



FISKERIDEPARTEMENTET

*Norwegian Ministry of Fisheries*

# **Visions for modern aquaculture's future**

## **AquaVision 2004**

Svein Ludvigsen, Minister of fisheries, Norway

# Visions.....

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...in today's globalised society

- Internationalisation and globalisation
- The power of the consumer is growing
- Produce a product which is demanded! Not the opposite”.



## Consumers' preferences

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- How expensive is the product?
- How accessible is the product for me?
- How familiar is the product for me?
- What is the quality of the product?
- May I harm the environment by buying this product?
- Is it safe for me to eat this product?

© Photo: Norwegian Seafood Export Council



High quality documented and traceable seafood products tailor made to the consumers taste and needs



© Photo: Norwegian Seafood Export Council

- Sustainable aquaculture management
- Food safety
- Research and development

## Sustainable aquaculture management

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Implement principles of sustainability in regulations

- Including environmental issues, animal health and welfare
- NYTEK
- MTB
- GMO



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# The Riches of the Sea - Norway's Future

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## HEALTH

### Study: Farmed salmon more contaminated than wild

Researchers find more cancer-causing pollutants in fish farms

Friday, January 9, 2004 Posted: 09:19 GMT (5:19 PM HKT)

WASHINGTON (AP) -- Farm-raised salmon contain significantly more dioxins and other potentially cancer-causing pollutants than do salmon caught in the wild, says a major study that tested contaminants in fish bought around the world.



Salmon farmed in Northern Europe had

## Science magazine

9 January 2004

### Global Assessment of Organic Contaminants in Farmed Salmon

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The annual global production of farmed salmon has increased by a factor of 40 during the past two decades. Salmon from farms in northern Europe, North America, and Chile are now available widely year-round at relatively low prices. Salmon farms have been criticized for their ecological effects, but the potential human health risks of farmed salmon consumption have not been examined rigorously. Having analyzed over 2 metric tons of farmed and wild salmon from around the world for organochlorine contaminants, we show that concentrations of these contaminants are consistently higher in farmed salmon than in wild salmon.

investigation into the sources of contamination. Risk analysis indicates that consumption of farmed Atlantic salmon may pose health risks that detract from the beneficial effects of fish consumption.

Between 1987 and 1999, salmon consumption increased annually at a rate of 14% in the European Union and 23% in the United States (1). Currently, over half the salmon sold globally is farm-raised in Northern Europe, Chile, Canada, and the United States, and the annual global production of farmed salmon (predominantly Atlantic salmon, *Salmo salar*) has risen from ~24,000 to over 1 million metric tons during the past two decades (2). The health benefits of eating fish such as salmon have been well documented (3, 4). However, salmon are relatively fatty omnivorous fish that feed high in the food web, and as such, they bioaccumulate con-

taminants (5). The potential risks of eating contaminated farmed salmon have not been well evaluated. Three previous studies reporting contaminants in salmon are inconclusive because of their very small sample sizes and narrow geographic representation (6-8). As a result, the extent of this problem and the potential risks to human health remain unclear.

We analyzed organochlorine contaminants in approximately 700 farmed and wild salmon (totaling ~2 metric tons) collected from around the world. We do not report on other important contaminants, such as metals, pesticides, because our preliminary study (9) showed no significant difference in methylmercury levels between farmed and wild salmon. Using the data on organochlorine contaminants, we assessed the variation in contaminant loads between farmed and wild salmon and among geographic regions, and we calculated the human health risks of salmon consumption. Farmed Atlantic salmon from eight major producing regions in the Northern and Southern Hemisphere were purchased from wholesalers that could obtain fish of the appropriate size within the sam-

pling period; in addition, farmed Atlantic salmon fillets were purchased at supermarkets in 16 large cities in North America and Europe. For comparison, samples of five wild species of Pacific salmon (*Oncorhynchus kisutch*, coho [*O. kisutch*], chinook [*O. tshawytscha*], pink [*O. gorbuscha*], and sockeye [*O. nerka*]) were obtained from three different geographic regions. Wild Atlantic salmon were not studied because few are available commercially; nor did we analyze farmed Pacific salmon because they are not raised in any substantial amounts (2, 10).

A total of 284 individual whole salmon were purchased from wholesalers and fillets on additional 144 fillets were purchased from retail outlets. The fillets were purchased from retail outlets in 16 large cities in North America and Europe. For comparison, samples of five wild species of Pacific salmon (*Oncorhynchus kisutch*, coho [*O. kisutch*], chinook [*O. tshawytscha*], pink [*O. gorbuscha*], and sockeye [*O. nerka*]) were obtained from three different geographic regions. Wild Atlantic salmon were not studied because few are available commercially; nor did we analyze farmed Pacific salmon because they are not raised in any substantial amounts (2, 10).

Each composite sample consisted of fillets from three salmon per location or three fillets per retail outlet, giving 146 measurable samples. All samples were homogenized and analyzed by gas chromatography-high-resolution mass spectrometry (11). Strict quality assurance and quality control procedures were followed (12). Thirty samples of salmon feed were purchased from the European, North American, and South American outlets of the two major fish feed companies, which together have ~80% of the global market for fish feed (13), and were analyzed as above.

Contaminant concentrations in farmed and wild salmon were compared by analysis of variance. In comparing wild and farmed salmon, farmed salmon were considered as a single group. In addition, locations at which salmon were farmed were compared by analysis of variance with multiple comparisons of means to test for differences among locations in contaminant levels. In all analyses of vari-

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## BBC NEWS UK EDITION

Last Updated: Thursday, 8 January, 2004, 20:59 GMT

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### Scare over farmed salmon safety

Salmon farmed in Scotland is among the most tainted with cancer-causing chemicals, US scientists have warned.



The Indiana University experts urged people to limit the amount of farmed salmon they eat after studying contamination levels across the world.

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## Food safety

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- Interest of us all to cooperate to improve our ability to handle such unexpected situations
- Correct information
- Respond quickly

Round table conference:

- Consumer information related to food safety issues.

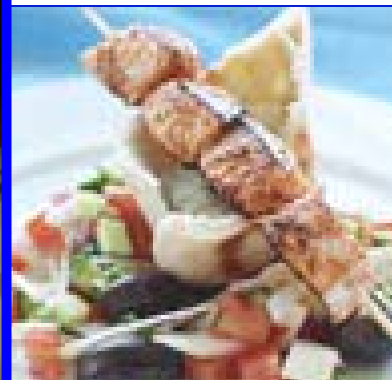




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R&D will be the most important tool to develop the aquaculture industry further

# Year 2020?

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