



# FARMED SALMON AND HUMAN HEALTH

In 1999, the World Health Organization raised food safety concerns over fish farming, including salmon,<sup>1</sup> warning that this growing practice posed risks to public health. Artificial coloring, toxic by-products, and cancer-causing contaminants have all been found in factory farmed salmon.

The United States currently imports approximately 200,000 tons of farmed salmon annually,<sup>2</sup> but very little of it is ever tested for diseases or chemical contaminants. Although the U.S. Food and Drug Administration considered testing farmed salmon for antibiotics, pesticides, or possible carcinogens—all of which are used by many overseas salmon farms—those plans are on hold.<sup>3</sup>

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## ARTIFICIAL COLOR

Industrial salmon farms use artificial color to make farmed fish—whose flesh is typically greyish white—appear a more appetizing “salmon” pink. Market research found that consumers “buy with their eyes” and put a premium on color. Since 1982, the use of artificial coloring in farmed salmon has more than tripled.<sup>4</sup> One of the most commonly used dyes, Canthaxanthin, has been linked to human eye defects and retinal damage.

In 2003, the European Commission ordered salmon farmers to sharply reduce the use of Canthaxanthin,<sup>5</sup> and most countries, including the U.S., require labels to identify farmed and dyed salmon as such. Yet, fish are occasionally sold without labels: Safeway, Kroger, and Alberstons were sued in 2003 for failing to identify artificially colored, factory raised salmon.<sup>6</sup>



Farmers use a “SalmoFan” chart to choose the color for their salmon. Artificial dyes, added to the food, can account for up to one-third of total feed costs.

## HARMFUL CHEMICALS

Industrial salmon operations use a number of other chemicals to raise marketable fish. All of these pose known and potential risks to human health. These substances include oxytetracycline, an antibiotic that may lead to antibiotic resistance.<sup>7</sup>

Similar to the controversial use of antibiotics by the poultry and livestock industries, factory salmon farms must prevent fish from infecting one another with diseases. Because of the high prevalence of drugs on salmon farms, unwary consumers may ingest untold amounts of antibiotics.

"Malachite green," a fungicide, was banned internationally in the 1990s, but still illegally used in some salmon hatcheries and for juvenile fish. Scientists have found that exposure to malachite green may raise the risk of cancer, cause genetic mutations, and harm the human reproductive system.<sup>8</sup>

Contaminants like dieldrin, dioxins, toxaphene, and PCBs are often found in food and nutritional supplements manufactured for aquaculture. Because of this, farmed salmon have higher concentrations of toxics than wild salmon.<sup>9</sup>

Although the U.S. EPA recommends eating salmon no more than once or twice a week, a 2004 study by independent researchers found much higher levels of toxic contaminants in farmed salmon than previously thought. These scientists recommended as little as one serving of salmon per month.<sup>10</sup>

### LOWER NUTRITIONAL VALUE IN FARMED SALMON VS WILD

A close reading of supermarket labels shows that some wild salmon, high in "heart-healthy," Omega-3 fatty acids, contain less than 1 percent fat. In contrast, factory farmed fish can be as high as 27 percent fat and contain 15 percent less protein.

Despite efforts by governments and international agencies to limit antibiotics, harmful chemicals, and toxic substances in farmed salmon, the danger persists. Millions of fish—raised in close confinement, eating an unvaried artificial diet, and constantly exposed to their own wastes—mean inevitable exposure to harmful chemicals. These compounds accumulate in the tissues of salmon and are passed on to humans. People who regularly eat farmed salmon face a higher, though still poorly understood, risk of retinal damage, cancer, resistance to antibiotics, and harm to reproductive and other organs.

| FISH 100-GRAM SERVING* | FAT PER SERVING GRAMS | PERCENT TOTAL FAT THAT'S OMEGA-3 | TOTAL CALORIES |
|------------------------|-----------------------|----------------------------------|----------------|
| WILD ATLANTIC SALMON   | 6.34                  | 27%                              | 142            |
| WILD COHO SALMON       | 5.93                  | 22                               | 146            |
| WILD TROUT             | 3.46                  | 20                               | 119            |
| WILD CATFISH           | 2.82                  | 19                               | 95             |
| FARMED TROUT           | 5.40                  | 17                               | 138            |
| FARMED ATLANTIC SALMON | 10.85                 | 17                               | 183            |
| FARMED COHO SALMON     | 7.67                  | 16                               | 160            |
| FARMED CATFISH         | 7.59                  | 5                                | 135            |

\*approximately 3 ounces Data: USDA Nutrient Database

<sup>1</sup> "Food safety associated with products from aquaculture," World Health Organization, Technical Report Series, No 883, 1999, [www.who.int/food-safety/publications/fs\\_management/aquaculture/en/](http://www.who.int/food-safety/publications/fs_management/aquaculture/en/).

<sup>2</sup> National Marine Fisheries Service, Seafood Supply and U.S. Trade, [PowerPoint graph]: "US Imports of Farmed Salmon: 1989-2003," [www.nmfs.noaa.gov/ocs/tradecommercial/documents/ustrade2004f.ppt](http://www.nmfs.noaa.gov/ocs/tradecommercial/documents/ustrade2004f.ppt).

<sup>3</sup> "Seafood: Farmed vs. wild," Consumer Reports, January 2005, [www.consumerreports.org/cro/food/animal-feed-and-the-food-supply-105/seafood-farmed-vs-wild.htm](http://www.consumerreports.org/cro/food/animal-feed-and-the-food-supply-105/seafood-farmed-vs-wild.htm).

<sup>4</sup> "Opinion of the Scientific Committee on Animal Nutrition on the use of Canthaxanthin in feedstuffs for salmon and trout, laying hens and other poultry," European Commission, Health and Consumer Protection Directorate, Brussels, 2002, <http://europa.eu.int/comm/food/fs>.

<sup>5</sup> "Brighter eyesight or brighter salmon?" DG SANCO press release, January 27, 2003, European Commission, [http://europa.eu.int/rapid/start/cgi/guesten.ksh?p\\_action=gettxt&gt&doc=IP/03/123|0|RAPID&lg=EN](http://europa.eu.int/rapid/start/cgi/guesten.ksh?p_action=gettxt&gt&doc=IP/03/123|0|RAPID&lg=EN).

<sup>6</sup> Smith and Lowney, PLLC, "The color salmon lawsuit," [www.smithandlowney.com/salmon/information](http://www.smithandlowney.com/salmon/information).

<sup>7</sup> C. D. Miranda et al., "Diversity of tetracycline resistance genes in bacteria from Chilean salmon farms," *Antimicrobial Agents and Chemotherapy*, 47 (2003), pp. 883-888, <http://aac.asm.org/cgi/content/abstract/47/3/883>.

<sup>8</sup> "What Is Malachite Green?" Food Safety Network, [www.aquacultureassociation.ca/news/Malachite%20green%20Update%20Jul%2006.pdf](http://www.aquacultureassociation.ca/news/Malachite%20green%20Update%20Jul%2006.pdf).

<sup>9</sup> M. J. Mac, "PCBs and DDE in commercial fish feeds," *Progressive Fish Culturist*, 41 (1979), pp. 210-211. See also K. Oetjen and H. Karl, "Levels of toxaphene indicator compounds in fish meal, fish oil and fish feed," *Chemosphere*, 37:1 (1998), pp. 1-11.

<sup>10</sup> Ronald A. Hites, "Global Assessment of Organic Contaminants in Farmed Salmon," *Science*, 303:5655 (2004), pp. 226-229, [www.sciencemag.org/cgi/content/abstract/303/5655/226](http://www.sciencemag.org/cgi/content/abstract/303/5655/226).