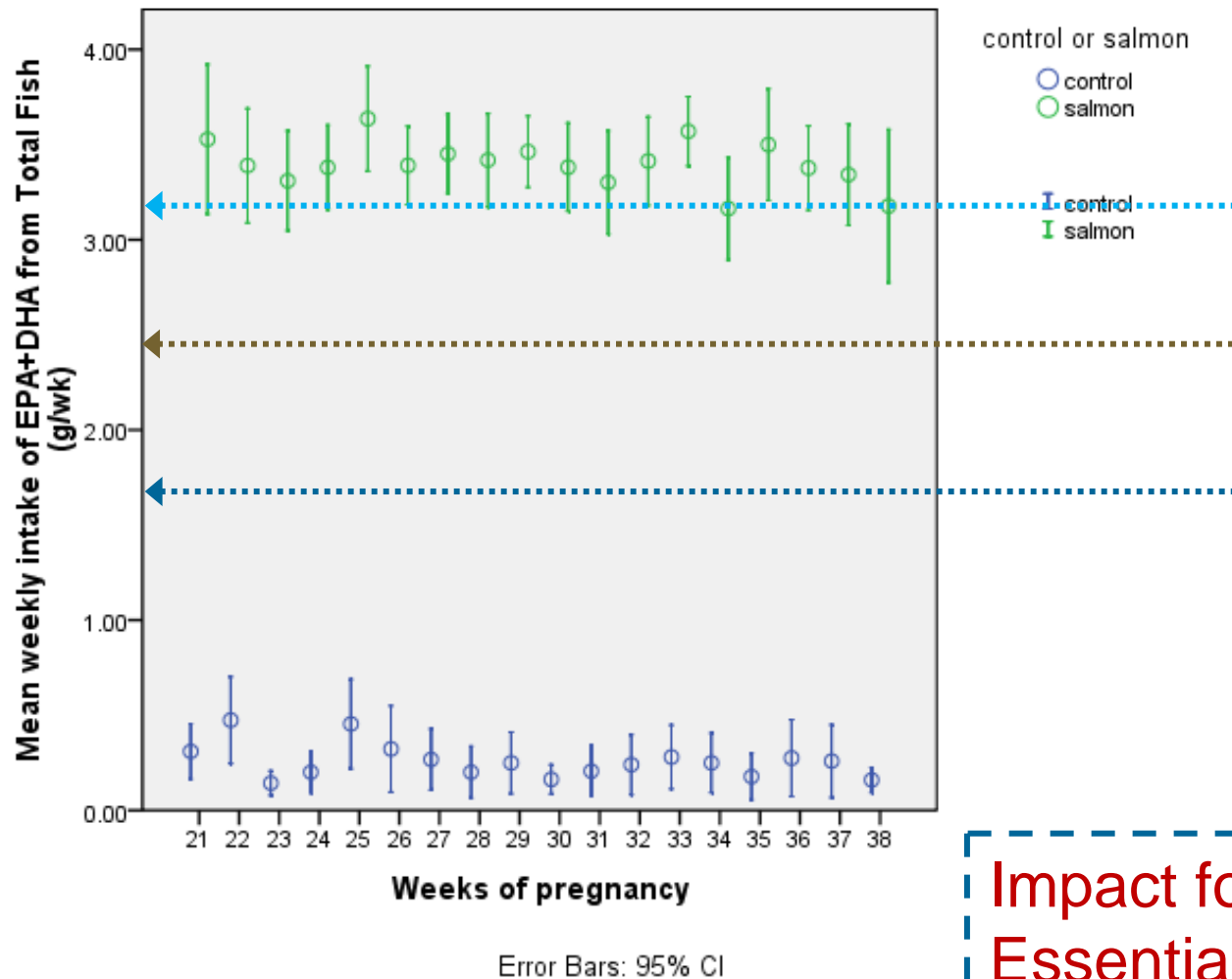
- Sourcing of sustainable alternatives to fish meal and fish oil in the fish feed
- Need for increased knowledge on
 - positive health effects of seafood in human diets
 - Need for increased knowledge concerning undesirable substances in the fish to avoid too restrictive legislation that might restrict the availability of feed resources
- Aquamax contributed significantly to increased knowledge in all these aspects and even more

Hypothesis: Consumption of tailor made salmon by pregnant women will

1. Improve their omega-3 PUFA and antioxidant status
2. Improve the omega-3 PUFA and antioxidant status of their developing baby
3. Ameliorate the development of atopic markers and manifestations in the infants



Fish Diaries: EPA+DHA intake from fish



Recommended UK minimum intake for all adults

Minimum recommended by EFSA for pregnant women

Recommended by EFSA for non-pregnant adults

**Impact for the authorities :
Essential knowledge for
dietary recommendation**

- Trust is important dimension of lay risk perceptions of farmed fish (Luoma and Lofstedt, 2007)
- Local production more trusted and desired
- People want to trust: *“we are not experts, are we? So we want to put our faith in the hands of experts to help us, who are paid to do that, people who know about that”* (CDE, UK)
- Differences between countries, e.g. Norway is very trusting in comparison to all other countries
- Further differences related to social class. Lower SES seem to be more trusting- or have more need to trust

Impact for the authorities :

Can this study give information of how to communicate risk most efficiently to different consumers?

- “Help the sector become more competitive through strong support for research and development, better spatial planning in coastal areas and river basins, and giving specific help through the EU's fisheries market policy”
- “Ensure it remains sustainable by maintaining its environmentally-friendly production methods and high standards of animal health and welfare and consumer protection”
- “Improve governance and ensure there is a business-friendly environment in place at all levels – local, national and EU – so the sector can realise its full potential”

- The principles and the objectives of the general food law apply to all stages of the production, processing and distribution of food and also of feed produced for, or fed to, food producing animals: **“farm to fork” approach.**
- **AQUAMAX:**
 - Feed
 - Food

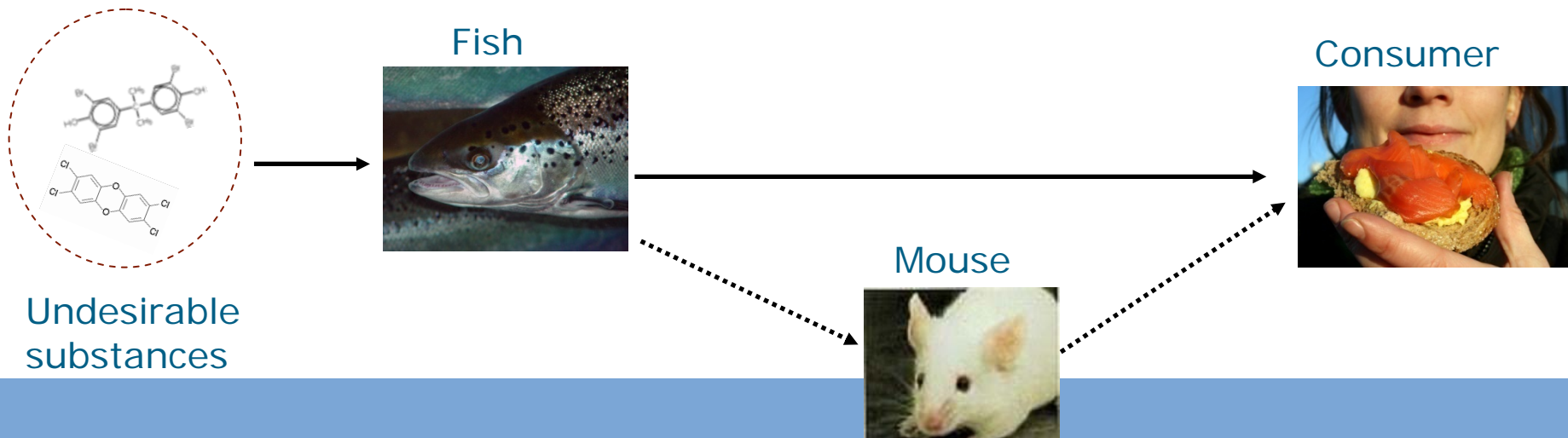


- The objectives of a high level of protection of human health and the protection of consumers' interests and of, where appropriate, the protection of animal health and welfare, plant health and the environment shall be pursued by food legislation
- AQUAMAX:
 - Feed → high level of human health protection
 - protection of animal health
 - protection of the environment (sustainability)
 - Food → high level of human health protection

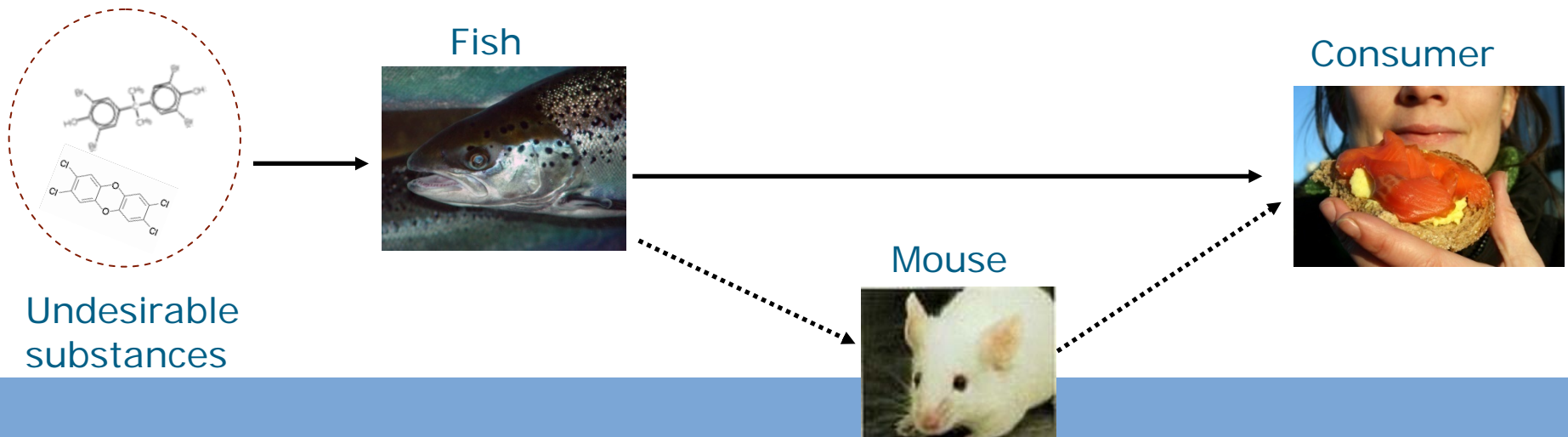


Directive 2002/32/EC Annex undesirable substances

- Aquamax has contribute with results on following components:
 - Ions and elements
 - **arsenic, lead, fluorine, mercury, nitrites, cadmium**
 - mycotoxins
 - aflatoxin B1, rye ergot
 - organic contaminants
 - **dioxins, dioxin-like PCBs, organochlorine pesticides (aldrin, dieldrin, camphechlor, chlordane, DDT, endosulfan, endrin, heptachlor, HCB, HCH (alpha, beta and gamma isomers))**



- Aquamax has contribute with results on following components:
 - **Nitrates**
 - **Mycotoxins:** aflatoxins, ochratoxin A, patulin, Fusarium-toxins (zearalenone, fumonisins, trichothecenes: Deoxynivalenol, *T-2* and *HT-2* toxin), ergot alkaloids, ...
 - **Heavy metals:** lead, cadmium, mercury, (*inorganic*) arsenic, methylmercury...
 - **Other environmental contaminants:** dioxins, dioxin-like PCBs, PAH, non-dioxin-like PCBs, BFRs, PFOS, tributyltin (TBT), iodine,...
 - **Processing/industrial contaminants:** 3-MCPD, inorganic tin, PAH, acrylamide, furan, ethylcarbamate
 - **Inherent plant toxins:** pyrrolizidine alkaloids, hydrocyanic acid, solanine ...



- Fish nutrition
- Human nutrition
- Nutritional toxicology
- Consumer perception

No.	Type
<i>160</i>	<i>Conference / posters</i>
<i>45</i>	<i>Publications (so far)</i>

- New knowledge useful for:
 - Industry
 - Development of legislation
 - Consumers
 - EU aquaculture strategy

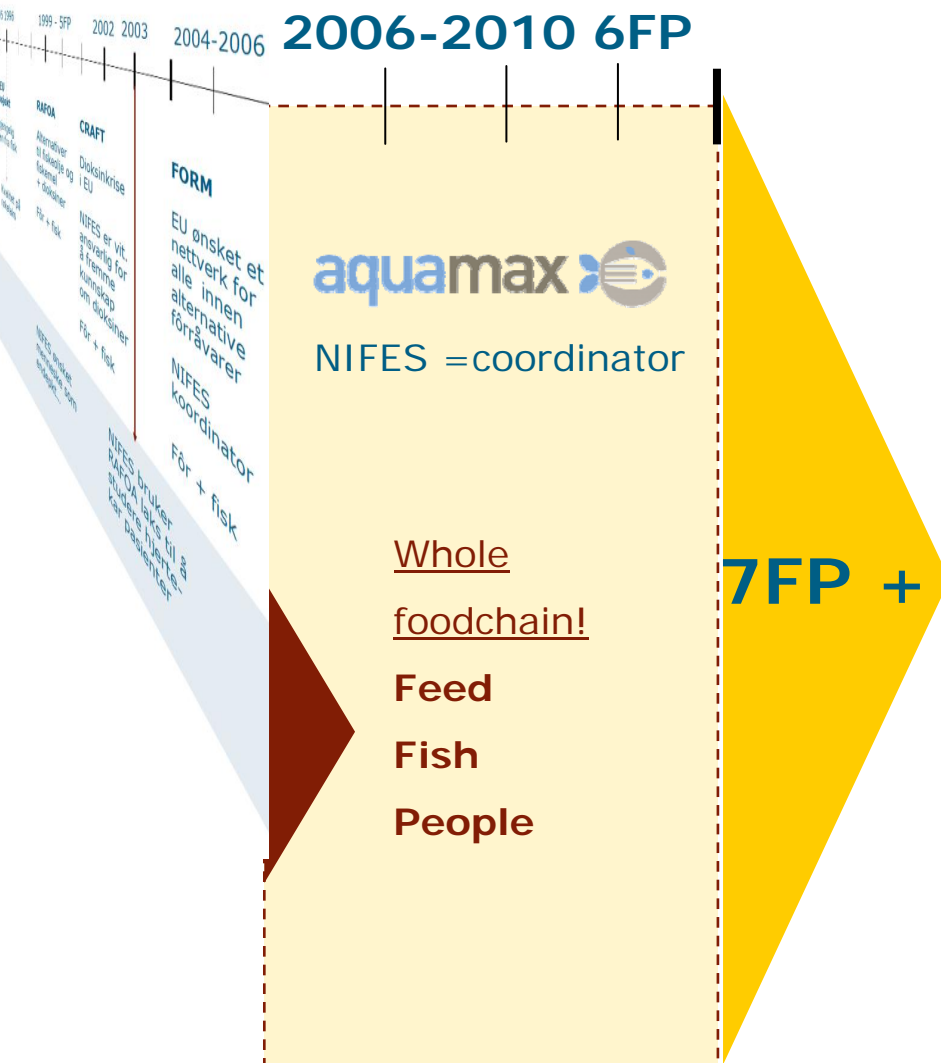
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Food production in the future

- Unexploited feed resources
 - Nutritional requirements
 - Health and welfare
- Healthy and safe food for consumers
 - Lifestyle diseases
- Public perception
- Strength of AquaMax
 - Combination of different disciplines

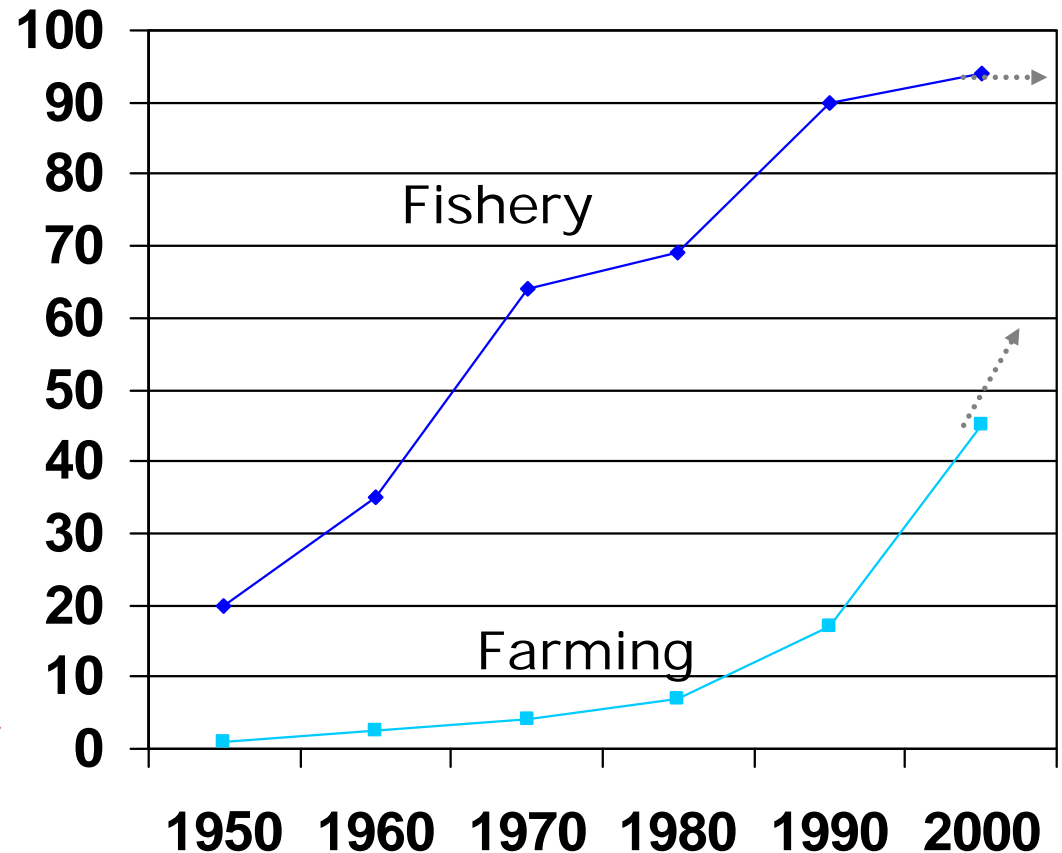
Food production in the future

Global seafood consumption:

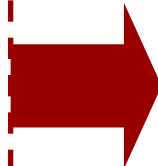
2001: 100 mill tones

2030: 165 mill tones

Proteins, marine omega-3 fatty acids, vitamin D, vitamin B12, iodine and selenium



Must come from aquaculture



Life style diseases – a global challenge



	1999	2020
Deaths	60% of all deaths	73% of all deaths
Diseases	43% of all diseases	60% of all diseases

WHO has estimated:

80% of cardiac infarctions
 90% of diabetes II
 30% of cancer



May be prevented by:

- **IMPROVED DIET**
- Physical activity
- Quitting smoking

