

Global Assessment of Organic Contaminants in Farmed Salmon

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FROM ABSTRACT

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 significantly higher in farmed salmon than in wild.

European-raised salmon have significantly greater contaminant loads than those raised in North and South America, indicating the need for further 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.

THESE AUTHORS ALSO NOTE:

"Between 1987 and 1999, salmon consumption increased annually at a rate of 14% in the European Union and 23% in the United States."

"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) has risen from 24,000 to over 1 million metric tons during the past two decades."

The health benefits of eating fish such as salmon are well documented.

"Salmon are relatively fatty carnivorous fish that feed high in the food web, and as such, they bioaccumulate contaminants."

"We measured 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 methylmercury, because our preliminary study showed no significant difference in methylmercury levels between farmed and wild salmon."

"Concentrations in farmed salmon from Europe and from North America were significantly higher than those in wild salmon for all 14 contaminants."

"In addition, concentrations of all contaminants in farmed salmon from Europe were significantly greater than concentrations in farmed salmon from both North and South America."

We focused additional analysis on PCBs, dioxins, toxaphene, and dieldrin.

"Total PCBs, dioxins, toxaphene, and dieldrin were consistently and significantly more concentrated in the farmed salmon as a group than in the wild salmon."

"PCB, dioxin, toxaphene, and dieldrin concentrations were highest in farmed salmon from Scotland and the Faroe Islands and lowest in farmed salmon from Chile and Washington State."

"Salmon produced in Europe had significantly higher contaminant levels than those produced in both North and South America"

"Even the least contaminated farmed salmon, from Chile and Washington State, had significantly higher contaminant loads of PCBs, dioxins, and dieldrin than wild salmon."

"Farmed salmon fillets purchased from supermarkets in Frankfurt, Edinburgh, Paris, London, and Oslo were generally the most contaminated, although those purchased in Boston and San Francisco approached these concentrations."

"Those purchased in New Orleans and Denver were the least contaminated of the store-bought samples."

"The concentrations of PCBs, dioxins, toxaphene, and dieldrin in salmon fillets purchased in cities in Europe were significantly higher than in those purchased in cities in North America."

"The large differences between the farmed and wild salmon contaminant concentrations are most likely a function of their diet."

"Farmed salmon are fed a concentrated feed high in fish oils and fish meal, which is obtained primarily from small pelagic fishes."

"The combined concentrations of PCBs, toxaphene, and dieldrin trigger stringent consumption advice for farmed salmon purchased from wholesalers and for store-bought farmed fillets." **[Very Important]**

"This advice is much more restrictive than consumption advice triggered by contaminants in the tissues of wild salmon."

"The most restrictive advice (less than one-half meal of salmon per month), which reflects the highest health risks, was generated for farmed salmon fillets purchased from stores in Frankfurt, Germany, and for farmed salmon from Scotland and the Faroe Islands." **[WOW, "less than one-half meal of salmon per month."]**

"The concentrations of PCBs, toxaphene, and dieldrin trigger EPA consumption advice of no more than 1 meal per month for all samples of farmed salmon."**[wow]**

"A variety of non-cancer health effects have also been associated with exposure to PCBs, toxaphene, dieldrin, and other contaminants found in salmon." Some of these noncancer health effects include adverse neurobehavioral effects, immune effects, and endocrine disruption. All which "occur at lower concentrations than those implicated in cancer." **[Extremely Important]**

"Our data indicate that farmed salmon have significantly higher contaminant burdens than wild salmon and that farmed salmon from Europe are significantly more contaminated than farmed salmon from South and North America."

"Fish that is not contaminated is a healthy food, high in nutrients, such as omega-3 polyunsaturated fatty acids, that are known to have a variety of beneficial human health effects."

"However, this study suggests that consumption of farmed salmon may result in exposure to a variety of persistent bioaccumulative contaminants with the potential for an elevation in attendant health risks."

"Consumption of farmed Atlantic salmon may pose risks that detract from the beneficial effects of fish consumption."

"This study also demonstrates the importance of labeling salmon as farmed and identifying the country of origin."

KEY POINTS FROM DAN MURPHY

- 1) The annual global production of farmed salmon has increased by a factor of 40 during the past two decades.
- 2) Over half the salmon sold globally is farm-raised.
- 3) Salmon are fatty carnivorous fish that bioaccumulate contaminants.
- 4) Due to the concentrations of contaminants, it is advised to consume no more than 1 meal per month for all samples of farmed salmon, and for European farmed salmon it should be less than half of that.
- 5) Other contaminants found in salmon cause non-cancer health effects including adverse neurobehavioral effects, immune system dysfunction, and endocrine disruption. These adverse effects occur at lower concentrations than those implicated in cancer.
- 6) Farmed salmon have significantly higher contaminant burdens than wild salmon and that farmed salmon from Europe are significantly more contaminated than farmed salmon from South and North America.
- 7) Wild salmon is high in omega-3 polyunsaturated fatty acids that have a variety of beneficial human health effects.
- 8) Farmed salmon and wild salmon have equal amounts of mercury levels.